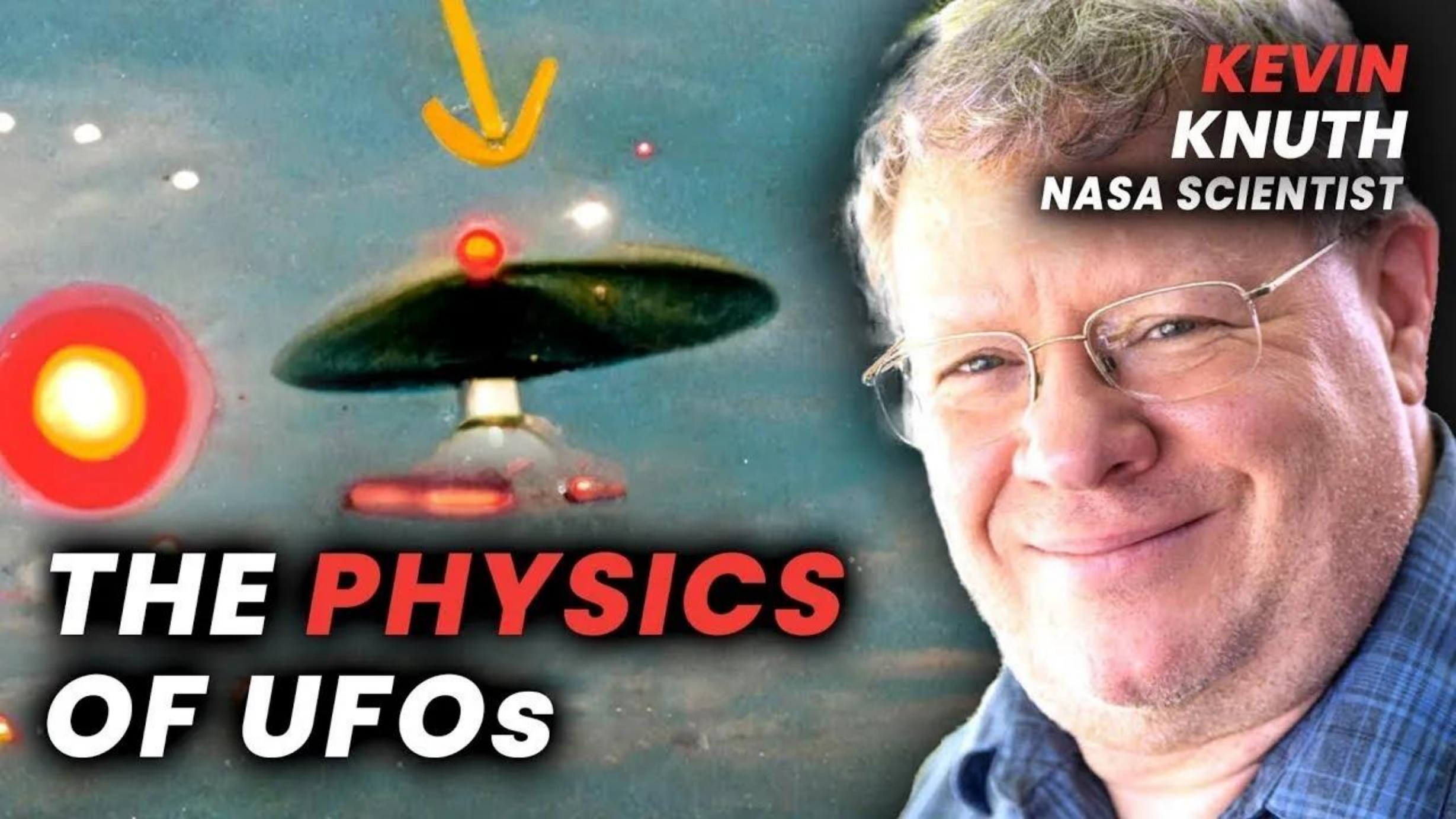
KEVIN
KNUTH
NASA SCIENTIST
THE PHYSICS
OF UFOs

1
00:00:03,030 --> 00:00:01,429
yeah it does feel like office hours

2
00:00:05,510 --> 00:00:03,040
that's what i yeah that's one thing i

3
00:00:06,470 --> 00:00:05,520
enjoy about watching you know watching

4
00:00:08,950 --> 00:00:06,480
your podcast

5
00:00:10,629 --> 00:00:08,960
it's great fun and it's it's informative

6
00:00:11,030 --> 00:00:10,639
for that reason you go into some depth

7
00:00:12,870 --> 00:00:11,040
and

8
00:00:15,669 --> 00:00:12,880
makes it really interesting i just feel

9
00:00:15,679 --> 00:00:20,630
it's exam little stressful

10
00:00:24,630 --> 00:00:22,310
i just finished up an interview with

11
00:00:27,750 --> 00:00:24,640
kevin knuth kevin knuth is a physicist

12
00:00:33,670 --> 00:00:27,760
at the university of albany someone who

13
00:00:37,510 --> 00:00:35,590

he's one of the rare individuals

14
00:00:40,229 --> 00:00:37,520
interested in the phenomenon

15
00:00:41,590 --> 00:00:40,239
of ufos aliens uaps whatever you would

16
00:00:43,750 --> 00:00:41,600
like to call them

17
00:00:45,190 --> 00:00:43,760
and he's a respectable physicist more

18
00:00:48,630 --> 00:00:45,200
than respectable in fact

19
00:00:52,069 --> 00:00:48,640
i didn't realize how excellent

20
00:00:54,709 --> 00:00:52,079
creative originative he is until

21
00:00:55,990 --> 00:00:54,719
i started researching about him after i

22
00:00:57,910 --> 00:00:56,000
had already booked the interview

23
00:00:59,910 --> 00:00:57,920
and then i found out that not only is he

24
00:01:01,670 --> 00:00:59,920
interested in aliens which is

25
00:01:03,270 --> 00:01:01,680
it's not a goal of this channel at all

26
00:01:04,149 --> 00:01:03,280
i'm more interested in the physics of

27
00:01:05,189 --> 00:01:04,159
aliens and

28
00:01:06,789 --> 00:01:05,199
what they have to say about

29
00:01:07,429 --> 00:01:06,799
consciousness as well as our role in the

30
00:01:09,910 --> 00:01:07,439
universe

31
00:01:10,469 --> 00:01:09,920
not only is he interested in that but

32
00:01:13,750 --> 00:01:10,479
he's done

33
00:01:15,749 --> 00:01:13,760
significant research into the

34
00:01:17,429 --> 00:01:15,759
fundamental laws of physics with him and

35
00:01:19,590 --> 00:01:17,439
his colleagues conceiving of

36
00:01:21,190 --> 00:01:19,600
a theory called influence theory we'll

37
00:01:21,990 --> 00:01:21,200
get into that the conversation is pretty

38
00:01:23,830 --> 00:01:22,000

much two parts

39
00:01:25,910 --> 00:01:23,840
aliens and then fundamental physics i

40
00:01:27,990 --> 00:01:25,920
didn't expect to get along with kevin

41
00:01:31,109 --> 00:01:28,000
anywhere near as much as i did

42
00:01:32,789 --> 00:01:31,119
he probably to me was

43
00:01:35,190 --> 00:01:32,799
one of the guests i felt the most

44
00:01:36,870 --> 00:01:35,200
relaxed with for whatever reason

45
00:01:38,630 --> 00:01:36,880
maybe our personalities drive at some

46
00:01:40,469 --> 00:01:38,640
unconscious level i don't know what it

47
00:01:41,350 --> 00:01:40,479
is but hopefully you enjoy listening to

48
00:01:43,510 --> 00:01:41,360
the conversation

49
00:01:45,270 --> 00:01:43,520
as much as i had having it please if

50
00:01:46,469 --> 00:01:45,280
you're interested in seeing or listening

51
00:01:49,950 --> 00:01:46,479
to more conversations

52
00:01:51,670 --> 00:01:49,960
like this then consider donating at

53
00:01:53,749 --> 00:01:51,680
patreon.com

54
00:01:55,190 --> 00:01:53,759
literally every one of those donations

55
00:02:01,990 --> 00:01:55,200
helps

56
00:02:06,230 --> 00:02:05,350
thank you and enjoy i watched several

57
00:02:09,430 --> 00:02:06,240
interviews

58
00:02:12,309 --> 00:02:09,440
over the last few months since we first

59
00:02:14,070 --> 00:02:12,319
um connected when was it early i guess

60
00:02:15,350 --> 00:02:14,080
late fall or something

61
00:02:17,830 --> 00:02:15,360
so i've watched several interviews

62
00:02:21,350 --> 00:02:17,840
they're always they're really engaging

63
00:02:23,030 --> 00:02:21,360

and interesting and and i

64
00:02:27,190 --> 00:02:23,040
and i feel jealous you get to talk to

65
00:02:30,710 --> 00:02:29,030
two hours of just one-on-one which is

66
00:02:32,070 --> 00:02:30,720
quite nice right that's hard to hard to

67
00:02:34,070 --> 00:02:32,080
get

68
00:02:35,589 --> 00:02:34,080
which one did you like the most if you

69
00:02:39,750 --> 00:02:35,599
don't mind me asking

70
00:02:40,869 --> 00:02:39,760
yeah um no that's a good question um

71
00:02:42,390 --> 00:02:40,879
i'm pleased i don't mean to put you on

72
00:02:43,350 --> 00:02:42,400
the spot if you're actually if you're

73
00:02:44,869 --> 00:02:43,360
being

74
00:02:47,190 --> 00:02:44,879
overly polite and saying that you watch

75
00:02:50,150 --> 00:02:47,200
that i don't know what no i'm trying to

76
00:02:51,350 --> 00:02:50,160
i'm trying to i enjoyed eric weinstein's

77
00:02:54,869 --> 00:02:51,360
that was

78
00:02:56,550 --> 00:02:54,879
he was a lot of fun to watch um

79
00:02:58,149 --> 00:02:56,560
he was quite dynamic i've been super

80
00:02:59,990 --> 00:02:58,159
excited to talk to you when i first

81
00:03:02,149 --> 00:03:00,000
contacted you it was because

82
00:03:03,670 --> 00:03:02,159
you had a paper still do paper out on

83
00:03:05,190 --> 00:03:03,680
uaps i believe they're called which is

84
00:03:06,550 --> 00:03:05,200
the ufos essentially for those who are

85
00:03:08,630 --> 00:03:06,560
listening

86
00:03:11,030 --> 00:03:08,640
analyzing them and you're a physics

87
00:03:14,630 --> 00:03:11,040
professor so you're not some

88
00:03:16,710 --> 00:03:14,640

let's say loon from the periphery

89
00:03:18,390 --> 00:03:16,720
and i thought okay that's interesting

90
00:03:19,990 --> 00:03:18,400
because very few academics actually

91
00:03:21,430 --> 00:03:20,000
pursue this

92
00:03:23,589 --> 00:03:21,440
and i assume you're tenured so very few

93
00:03:26,630 --> 00:03:23,599
tenured people let alone non-tenured

94
00:03:27,589 --> 00:03:26,640
pursue this and then i realized you had

95
00:03:29,110 --> 00:03:27,599
some papers

96
00:03:30,550 --> 00:03:29,120
but this is a channel on theories of

97
00:03:31,830 --> 00:03:30,560
everything which means we explore the

98
00:03:33,430 --> 00:03:31,840
foundations of mathematics the

99
00:03:34,630 --> 00:03:33,440
foundations of physics you have many

100
00:03:35,910 --> 00:03:34,640
paper you've been thinking about this

101
00:03:37,430 --> 00:03:35,920
for quite some time so you turned out to

102
00:03:40,229 --> 00:03:37,440
be far more interesting than

103
00:03:41,750 --> 00:03:40,239
i had initially thought and that's not a

104
00:03:42,229 --> 00:03:41,760
slight that's actually a huge compliment

105
00:03:44,470 --> 00:03:42,239
because

106
00:03:46,789 --> 00:03:44,480
i see that you're able to derive spin

107
00:03:48,229 --> 00:03:46,799
and probability and space time

108
00:03:49,670 --> 00:03:48,239
when i say probability i mean the way

109
00:03:50,390 --> 00:03:49,680
that it's used in quantum mechanics and

110
00:03:52,789 --> 00:03:50,400
momentum

111
00:03:54,550 --> 00:03:52,799
from relatively simple ingredients i was

112
00:03:56,149 --> 00:03:54,560
just reading about that recently

113
00:03:58,390 --> 00:03:56,159

that is fun we're going to talk about

114
00:04:00,390 --> 00:03:58,400
that later if you don't mind

115
00:04:02,949 --> 00:04:00,400
no that sounds that's great one of my

116
00:04:05,030 --> 00:04:02,959
favorite topics so

117
00:04:06,550 --> 00:04:05,040
thank you for coming on well thank you

118
00:04:09,270 --> 00:04:06,560
for having me i i'm

119
00:04:10,630 --> 00:04:09,280
really looking forward to this for those

120
00:04:12,710 --> 00:04:10,640
listening or watching there's going to

121
00:04:14,710 --> 00:04:12,720
be an exordium on aliens first

122
00:04:15,910 --> 00:04:14,720
if you're mainly interested in the

123
00:04:18,710 --> 00:04:15,920
foundations of physics

124
00:04:20,069 --> 00:04:18,720
then look at the timestamps and view or

125
00:04:23,189 --> 00:04:20,079
listen to accordingly

126
00:04:25,030 --> 00:04:23,199
we're going to talk about aliens

127
00:04:29,749 --> 00:04:25,040
why don't you tell us about the benthum

128
00:04:32,950 --> 00:04:29,759
encounter from 1951

129
00:04:36,310 --> 00:04:32,960
uh right so that that encounter

130
00:04:39,510 --> 00:04:36,320
happened um in 1951.

131
00:04:44,230 --> 00:04:39,520
um graham bethune was um

132
00:04:47,749 --> 00:04:44,240
he was a navy pilot they were

133
00:04:54,070 --> 00:04:50,950
iceland to reykjavik to

134
00:04:56,230 --> 00:04:54,080
because the the in

135
00:04:57,350 --> 00:04:56,240
iceland they were having problems with a

136
00:05:00,310 --> 00:04:57,360
ufo

137
00:05:01,350 --> 00:05:00,320
operating in the area and um i think it

138
00:05:02,870 --> 00:05:01,360

was operating in a

139
00:05:04,469 --> 00:05:02,880
maybe near an airport or somewhere

140
00:05:06,550 --> 00:05:04,479
sensitive i don't recall exactly what

141
00:05:08,469 --> 00:05:06,560
the difficulty was

142
00:05:10,469 --> 00:05:08,479
and they were summoned there to

143
00:05:11,270 --> 00:05:10,479
basically check this out and help them

144
00:05:14,790 --> 00:05:11,280
out with this

145
00:05:17,029 --> 00:05:14,800
problem um they got there no

146
00:05:19,189 --> 00:05:17,039
no didn't see anything the thing with us

147
00:05:20,950 --> 00:05:19,199
the thing was gone by that time

148
00:05:22,469 --> 00:05:20,960
and they were heading back across the

149
00:05:25,749 --> 00:05:22,479
atlantic from iceland

150
00:05:31,510 --> 00:05:25,759
um toward newfoundland and

151
00:05:34,550 --> 00:05:33,990
they saw lights on the surface of the

152
00:05:37,270 --> 00:05:34,560
water

153
00:05:38,710 --> 00:05:37,280
on the ocean below and it looked like

154
00:05:39,270 --> 00:05:38,720
city lights and at first they thought

155
00:05:44,310 --> 00:05:39,280
they were

156
00:05:45,590 --> 00:05:44,320
and so they double checked their course

157
00:05:47,029 --> 00:05:45,600
and realized no they're on course and

158
00:05:49,029 --> 00:05:47,039
they thought well there must be ships

159
00:05:50,629 --> 00:05:49,039
maybe naval ships operating in the area

160
00:05:54,870 --> 00:05:50,639
or something and

161
00:05:57,430 --> 00:05:54,880
and um and as they got closer the

162
00:05:59,029 --> 00:05:57,440
um these lights were basically was a

163
00:06:02,710 --> 00:05:59,039

disc shaped light

164
00:06:04,150 --> 00:06:02,720
um a ring i guess and it appeared to be

165
00:06:06,790 --> 00:06:04,160
under the water

166
00:06:08,710 --> 00:06:06,800
and as they approach this thing this

167
00:06:10,230 --> 00:06:08,720
thing shot up from the sea surface to

168
00:06:12,390 --> 00:06:10,240
their altitude

169
00:06:15,189 --> 00:06:12,400
in a very short period of time like a

170
00:06:19,110 --> 00:06:15,199
matter of a second or two

171
00:06:25,830 --> 00:06:23,110
and this it was basically a large

172
00:06:26,309 --> 00:06:25,840
um large disc i think he described it as

173
00:06:29,590 --> 00:06:26,319
being

174
00:06:32,870 --> 00:06:29,600
uh 300 feet across i probably

175
00:06:35,189 --> 00:06:32,880
i needed i actually printed out my

176
00:06:36,070 --> 00:06:35,199
paper here too and when you felt some of

177
00:06:39,430 --> 00:06:36,080
these details

178
00:06:41,430 --> 00:06:39,440
there's a lot of cases and um yeah so it

179
00:06:43,590 --> 00:06:41,440
was several hundred feet across

180
00:06:45,510 --> 00:06:43,600
um the disc was slightly below their

181
00:06:47,510 --> 00:06:45,520
altitude so they could actually see this

182
00:06:50,790 --> 00:06:47,520
disc it had

183
00:06:54,150 --> 00:06:50,800
like glowing around the periphery and as

184
00:06:56,629 --> 00:06:54,160
the object moved um the

185
00:06:57,670 --> 00:06:56,639
the color of the light would change so

186
00:06:59,270 --> 00:06:57,680
um

187
00:07:01,189 --> 00:06:59,280
and i think it's been described as

188
00:07:03,029 --> 00:07:01,199

looking like a plasma

189
00:07:05,189 --> 00:07:03,039
so this object basically was with them

190
00:07:06,550 --> 00:07:05,199
for several for several minutes they

191
00:07:10,469 --> 00:07:06,560
basically steered

192
00:07:12,230 --> 00:07:10,479
um the one of the one one person wanted

193
00:07:13,270 --> 00:07:12,240
to steer toward it so they steered

194
00:07:16,710 --> 00:07:13,280
toward it

195
00:07:18,390 --> 00:07:16,720
and um and eventually the thing took off

196
00:07:19,830 --> 00:07:18,400
but it was seen by pretty much everybody

197
00:07:21,510 --> 00:07:19,840
on on board um

198
00:07:23,670 --> 00:07:21,520
i think there were like on the order of

199
00:07:26,550 --> 00:07:23,680
20 people or so on board

200
00:07:28,469 --> 00:07:26,560
who witnessed this thing so this thing

201
00:07:29,589 --> 00:07:28,479
then took off and they estimated its

202
00:07:32,150 --> 00:07:29,599
speed

203
00:07:33,029 --> 00:07:32,160
as it left to be about 1500 miles an

204
00:07:34,950 --> 00:07:33,039
hour

205
00:07:36,309 --> 00:07:34,960
which is about what was picked up on

206
00:07:37,749 --> 00:07:36,319
radar they were close enough to

207
00:07:39,749 --> 00:07:37,759
newfoundland that

208
00:07:42,790 --> 00:07:39,759
they were able to detect this on radar

209
00:07:44,869 --> 00:07:42,800
and they confirmed that later

210
00:07:46,150 --> 00:07:44,879
when they say that it changed colors of

211
00:07:49,749 --> 00:07:46,160
the lights as it moved

212
00:07:51,029 --> 00:07:49,759
yeah is that akin to the doppler effect

213
00:07:52,869 --> 00:07:51,039

or is that something different

214
00:07:55,589 --> 00:07:52,879
it's something different i think because

215
00:07:58,790 --> 00:07:55,599
it was it would go from like a violet

216
00:08:00,710 --> 00:07:58,800
a red violet to a yellow and basically

217
00:08:03,749 --> 00:08:00,720
within those ranges

218
00:08:04,150 --> 00:08:03,759
and and i don't remember which way it

219
00:08:05,749 --> 00:08:04,160
went

220
00:08:07,510 --> 00:08:05,759
when it was when it was moving it was

221
00:08:10,150 --> 00:08:07,520
yellow and it was stationary it was red

222
00:08:12,150 --> 00:08:10,160
i think that's basically how it was

223
00:08:13,589 --> 00:08:12,160
that that detail i might not recall

224
00:08:15,029 --> 00:08:13,599
properly

225
00:08:17,350 --> 00:08:15,039
what do you attribute as the cause of

226
00:08:20,150 --> 00:08:17,360
that or the reason for that

227
00:08:21,830 --> 00:08:20,160
i don't know i i mean it's hard to

228
00:08:26,869 --> 00:08:21,840
figure out

229
00:08:29,830 --> 00:08:26,879
you know i try to treat these

230
00:08:31,110 --> 00:08:29,840
observations as evidence right we're

231
00:08:32,709 --> 00:08:31,120
basically

232
00:08:34,949 --> 00:08:32,719
trying to do some kind of physics

233
00:08:37,750 --> 00:08:34,959
detective work to try to figure out

234
00:08:39,269 --> 00:08:37,760
what is this thing how is it operating

235
00:08:41,509 --> 00:08:39,279
how does it fly you know these are all

236
00:08:42,870 --> 00:08:41,519
the questions how does it move so fast

237
00:08:45,110 --> 00:08:42,880
these are the questions that come to me

238
00:08:47,829 --> 00:08:45,120

as a physicist and

239
00:08:49,030 --> 00:08:47,839
um a lot of times these the light

240
00:08:52,070 --> 00:08:49,040
emitted by these things

241
00:08:53,829 --> 00:08:52,080
appears to be a plasma so um

242
00:08:55,829 --> 00:08:53,839
it could be that you're basically the

243
00:08:56,710 --> 00:08:55,839
object is ionizing the air around the

244
00:08:58,710 --> 00:08:56,720
craft

245
00:08:59,829 --> 00:08:58,720
and that's what emitting the light and

246
00:09:02,150 --> 00:08:59,839
then as the

247
00:09:04,310 --> 00:09:02,160
object moves you basically maybe it's

248
00:09:07,590 --> 00:09:04,320
changing the electric fields

249
00:09:08,870 --> 00:09:07,600
around the object and and then changing

250
00:09:13,350 --> 00:09:08,880
the

251
00:09:17,910 --> 00:09:16,870
okay professor how did you get

252
00:09:20,150 --> 00:09:17,920
interested

253
00:09:20,949 --> 00:09:20,160
in this subject you're not a fool you're

254
00:09:24,230 --> 00:09:20,959
not just

255
00:09:25,750 --> 00:09:24,240
some loon you're not some what someone

256
00:09:26,790 --> 00:09:25,760
would think of as the stereotypical

257
00:09:29,990 --> 00:09:26,800
person who studies

258
00:09:32,150 --> 00:09:30,000
alien encounters or professes that

259
00:09:33,990 --> 00:09:32,160
aliens exist or ufos or whatever it may

260
00:09:37,110 --> 00:09:34,000
be

261
00:09:39,350 --> 00:09:37,120
how did you get into what what started

262
00:09:42,389 --> 00:09:39,360
you off on this journey

263
00:09:45,269 --> 00:09:42,399

i'm a physicist so i'm curious um

264
00:09:47,190 --> 00:09:45,279
and i'm often surprised at how uncurious

265
00:09:50,070 --> 00:09:47,200
some of my colleagues are

266
00:09:51,990 --> 00:09:50,080
but the yeah so i'm curious about these

267
00:09:56,550 --> 00:09:52,000
things and i've always been curious

268
00:10:00,070 --> 00:09:56,560
and when i went to graduate school

269
00:10:02,870 --> 00:10:00,080
it would have been the fall of 1988

270
00:10:04,630 --> 00:10:02,880
it was probably about our second first

271
00:10:06,550 --> 00:10:04,640
or second week in graduate school so it

272
00:10:09,590 --> 00:10:06,560
was in september of 88

273
00:10:13,110 --> 00:10:09,600
there was a cattle mutilation

274
00:10:15,430 --> 00:10:13,120
i was at bozeman montana and

275
00:10:16,470 --> 00:10:15,440
the there was a cattle mutilation and

276
00:10:18,150 --> 00:10:16,480
i'd never heard of

277
00:10:20,310 --> 00:10:18,160
anything like a cattle mutilation i grew

278
00:10:21,910 --> 00:10:20,320
up in wisconsin and we have cows in

279
00:10:25,190 --> 00:10:21,920
wisconsin and i've

280
00:10:27,350 --> 00:10:25,200
heard of cow tipping but who's going to

281
00:10:30,470 --> 00:10:27,360
mutilate a cow that's horrible

282
00:10:33,509 --> 00:10:30,480
so i had i was

283
00:10:37,030 --> 00:10:33,519
pretty shocked by this and

284
00:10:38,870 --> 00:10:37,040
there were a lot of people um

285
00:10:40,069 --> 00:10:38,880
concerned about this on the news they

286
00:10:43,910 --> 00:10:40,079
didn't know whether it was

287
00:10:45,750 --> 00:10:43,920
alien or if um if there were satanists

288
00:10:47,590 --> 00:10:45,760

involved and there were lots of theories

289
00:10:49,030 --> 00:10:47,600
floating around so we were discussing

290
00:10:52,470 --> 00:10:49,040
this in the

291
00:10:54,230 --> 00:10:52,480
hallway then

292
00:10:56,550 --> 00:10:54,240
the new graduate students the ones who

293
00:10:58,069 --> 00:10:56,560
basically moved moved to montana

294
00:11:01,269 --> 00:10:58,079
and had never heard of this before were

295
00:11:03,110 --> 00:11:01,279
discussing this and um

296
00:11:04,470 --> 00:11:03,120
and it was a very heated discussion very

297
00:11:05,990 --> 00:11:04,480
passionate and

298
00:11:08,150 --> 00:11:06,000
everybody is upset and worried and

299
00:11:09,990 --> 00:11:08,160
wondering what the heck is going on

300
00:11:11,910 --> 00:11:10,000
what kind of crazy place did we just

301
00:11:13,590 --> 00:11:11,920
move to um and are going to have to

302
00:11:17,190 --> 00:11:13,600
spend four or five years here

303
00:11:18,870 --> 00:11:17,200
so um so this was really our concern

304
00:11:21,269 --> 00:11:18,880
and while we were talking one of the

305
00:11:23,910 --> 00:11:21,279
professors came out of his office

306
00:11:24,389 --> 00:11:23,920
and um came down the hall to see what

307
00:11:26,069 --> 00:11:24,399
was

308
00:11:28,550 --> 00:11:26,079
you know we were so excited about and we

309
00:11:30,150 --> 00:11:28,560
told him what we were discussing and he

310
00:11:32,710 --> 00:11:30,160
said yeah that's

311
00:11:33,670 --> 00:11:32,720
that's interesting he said it's this

312
00:11:35,910 --> 00:11:33,680
happens here

313
00:11:37,030 --> 00:11:35,920

we don't really know they never figure

314
00:11:40,949 --> 00:11:37,040
out

315
00:11:44,550 --> 00:11:40,959
how the cows were mutilated and why and

316
00:11:46,550 --> 00:11:44,560
there's very often ufos seen in the area

317
00:11:48,470 --> 00:11:46,560
around the time so it's so it's

318
00:11:49,110 --> 00:11:48,480
interesting but it's never figured out

319
00:11:54,150 --> 00:11:49,120
and

320
00:11:56,310 --> 00:11:54,160
you know we i don't i don't think that

321
00:11:58,870 --> 00:11:56,320
helped calm us at all

322
00:11:59,750 --> 00:11:58,880
and he then said but what's very strange

323
00:12:02,389 --> 00:11:59,760
what's even more

324
00:12:04,870 --> 00:12:02,399
interesting he said i have a number of

325
00:12:07,430 --> 00:12:04,880
friends in the air force

326
00:12:08,069 --> 00:12:07,440
up at malmstrom air force base and they

327
00:12:10,230 --> 00:12:08,079
have

328
00:12:11,110 --> 00:12:10,240
trouble with ufos flying over the

329
00:12:14,230 --> 00:12:11,120
missile sites

330
00:12:17,350 --> 00:12:14,240
shutting down our ice cbms

331
00:12:17,990 --> 00:12:17,360
and this was in 1988 this is 1988 i was

332
00:12:19,829 --> 00:12:18,000
told this

333
00:12:21,430 --> 00:12:19,839
by a professor at montana state

334
00:12:24,790 --> 00:12:21,440
university

335
00:12:26,389 --> 00:12:24,800
and now now i've never heard this before

336
00:12:29,430 --> 00:12:26,399
in fact i didn't hear about this

337
00:12:32,150 --> 00:12:29,440
publicly until i think around 2010 when

338
00:12:34,550 --> 00:12:32,160

robert hastings had a press conference

339
00:12:37,110 --> 00:12:34,560
um with people from the air force from

340
00:12:40,310 --> 00:12:37,120
malmstrom air force base

341
00:12:42,470 --> 00:12:40,320
and so to be honest we when the

342
00:12:44,389 --> 00:12:42,480
professor walked away we

343
00:12:47,030 --> 00:12:44,399
we laughed about it i mean you know

344
00:12:47,829 --> 00:12:47,040
there's ufos shutting down nuclear

345
00:12:50,710 --> 00:12:47,839
missiles

346
00:12:51,190 --> 00:12:50,720
and he was a professor of what what was

347
00:12:53,670 --> 00:12:51,200
his

348
00:12:55,190 --> 00:12:53,680
physics he was a physics professor what

349
00:12:57,350 --> 00:12:55,200
particular field of physics

350
00:12:58,870 --> 00:12:57,360
i don't remember who it was because it

351
00:13:01,190 --> 00:12:58,880
was my first week there and i didn't

352
00:13:03,269 --> 00:13:01,200
know all the professors

353
00:13:04,790 --> 00:13:03,279
i have i have a guess who it could be

354
00:13:07,110 --> 00:13:04,800
but i don't but i

355
00:13:08,310 --> 00:13:07,120
don't want to say because yes i don't

356
00:13:09,750 --> 00:13:08,320
know for sure

357
00:13:12,069 --> 00:13:09,760
yeah have you ever tried to reach out to

358
00:13:15,670 --> 00:13:12,079
that person afterward um

359
00:13:16,949 --> 00:13:15,680
no i haven't um it's unfortunately i'm

360
00:13:19,110 --> 00:13:16,959
at that age where

361
00:13:20,389 --> 00:13:19,120
a lot of my professors are have passed

362
00:13:22,389 --> 00:13:20,399
away so

363
00:13:23,670 --> 00:13:22,399

so i didn't try reaching out i probably

364
00:13:24,550 --> 00:13:23,680
that probably would be a good idea

365
00:13:26,470 --> 00:13:24,560
though

366
00:13:27,670 --> 00:13:26,480
okay continue that's a good suggestion

367
00:13:30,710 --> 00:13:27,680
thank you

368
00:13:35,590 --> 00:13:30,720
um yeah so

369
00:13:37,910 --> 00:13:35,600
we um so we laughed about it and then

370
00:13:38,949 --> 00:13:37,920
it was kind of a running gag through the

371
00:13:41,110 --> 00:13:38,959
whole semester

372
00:13:42,870 --> 00:13:41,120
you know and then oh and you know there

373
00:13:43,910 --> 00:13:42,880
are ufos shutting down our nuclear

374
00:13:45,590 --> 00:13:43,920
missiles

375
00:13:47,350 --> 00:13:45,600
and you know we would always giggle

376
00:13:49,910 --> 00:13:47,360
about that

377
00:13:51,750 --> 00:13:49,920
but it really just seemed unthinkable

378
00:13:55,030 --> 00:13:51,760
because

379
00:13:57,269 --> 00:13:55,040
our our militaries are restricted

380
00:13:59,110 --> 00:13:57,279
these are restricted areas if we have

381
00:14:00,710 --> 00:13:59,120
somebody coming in shutting down our

382
00:14:03,269 --> 00:14:00,720
nuclear missiles

383
00:14:03,829 --> 00:14:03,279
our military if a foreign nation did

384
00:14:05,990 --> 00:14:03,839
this

385
00:14:07,829 --> 00:14:06,000
we would go to war over it and probably

386
00:14:08,949 --> 00:14:07,839
nuclear war because the nuclear missiles

387
00:14:11,750 --> 00:14:08,959
are involved

388
00:14:13,509 --> 00:14:11,760

and so so it's unthinkable that we

389
00:14:15,590 --> 00:14:13,519
wouldn't do anything and so it was

390
00:14:18,870 --> 00:14:15,600
really hard to believe

391
00:14:20,389 --> 00:14:18,880
and it just

392
00:14:22,470 --> 00:14:20,399
you know i just remember the event it

393
00:14:23,030 --> 00:14:22,480
was just something somebody said once

394
00:14:30,230 --> 00:14:23,040
and

395
00:14:30,949 --> 00:14:30,240
maybe 2015 or so that i was preparing

396
00:14:33,670 --> 00:14:30,959
for

397
00:14:35,590 --> 00:14:33,680
an astronomy class and i had we were

398
00:14:37,829 --> 00:14:35,600
going to talk about astrobiology and i

399
00:14:40,629 --> 00:14:37,839
had some students asking me about

400
00:14:41,110 --> 00:14:40,639
the possibilities of aliens visiting

401
00:14:44,150 --> 00:14:41,120
earth

402
00:14:47,910 --> 00:14:44,160
and and wanted me to talk about that

403
00:14:50,710 --> 00:14:47,920
so i was online looking for

404
00:14:51,829 --> 00:14:50,720
papers anything that i could you know

405
00:14:53,829 --> 00:14:51,839
could use to put out

406
00:14:55,110 --> 00:14:53,839
together a reasonable lecture on the

407
00:15:00,069 --> 00:14:55,120
topic

408
00:15:03,189 --> 00:15:00,079
and i stumbled on the um robert hastings

409
00:15:06,310 --> 00:15:03,199
press conference and

410
00:15:08,790 --> 00:15:06,320
where he had i think six people

411
00:15:09,670 --> 00:15:08,800
um all working and at nuclear missile

412
00:15:10,790 --> 00:15:09,680
sites

413
00:15:13,350 --> 00:15:10,800

i think three of them were from

414
00:15:15,509 --> 00:15:13,360
malmstrom air force base and

415
00:15:17,189 --> 00:15:15,519
and i started watching this and i was

416
00:15:19,990 --> 00:15:17,199
just watching with disbelief

417
00:15:21,430 --> 00:15:20,000
thinking oh my god i heard about this in

418
00:15:22,949 --> 00:15:21,440
1988

419
00:15:24,870 --> 00:15:22,959
and the professor who told me then said

420
00:15:27,910 --> 00:15:24,880
it was going on then it was

421
00:15:28,790 --> 00:15:27,920
in the present happening in 1988 and

422
00:15:31,670 --> 00:15:28,800
these people

423
00:15:32,870 --> 00:15:31,680
in the press conference um robert salas

424
00:15:35,670 --> 00:15:32,880
salus was one of the

425
00:15:38,629 --> 00:15:35,680
prominent people um he was talking about

426
00:15:40,230 --> 00:15:38,639
an event in 1966

427
00:15:42,870 --> 00:15:40,240
and i thought well wait a minute you

428
00:15:45,509 --> 00:15:42,880
can't have

429
00:15:48,069 --> 00:15:45,519
a crazy story like this if somebody's

430
00:15:50,069 --> 00:15:48,079
making this up in 1966 it's not going to

431
00:15:50,870 --> 00:15:50,079
persist until 1988 these are

432
00:15:54,550 --> 00:15:50,880
professionals

433
00:15:55,910 --> 00:15:54,560
have to have you know clearance and

434
00:15:59,829 --> 00:15:55,920
specialized training and

435
00:16:01,910 --> 00:15:59,839
and and these are secure areas they

436
00:16:03,670 --> 00:16:01,920
they're not they're not nut cases and

437
00:16:04,389 --> 00:16:03,680
they're not going to joke about things

438
00:16:08,790 --> 00:16:04,399

like this

439
00:16:11,110 --> 00:16:08,800
and certainly not for 20 years and

440
00:16:13,509 --> 00:16:11,120
and i thought there has to be something

441
00:16:15,910 --> 00:16:13,519
to this something must be going on and

442
00:16:16,550 --> 00:16:15,920
and i thought this really has to be real

443
00:16:20,069 --> 00:16:16,560
i can't

444
00:16:22,150 --> 00:16:20,079
see any other way around it um

445
00:16:23,990 --> 00:16:22,160
and i can imagine and at that point i

446
00:16:26,550 --> 00:16:24,000
could imagine that

447
00:16:27,670 --> 00:16:26,560
we don't do anything because the

448
00:16:29,269 --> 00:16:27,680
assumption is that

449
00:16:31,509 --> 00:16:29,279
it can't be real so let's not do

450
00:16:34,629 --> 00:16:31,519
anything and

451
00:16:37,189 --> 00:16:34,639
and and i think that's why

452
00:16:40,389 --> 00:16:37,199
there's been a lot of inaction and lack

453
00:16:43,430 --> 00:16:41,749
i'm gonna share my screen and then

454
00:16:44,470 --> 00:16:43,440
you're gonna if you don't mind please

455
00:16:47,749 --> 00:16:44,480
tell me

456
00:16:55,350 --> 00:16:51,990
okay with this all right

457
00:16:55,910 --> 00:16:55,360
so basically what i'm basically doing

458
00:17:00,949 --> 00:16:55,920
here

459
00:17:07,990 --> 00:17:04,710
let's see so they were estimating

460
00:17:09,669 --> 00:17:08,000
they they so grandpa then this is

461
00:17:11,510 --> 00:17:09,679
said that it cooks yeah this is from

462
00:17:15,270 --> 00:17:11,520
1951 this is right now

463
00:17:17,909 --> 00:17:15,280

from japan or nimitz right

464
00:17:18,870 --> 00:17:17,919
so so here the penalty i work from

465
00:17:22,789 --> 00:17:18,880
penalty because

466
00:17:26,230 --> 00:17:22,799
so they were they estimated the

467
00:17:27,590 --> 00:17:26,240
um the distance to be about five to

468
00:17:30,310 --> 00:17:27,600
seven miles away

469
00:17:30,870 --> 00:17:30,320
so he wasn't exactly sure how far away

470
00:17:34,150 --> 00:17:30,880
it was

471
00:17:37,909 --> 00:17:34,160
and so what i bet did basically is i

472
00:17:40,150 --> 00:17:37,919
i used a um

473
00:17:41,909 --> 00:17:40,160
basically he's estimating this looking

474
00:17:42,150 --> 00:17:41,919
out from the plane he's looking down at

475
00:17:50,150 --> 00:17:42,160
an

476
00:17:52,230 --> 00:17:50,160
uncertainty so he's going to be off by

477
00:17:54,470 --> 00:17:52,240
i think i say what it is in the in the

478
00:17:55,830 --> 00:17:54,480
paper he's off you know potentially off

479
00:17:59,669 --> 00:17:55,840
by so many degrees

480
00:18:02,230 --> 00:17:59,679
so so what i did is i did a monty

481
00:18:03,669 --> 00:18:02,240
monte carlo sampling where i basically

482
00:18:06,230 --> 00:18:03,679
randomly sampled

483
00:18:07,510 --> 00:18:06,240
um angles with a gaussian distribution

484
00:18:09,510 --> 00:18:07,520
about the angle that

485
00:18:11,029 --> 00:18:09,520
you know he would have been looking or

486
00:18:13,830 --> 00:18:11,039
thought that he was looking

487
00:18:15,510 --> 00:18:13,840
and um and that gives you a distribution

488
00:18:18,150 --> 00:18:15,520

of distances

489
00:18:18,870 --> 00:18:18,160
so i'm basically doing a monte carlo

490
00:18:23,830 --> 00:18:18,880
sampling

491
00:18:26,470 --> 00:18:23,840
to um take into account potential errors

492
00:18:26,950 --> 00:18:26,480
my question the question i've always

493
00:18:30,230 --> 00:18:26,960
asked

494
00:18:31,909 --> 00:18:30,240
when you know when pilots are confronted

495
00:18:33,350 --> 00:18:31,919
with these stories is mike

496
00:18:35,909 --> 00:18:33,360
the question that comes to my mind is

497
00:18:38,549 --> 00:18:35,919
how how wrong could they be

498
00:18:39,909 --> 00:18:38,559
um these are trained individuals um

499
00:18:40,789 --> 00:18:39,919
millions of dollars go into their

500
00:18:42,950 --> 00:18:40,799
training

501
00:18:44,070 --> 00:18:42,960
which doesn't mean they're perfect um

502
00:18:45,909 --> 00:18:44,080
but but then

503
00:18:47,270 --> 00:18:45,919
then that begs the question how

504
00:18:49,270 --> 00:18:47,280
imperfect are they how

505
00:18:51,510 --> 00:18:49,280
how wrong could they be about you know

506
00:18:54,789 --> 00:18:51,520
some of these facts

507
00:18:56,789 --> 00:18:54,799
and and i can imagine

508
00:18:59,510 --> 00:18:56,799
you know when so for instance if they

509
00:19:02,630 --> 00:18:59,520
estimate the size of the object as being

510
00:19:05,110 --> 00:19:02,640
300 feet across or something um

511
00:19:07,029 --> 00:19:05,120
how wrong could you be with that well

512
00:19:08,470 --> 00:19:07,039
maybe it was 100 feet across but it

513
00:19:10,390 --> 00:19:08,480

certainly wouldn't have been 30.

514
00:19:12,310 --> 00:19:10,400
i mean nobody's gonna mistake a 30-foot

515
00:19:13,510 --> 00:19:12,320
disc for a 300-foot disc

516
00:19:15,270 --> 00:19:13,520
well you wouldn't even be able to see

517
00:19:17,029 --> 00:19:15,280
that if you're five miles away

518
00:19:18,549 --> 00:19:17,039
approximately so he's five miles away

519
00:19:20,549 --> 00:19:18,559
and he's looking down and he's looking

520
00:19:22,950 --> 00:19:20,559
down

521
00:19:24,950 --> 00:19:22,960
five miles away huh and he was able to

522
00:19:26,630 --> 00:19:24,960
see that it looked like city lights

523
00:19:30,230 --> 00:19:26,640
yeah it looks like it was a circle

524
00:19:32,870 --> 00:19:30,240
circular group of lights

525
00:19:33,750 --> 00:19:32,880
okay now let's look at this then you

526
00:19:35,590 --> 00:19:33,760
estimated the

527
00:19:36,789 --> 00:19:35,600
altitude and also by the way just as a

528
00:19:39,590 --> 00:19:36,799
technical design why are

529
00:19:41,350 --> 00:19:39,600
you using monte carlo it seems like just

530
00:19:42,950 --> 00:19:41,360
help edify me here seems like you have a

531
00:19:43,669 --> 00:19:42,960
gaussian distribution or some sort of

532
00:19:46,390 --> 00:19:43,679
distribution

533
00:19:47,590 --> 00:19:46,400
do you have to then sample it so that

534
00:19:49,510 --> 00:19:47,600
it's spiky at the edges

535
00:19:51,270 --> 00:19:49,520
oh i i use i could have used that

536
00:19:52,470 --> 00:19:51,280
distribution the problem is that you'd

537
00:19:57,350 --> 00:19:52,480
then have to

538
00:20:00,390 --> 00:19:59,110

you know estimating the speed of the

539
00:20:04,950 --> 00:20:00,400
object i then

540
00:20:06,549 --> 00:20:04,960
have to basically use

541
00:20:08,149 --> 00:20:06,559
the uncertainties in each of those

542
00:20:09,669 --> 00:20:08,159
quantities that go into calculating the

543
00:20:12,549 --> 00:20:09,679
speed of that object

544
00:20:14,310 --> 00:20:12,559
and so it requires transforming you know

545
00:20:14,710 --> 00:20:14,320
all these probability distributions

546
00:20:18,149 --> 00:20:14,720
which

547
00:20:19,350 --> 00:20:18,159
is quite tedious okay and so doing it

548
00:20:21,430 --> 00:20:19,360
with monte carlo

549
00:20:23,029 --> 00:20:21,440
doing monte carlo i'm going to get

550
00:20:26,549 --> 00:20:23,039
appropriate answers and it's a faster

551
00:20:29,830 --> 00:20:27,789
otherwise i might have to take

552
00:20:31,590 --> 00:20:29,840
approximations and things like this to

553
00:20:33,750 --> 00:20:31,600
pull it off analytically which

554
00:20:35,110 --> 00:20:33,760
i didn't want to have to do i see the

555
00:20:36,470 --> 00:20:35,120
computer can't do that

556
00:20:38,230 --> 00:20:36,480
it's not as simple as putting it into

557
00:20:40,070 --> 00:20:38,240
wolfram wolfram alpha

558
00:20:41,830 --> 00:20:40,080
or mathematica no not always because

559
00:20:45,669 --> 00:20:41,840
you've got to i mean you're

560
00:20:49,110 --> 00:20:45,679
you're um you're taking derivatives and

561
00:20:51,750 --> 00:20:49,120
inverses and things like this you've got

562
00:20:52,310 --> 00:20:51,760
so okay and if you see me looking off

563
00:20:54,630 --> 00:20:52,320

over here

564
00:20:56,710 --> 00:20:54,640
it's that i also have some of the

565
00:20:58,549 --> 00:20:56,720
studies on this side as well so please

566
00:21:01,029 --> 00:20:58,559
okay i'm not you're the only thing i'm

567
00:21:02,549 --> 00:21:01,039
paying attention to no that's fine

568
00:21:05,110 --> 00:21:02,559
then you've got times going on here you

569
00:21:07,750 --> 00:21:05,120
have altitude you have minimum log 10

570
00:21:09,110 --> 00:21:07,760
okay well that's the acceleration that's

571
00:21:11,029 --> 00:21:09,120
the acceleration altitude

572
00:21:12,470 --> 00:21:11,039
okay altitude and times and these are

573
00:21:14,470 --> 00:21:12,480
referring to the altitude is referring

574
00:21:16,710 --> 00:21:14,480
to what

575
00:21:18,950 --> 00:21:16,720
the altitude is referring to the

576
00:21:22,390 --> 00:21:18,960
basically the altitude of the craft so

577
00:21:25,510 --> 00:21:22,400
how how far it went up from

578
00:21:27,190 --> 00:21:25,520
the sea surface great and then the time

579
00:21:29,029 --> 00:21:27,200
is referring to how long did it take

580
00:21:32,390 --> 00:21:29,039
from that altitude

581
00:21:36,710 --> 00:21:32,400
yep okay okay simple simple simple great

582
00:21:41,029 --> 00:21:36,720
now let's let's get to japan

583
00:21:44,230 --> 00:21:41,039
airlines flight 1628 in 1986

584
00:21:45,510 --> 00:21:44,240
right that was that's another instance

585
00:21:48,630 --> 00:21:45,520
where

586
00:21:50,630 --> 00:21:48,640
i knew about that incident in 1986 i

587
00:21:55,190 --> 00:21:50,640
remember watching it on

588
00:21:57,190 --> 00:21:55,200

nbc news with tom brokaw and i remember

589
00:21:58,630 --> 00:21:57,200
him discussing this and then playing

590
00:22:04,950 --> 00:21:58,640
some of the

591
00:22:07,110 --> 00:22:04,960
and the air air traffic control

592
00:22:08,870 --> 00:22:07,120
and i remember thinking that this is

593
00:22:12,549 --> 00:22:08,880
really pretty amazing you've got

594
00:22:15,590 --> 00:22:12,559
a you've got a um

595
00:22:19,029 --> 00:22:15,600
you've got a large jet

596
00:22:22,870 --> 00:22:19,039
it was a 747 i guess it was um

597
00:22:24,070 --> 00:22:22,880
and it's basically flying from they were

598
00:22:26,950 --> 00:22:24,080
flying from

599
00:22:27,750 --> 00:22:26,960
paris to tokyo bringing beaujolais

600
00:22:29,510 --> 00:22:27,760
nouveau

601
00:22:31,430 --> 00:22:29,520
so here now we can all have a giggle

602
00:22:35,270 --> 00:22:31,440
hahaha has got a plane full of

603
00:22:38,310 --> 00:22:35,280
uh wine right um but

604
00:22:39,750 --> 00:22:38,320
so supposed to aliens were after all

605
00:22:41,990 --> 00:22:39,760
that's right and you were an undergrad

606
00:22:43,590 --> 00:22:42,000
at this point i was an undergrad at the

607
00:22:45,190 --> 00:22:43,600
point

608
00:22:47,190 --> 00:22:45,200
studying math and physics math and

609
00:22:50,390 --> 00:22:47,200
physics yeah okay great great

610
00:22:53,110 --> 00:22:50,400
yeah so so the um

611
00:22:54,070 --> 00:22:53,120
and you can actually still find the news

612
00:22:56,870 --> 00:22:54,080
reports online

613
00:22:59,110 --> 00:22:56,880

the videos people put them online but

614
00:23:01,350 --> 00:22:59,120
the um

615
00:23:02,710 --> 00:23:01,360
so as they're flying they're approaching

616
00:23:05,270 --> 00:23:02,720
anchorage alaska

617
00:23:07,909 --> 00:23:05,280
and um they see some lights in the

618
00:23:08,789 --> 00:23:07,919
distance basically approaching the plane

619
00:23:10,950 --> 00:23:08,799
and so

620
00:23:12,470 --> 00:23:10,960
they're concerned so they call um air

621
00:23:14,310 --> 00:23:12,480
traffic to control to see if they have

622
00:23:17,190 --> 00:23:14,320
any traffic for them

623
00:23:17,909 --> 00:23:17,200
and air traffic controls is negative um

624
00:23:21,110 --> 00:23:17,919
they said

625
00:23:23,830 --> 00:23:21,120
well we see traffic there we've got

626
00:23:24,310 --> 00:23:23,840
um several craft approaching and so

627
00:23:26,230 --> 00:23:24,320
they're

628
00:23:27,350 --> 00:23:26,240
very concerned about this so approaching

629
00:23:30,549 --> 00:23:27,360
anchorage they have

630
00:23:33,750 --> 00:23:30,559
um two craft approaching and then

631
00:23:34,470 --> 00:23:33,760
um and then shortly thereafter a larger

632
00:23:36,310 --> 00:23:34,480
craft

633
00:23:37,909 --> 00:23:36,320
approaches and the thing is walnut

634
00:23:40,230 --> 00:23:37,919
shaped and glowing

635
00:23:41,909 --> 00:23:40,240
and at one point it's it's in front of

636
00:23:43,830 --> 00:23:41,919
the aircraft

637
00:23:45,110 --> 00:23:43,840
and the pilot described it as so big

638
00:23:46,789 --> 00:23:45,120

that they couldn't see out of the

639
00:23:49,830 --> 00:23:46,799
windscreen

640
00:23:51,510 --> 00:23:49,840
so i mean you're you're a pilot of a jet

641
00:23:53,190 --> 00:23:51,520
you've got something in front of you

642
00:23:56,549 --> 00:23:53,200
that you can't see beyond

643
00:23:59,190 --> 00:23:56,559
that's a scary prospect um

644
00:24:00,870 --> 00:23:59,200
so he's panicked and and calling air

645
00:24:02,630 --> 00:24:00,880
traffic control and they don't

646
00:24:04,470 --> 00:24:02,640
they're not picking anything up on radar

647
00:24:08,149 --> 00:24:04,480
except his plane

648
00:24:11,510 --> 00:24:08,159
um and at some point the military

649
00:24:13,990 --> 00:24:11,520
is contacted and gets involved and on

650
00:24:14,549 --> 00:24:14,000
military height finding radar they pick

651
00:24:17,669 --> 00:24:14,559
up

652
00:24:20,789 --> 00:24:17,679
um the larger craft on the plane and the

653
00:24:23,029 --> 00:24:20,799
airplane so they pick up both objects

654
00:24:24,789 --> 00:24:23,039
so the so the military is able to detect

655
00:24:27,029 --> 00:24:24,799
this with their radar

656
00:24:28,950 --> 00:24:27,039
um were you able to estimate the size of

657
00:24:32,310 --> 00:24:28,960
the craft

658
00:24:35,549 --> 00:24:32,320
um no uh he estimated it to be

659
00:24:39,029 --> 00:24:35,559
um the size of i think it was three

660
00:24:41,590 --> 00:24:39,039
747s so it's basically the size of an

661
00:24:43,190 --> 00:24:41,600
aircraft carrier

662
00:24:45,190 --> 00:24:43,200
so you've got this guy you've got a

663
00:24:45,990 --> 00:24:45,200

flying aircraft carrier shaped like a

664
00:24:49,830 --> 00:24:46,000
walnut

665
00:24:52,789 --> 00:24:49,840
um now you then you have to ask

666
00:24:54,390 --> 00:24:52,799
how wrong can the pilot be i mean it's

667
00:24:55,750 --> 00:24:54,400
all right maybe it wasn't as big as an

668
00:24:57,190 --> 00:24:55,760
aircraft carrier maybe it was just the

669
00:24:59,350 --> 00:24:57,200
size of a destroyer

670
00:25:00,630 --> 00:24:59,360
still that's pretty amazing right he

671
00:25:02,390 --> 00:25:00,640
said it was glowing

672
00:25:03,669 --> 00:25:02,400
i mean glowing yeah and this was at

673
00:25:06,549 --> 00:25:03,679
night

674
00:25:08,789 --> 00:25:06,559
um i i don't know what time it happened

675
00:25:10,310 --> 00:25:08,799
i don't recall

676
00:25:12,549 --> 00:25:10,320
that's all that's all recorded but i

677
00:25:14,070 --> 00:25:12,559
don't recall off the top

678
00:25:15,830 --> 00:25:14,080
is that it with the japan airlines

679
00:25:18,149 --> 00:25:15,840
flight is there more no well the thing

680
00:25:20,310 --> 00:25:18,159
the the interesting thing is the object

681
00:25:22,230 --> 00:25:20,320
follows him for 40 minutes

682
00:25:24,789 --> 00:25:22,240
so it isn't just like i saw it it was

683
00:25:26,390 --> 00:25:24,799
gone no this thing basically kept track

684
00:25:28,070 --> 00:25:26,400
kept along with the airplane for 40

685
00:25:29,029 --> 00:25:28,080
minutes and it basically moved around

686
00:25:32,310 --> 00:25:29,039
the aircraft

687
00:25:33,750 --> 00:25:32,320
and moved around the airplane um as time

688
00:25:36,070 --> 00:25:33,760

went by so

689
00:25:37,990 --> 00:25:36,080
it would go so the military height

690
00:25:41,029 --> 00:25:38,000
finding radar in this radar data

691
00:25:43,510 --> 00:25:41,039
exists you can look at this the

692
00:25:45,190 --> 00:25:43,520
military framing radar is sweeping every

693
00:25:48,470 --> 00:25:45,200
10 seconds

694
00:25:51,190 --> 00:25:48,480
and the craft is about seven and a half

695
00:25:54,870 --> 00:25:51,200
miles away from the airplane

696
00:25:56,789 --> 00:25:54,880
and in one sweep it'll be at one o'clock

697
00:25:59,110 --> 00:25:56,799
in the next sweep 10 seconds later the

698
00:26:00,870 --> 00:25:59,120
thing could be at six o'clock

699
00:26:02,470 --> 00:26:00,880
and so the thing is literally jumping

700
00:26:05,029 --> 00:26:02,480
around this airplane and the

701
00:26:07,669 --> 00:26:05,039
pilots panicked he actually takes some

702
00:26:10,470 --> 00:26:07,679
evasive maneuvers at some point

703
00:26:12,549 --> 00:26:10,480
to try to evade the object and thought

704
00:26:15,190 --> 00:26:12,559
that he had he didn't see it

705
00:26:16,789 --> 00:26:15,200
and the um air force comes on and does

706
00:26:18,950 --> 00:26:16,799
now it's behind you

707
00:26:19,909 --> 00:26:18,960
it's still following you it's behind you

708
00:26:22,830 --> 00:26:19,919
so

709
00:26:24,549 --> 00:26:22,840
the thing basically followed him for 40

710
00:26:27,350 --> 00:26:24,559
minutes

711
00:26:28,950 --> 00:26:27,360
and and then he went down and landed

712
00:26:30,470 --> 00:26:28,960
when you said that the pilot said that

713
00:26:33,110 --> 00:26:30,480

he couldn't see

714
00:26:34,390 --> 00:26:33,120
beyond the ship if it's five miles away

715
00:26:36,149 --> 00:26:34,400
and it's the size of a

716
00:26:37,750 --> 00:26:36,159
carrier why can't you see beyond it you

717
00:26:37,990 --> 00:26:37,760
can see the edges of it no oh well this

718
00:26:40,789 --> 00:26:38,000
one

719
00:26:42,870 --> 00:26:40,799
was moving around so so at some point at

720
00:26:45,029 --> 00:26:42,880
one point it was very close he had said

721
00:26:47,110 --> 00:26:45,039
and i was initially he couldn't see

722
00:26:50,070 --> 00:26:47,120
initially he couldn't see beyond it

723
00:26:51,190 --> 00:26:50,080
so initially how close do you estimate

724
00:26:54,310 --> 00:26:51,200
it was to him

725
00:26:55,909 --> 00:26:54,320
i have no idea um let's say it was

726
00:26:58,070 --> 00:26:55,919
the size of a carrier then it would have

727
00:27:00,310 --> 00:26:58,080
to be

728
00:27:02,070 --> 00:27:00,320
i'm sure this is a simple trick okay

729
00:27:03,590 --> 00:27:02,080
yeah yeah you could figure out how close

730
00:27:05,830 --> 00:27:03,600
it would have to be

731
00:27:07,269 --> 00:27:05,840
for much of the event it was about seven

732
00:27:09,590 --> 00:27:07,279
and a half miles away according to the

733
00:27:11,669 --> 00:27:09,600
radar

734
00:27:13,510 --> 00:27:11,679
and the sweeping i'm sorry it wasn't 10

735
00:27:15,110 --> 00:27:13,520
seconds it was 12 seconds so it was

736
00:27:18,470 --> 00:27:15,120
every 12 seconds

737
00:27:19,990 --> 00:27:18,480
great okay this data exists meaning that

738
00:27:23,350 --> 00:27:20,000

it's public

739
00:27:24,870 --> 00:27:23,360
yeah the radar the radar data yeah

740
00:27:26,870 --> 00:27:24,880
how does that go online does someone

741
00:27:30,470 --> 00:27:26,880
leak it or does someone release it

742
00:27:33,269 --> 00:27:30,480
right it was um john callahan

743
00:27:36,710 --> 00:27:33,279
who was faa chief of accidents and

744
00:27:39,830 --> 00:27:36,720
investigations at the time

745
00:27:44,389 --> 00:27:39,840
they basically re-enacted the situation

746
00:27:47,590 --> 00:27:44,399
in one of their one of their

747
00:27:49,430 --> 00:27:47,600
testing centers and they the

748
00:27:51,029 --> 00:27:49,440
and that's where the data comes in so

749
00:27:54,310 --> 00:27:51,039
they can reenact it

750
00:27:56,310 --> 00:27:54,320
and then they re he recorded that and

751
00:27:58,870 --> 00:27:56,320
basically saved that himself he saved a

752
00:28:01,510 --> 00:27:58,880
copy for himself

753
00:28:01,990 --> 00:28:01,520
and he claims that at one point the

754
00:28:05,190 --> 00:28:02,000
president

755
00:28:08,310 --> 00:28:05,200
reagan's scientific advisory team

756
00:28:10,950 --> 00:28:08,320
um met with him along with cai

757
00:28:11,830 --> 00:28:10,960
cia officials and fbi and a number of

758
00:28:13,990 --> 00:28:11,840
people

759
00:28:16,310 --> 00:28:14,000
and they confiscated all of the data he

760
00:28:17,909 --> 00:28:16,320
had um although he didn't tell them

761
00:28:20,389 --> 00:28:17,919
about everything he had some of it

762
00:28:21,990 --> 00:28:20,399
stashed away

763
00:28:23,830 --> 00:28:22,000

but they met with him and they were very

764
00:28:25,430 --> 00:28:23,840
excited because they said that this was

765
00:28:28,470 --> 00:28:25,440
the longest

766
00:28:31,750 --> 00:28:28,480
encounter that they had had any

767
00:28:33,269 --> 00:28:31,760
data for okay

768
00:28:34,710 --> 00:28:33,279
let's get to the nimitz encounter i'm

769
00:28:35,190 --> 00:28:34,720
sure many people are familiar because

770
00:28:38,389 --> 00:28:35,200
that's

771
00:28:41,590 --> 00:28:38,399
david fravor if i'm correct okay

772
00:28:44,230 --> 00:28:41,600
and that's in 2004 i believe right

773
00:28:45,750 --> 00:28:44,240
okay why don't you give a brief rundown

774
00:28:47,029 --> 00:28:45,760
for the people who are unacquainted with

775
00:28:50,470 --> 00:28:47,039
this

776
00:28:54,230 --> 00:28:50,480
all right so in 2004 you had

777
00:28:57,430 --> 00:28:54,240
the the nimitz um carrier group was

778
00:29:01,750 --> 00:28:57,440
was off the coast of san diego

779
00:29:03,430 --> 00:29:01,760
california about about 100 miles 150

780
00:29:07,350 --> 00:29:03,440
miles off the coast

781
00:29:11,350 --> 00:29:07,360
and um senior chief kevin day

782
00:29:16,310 --> 00:29:11,360
was operating radar

783
00:29:18,870 --> 00:29:16,320
for much of this time and for

784
00:29:19,990 --> 00:29:18,880
overall for a period of of a couple of

785
00:29:23,510 --> 00:29:20,000
weeks

786
00:29:26,549 --> 00:29:23,520
he was picking up um anomalous

787
00:29:28,789 --> 00:29:26,559
um radar targets appearing basically

788
00:29:31,510 --> 00:29:28,799

just appearing on his radar

789
00:29:31,909 --> 00:29:31,520
at about 80 000 feet which is really

790
00:29:36,870 --> 00:29:31,919
very

791
00:29:40,389 --> 00:29:36,880
airplanes passenger jets fly around 35

792
00:29:42,630 --> 00:29:40,399
000 feet so these radar targets are

793
00:29:46,389 --> 00:29:42,640
appearing at about 80 000 feet

794
00:29:48,710 --> 00:29:46,399
and they typically were appearing south

795
00:29:49,430 --> 00:29:48,720
of catalina island or near san clemente

796
00:29:52,510 --> 00:29:49,440
island

797
00:29:54,389 --> 00:29:52,520
and then they would track south at about

798
00:29:57,430 --> 00:29:54,399
120 knots

799
00:29:59,750 --> 00:29:57,440
um down to guadelupe island

800
00:30:00,870 --> 00:29:59,760
in mexico where they would then drop off

801
00:30:02,710 --> 00:30:00,880
as radar

802
00:30:04,870 --> 00:30:02,720
and so we nobody knows what happened to

803
00:30:08,789 --> 00:30:04,880
them after that

804
00:30:09,590 --> 00:30:08,799
um so having an aircraft um flying at 80

805
00:30:12,630 --> 00:30:09,600
000 feet

806
00:30:14,310 --> 00:30:12,640
at only 100 knots is almost impossible

807
00:30:16,870 --> 00:30:14,320
there's not much air up there so you

808
00:30:19,350 --> 00:30:16,880
you need to go much faster to have lift

809
00:30:21,269 --> 00:30:19,360
so that's already anomalous

810
00:30:23,110 --> 00:30:21,279
so this anomalous in the other direction

811
00:30:26,389 --> 00:30:23,120
they're moving too slowly

812
00:30:29,750 --> 00:30:26,399
right so

813
00:30:32,789 --> 00:30:29,760

and kevin day had observed these and

814
00:30:35,029 --> 00:30:32,799
um you know they weren't

815
00:30:35,990 --> 00:30:35,039
in the operating they weren't where they

816
00:30:38,470 --> 00:30:36,000
were operating so

817
00:30:39,590 --> 00:30:38,480
this wasn't really a big concern at this

818
00:30:46,710 --> 00:30:39,600
point

819
00:30:49,190 --> 00:30:46,720
he um he he well he said that there were

820
00:30:51,110 --> 00:30:49,200
times when they would drop from

821
00:30:52,470 --> 00:30:51,120
they well they came in at 80 000 feet

822
00:30:54,789 --> 00:30:52,480
when they appeared they would they would

823
00:30:55,990 --> 00:30:54,799
drop down to 28 000 feet and that's when

824
00:30:59,909 --> 00:30:56,000
they would track south

825
00:31:01,669 --> 00:30:59,919
at at 100 knots so so even at 28 000

826
00:31:04,230 --> 00:31:01,679
feet you aren't going to be flying at a

827
00:31:05,990 --> 00:31:04,240
plane at 100 knots

828
00:31:07,669 --> 00:31:06,000
but from 28 000 feet they would

829
00:31:11,110 --> 00:31:07,679
periodically drop down to the sea

830
00:31:13,830 --> 00:31:11,120
surface and that

831
00:31:16,630 --> 00:31:13,840
amount of time to go from from basically

832
00:31:19,909 --> 00:31:16,640
at a constant altitude 28 000 feet to

833
00:31:21,110 --> 00:31:19,919
sea surface which is zero um they would

834
00:31:23,990 --> 00:31:21,120
do that in about point

835
00:31:25,350 --> 00:31:24,000
seven eight seconds so it was less than

836
00:31:27,909 --> 00:31:25,360
a second to go from

837
00:31:29,590 --> 00:31:27,919
basically rest in the y direction at

838
00:31:30,070 --> 00:31:29,600

twenty eight thousand feet to rest in

839
00:31:32,870 --> 00:31:30,080
the

840
00:31:33,990 --> 00:31:32,880
y direction at zero feet okay now to

841
00:31:35,430 --> 00:31:34,000
interject

842
00:31:37,350 --> 00:31:35,440
how long would that take if it was free

843
00:31:40,630 --> 00:31:37,360
falling

844
00:31:43,830 --> 00:31:40,640
um i'd have to do the calculation but

845
00:31:45,509 --> 00:31:43,840
it would be let's say estimate it to a

846
00:31:47,909 --> 00:31:45,519
significant digit it's fine

847
00:31:49,909 --> 00:31:47,919
you can be off by a factor of 10. right

848
00:31:53,110 --> 00:31:49,919
so the time is going to be

849
00:31:54,310 --> 00:31:53,120
um basically twice the height

850
00:31:57,990 --> 00:31:54,320
twice the height divided by the

851
00:32:01,669 --> 00:31:58,000
acceleration acceleration is about 10

852
00:32:04,710 --> 00:32:01,679
10 meters per second squared 28 000 feet

853
00:32:06,310 --> 00:32:04,720
2 times 8 000 is 16 000

854
00:32:09,110 --> 00:32:06,320
and now i'm going to divide that by 10

855
00:32:12,310 --> 00:32:09,120
meters per second squared

856
00:32:14,710 --> 00:32:12,320
and i'll get so that's

857
00:32:16,310 --> 00:32:14,720
16 000 divided by ten which is sixteen

858
00:32:19,350 --> 00:32:16,320
hundred

859
00:32:22,950 --> 00:32:19,360
and then we take the square root of that

860
00:32:23,430 --> 00:32:22,960
so that's going to be uh forty forty

861
00:32:29,350 --> 00:32:23,440
seconds

862
00:32:33,990 --> 00:32:29,360
they did it in one second so that means

863
00:32:40,389 --> 00:32:37,269

okay and and they came out

864
00:32:41,029 --> 00:32:40,399
and they came to us let's say our

865
00:32:42,630 --> 00:32:41,039
fastest

866
00:32:44,070 --> 00:32:42,640
accelerating technology downward

867
00:32:44,710 --> 00:32:44,080
whatever that is whatever kind of crap

868
00:32:46,710 --> 00:32:44,720
that is

869
00:32:48,470 --> 00:32:46,720
how fast approximately do you think we

870
00:32:51,590 --> 00:32:48,480
could do it

871
00:32:55,590 --> 00:32:51,600
right if you could dive at 10

872
00:32:58,710 --> 00:32:55,600
g um acceleration and then slow down

873
00:33:00,389 --> 00:32:58,720
for the other 10 g then um

874
00:33:02,310 --> 00:33:00,399
you're basically going you're

875
00:33:04,149 --> 00:33:02,320
accelerating halfway so we can find the

876
00:33:06,870 --> 00:33:04,159
time to the halfway point

877
00:33:07,269 --> 00:33:06,880
um but if you work this out it's it's

878
00:33:14,389 --> 00:33:07,279
one

879
00:33:15,110 --> 00:33:14,399
squared so so the total time is going to

880
00:33:18,710 --> 00:33:15,120
be

881
00:33:23,590 --> 00:33:18,720
basically so we've got 32 000

882
00:33:26,149 --> 00:33:23,600
divided by 100 so it's 320

883
00:33:27,029 --> 00:33:26,159
seconds squared so then now we have to

884
00:33:32,389 --> 00:33:27,039
take the

885
00:33:35,750 --> 00:33:32,399
um basically the square root of 320.

886
00:33:37,509 --> 00:33:35,760
so it's that's less than 400

887
00:33:38,950 --> 00:33:37,519
the square root of 400 is 20 so it's

888
00:33:40,789 --> 00:33:38,960

going to be a little less than 20

889
00:33:44,789 --> 00:33:40,799
seconds

890
00:33:46,230 --> 00:33:44,799
okay let's take a look at some more

891
00:33:48,230 --> 00:33:46,240
i'm going to share my screen with you

892
00:33:48,870 --> 00:33:48,240
and just so what are we looking at over

893
00:33:51,990 --> 00:33:48,880
here

894
00:33:55,029 --> 00:33:52,000
this is the nimitz video then we got

895
00:33:55,350 --> 00:33:55,039
different models and we have what is log

896
00:33:57,509 --> 00:33:55,360
z

897
00:33:58,950 --> 00:33:57,519
what is log l what is a what is and so

898
00:34:00,230 --> 00:33:58,960
on all right

899
00:34:02,549 --> 00:34:00,240
yeah so what we're doing is we're

900
00:34:05,350 --> 00:34:02,559
testing different um

901
00:34:05,990 --> 00:34:05,360
dynamics uh kinematic models these are

902
00:34:09,109 --> 00:34:06,000
these are

903
00:34:11,030 --> 00:34:09,119
basically in in this section of the

904
00:34:13,430 --> 00:34:11,040
paper we're analyzing the

905
00:34:15,270 --> 00:34:13,440
the video that was released by the us

906
00:34:17,909 --> 00:34:15,280
navy

907
00:34:18,629 --> 00:34:17,919
and the last the last few seconds of

908
00:34:22,069 --> 00:34:18,639
that video

909
00:34:25,109 --> 00:34:22,079
32 frames or something the

910
00:34:27,750 --> 00:34:25,119
object is locked on

911
00:34:30,149 --> 00:34:27,760
begins at the the targeting system is

912
00:34:32,629 --> 00:34:30,159
locked onto the object and it loses lock

913
00:34:36,069 --> 00:34:32,639

and the object takes off to the left

914
00:34:39,430 --> 00:34:36,079
now it's not a very impressive departure

915
00:34:41,510 --> 00:34:39,440
um and none of these videos are nearly

916
00:34:42,230 --> 00:34:41,520
as interesting as what the pilots

917
00:34:44,710 --> 00:34:42,240
describe

918
00:34:46,069 --> 00:34:44,720
these things as doing um so i'm

919
00:34:48,069 --> 00:34:46,079
convinced we were given

920
00:34:49,270 --> 00:34:48,079
probably the most boring videos they

921
00:34:52,470 --> 00:34:49,280
could find

922
00:34:53,750 --> 00:34:52,480
um and very possibly videos they didn't

923
00:34:57,670 --> 00:34:53,760
expect

924
00:34:59,430 --> 00:34:57,680
any thing anomalous to to come from so

925
00:35:02,470 --> 00:34:59,440
that acceleration doesn't look very

926
00:35:04,390 --> 00:35:02,480
dramatic but um

927
00:35:06,230 --> 00:35:04,400
so we so we basically tested several

928
00:35:07,910 --> 00:35:06,240
models one of one of the models is that

929
00:35:10,630 --> 00:35:07,920
it accelerated

930
00:35:12,550 --> 00:35:10,640
um just accelerated off the screen so

931
00:35:14,790 --> 00:35:12,560
it's constant acceleration

932
00:35:15,990 --> 00:35:14,800
another one was accelerated for a

933
00:35:18,950 --> 00:35:16,000
shorter period of time

934
00:35:20,790 --> 00:35:18,960
and then um just coasted off the screen

935
00:35:23,670 --> 00:35:20,800
at constant velocity

936
00:35:27,190 --> 00:35:23,680
and um and so those are the basic models

937
00:35:31,190 --> 00:35:29,109
and so why do you think it is that they

938
00:35:32,710 --> 00:35:31,200

didn't you believe that they have more

939
00:35:33,910 --> 00:35:32,720
interesting footage and they chose to

940
00:35:36,870 --> 00:35:33,920
release this

941
00:35:38,150 --> 00:35:36,880
they it being the us government yeah i'm

942
00:35:41,109 --> 00:35:38,160
just guessing that

943
00:35:42,950 --> 00:35:41,119
based on what the pilots have you know

944
00:35:45,990 --> 00:35:42,960
what numerous pilots have said

945
00:35:48,470 --> 00:35:46,000
in these types of encounters um

946
00:35:49,109 --> 00:35:48,480
these things behave much more amazingly

947
00:35:52,310 --> 00:35:49,119
than

948
00:35:54,710 --> 00:35:52,320
released so

949
00:35:56,790 --> 00:35:54,720
david fravor when he encountered the the

950
00:35:57,430 --> 00:35:56,800
tic tac object and it finally took off

951
00:36:00,069 --> 00:35:57,440
he said it

952
00:36:01,270 --> 00:36:00,079
accelerated like it was shot from a gun

953
00:36:05,589 --> 00:36:01,280
and it was gone

954
00:36:09,750 --> 00:36:05,599
in you know out of sight in two seconds

955
00:36:10,630 --> 00:36:09,760
so um clearly this acceleration isn't

956
00:36:14,069 --> 00:36:10,640
that fast

957
00:36:15,030 --> 00:36:14,079
so it's so so that's why you think it is

958
00:36:16,870 --> 00:36:15,040
that they released

959
00:36:19,190 --> 00:36:16,880
the video if you were to speculate at

960
00:36:21,670 --> 00:36:19,200
all the us government

961
00:36:22,470 --> 00:36:21,680
um that i don't that i don't know i know

962
00:36:24,870 --> 00:36:22,480
that um

963
00:36:26,310 --> 00:36:24,880

lou elizondo and chris mellon were

964
00:36:28,550 --> 00:36:26,320
working on the inside

965
00:36:29,510 --> 00:36:28,560
to try to get some of this information

966
00:36:32,069 --> 00:36:29,520
out

967
00:36:33,670 --> 00:36:32,079
because they weren't able to freely

968
00:36:36,630 --> 00:36:33,680
discuss this

969
00:36:38,829 --> 00:36:36,640
um you know amongst the intelligence

970
00:36:41,670 --> 00:36:38,839
community

971
00:36:43,510 --> 00:36:41,680
so and so there's probably multiple

972
00:36:44,230 --> 00:36:43,520
concerns there i mean one is that if

973
00:36:48,870 --> 00:36:44,240
you're

974
00:36:49,349 --> 00:36:48,880
the navy is having problems with these

975
00:36:51,910 --> 00:36:49,359
things

976
00:36:53,670 --> 00:36:51,920
right but they're not able to discuss

977
00:36:55,750 --> 00:36:53,680
you know these objects and have it taken

978
00:36:58,950 --> 00:36:55,760
seriously so now

979
00:37:00,230 --> 00:36:58,960
now what do you do um in 2015 for

980
00:37:02,230 --> 00:37:00,240
example

981
00:37:04,310 --> 00:37:02,240
the they were having near day nearly

982
00:37:07,030 --> 00:37:04,320
daily encounters with ufos

983
00:37:09,109 --> 00:37:07,040
um and so you've got pilots who are not

984
00:37:10,630 --> 00:37:09,119
trained for these types of encounters

985
00:37:13,109 --> 00:37:10,640
some of these were happening in the

986
00:37:15,670 --> 00:37:13,119
persian gulf area while they were

987
00:37:17,510 --> 00:37:15,680
operating you know so that's a you've

988
00:37:19,270 --> 00:37:17,520

got a military campaign going on these

989
00:37:22,150 --> 00:37:19,280
guys are going on bombing runs on

990
00:37:22,950 --> 00:37:22,160
in syria and they've got to fly through

991
00:37:25,190 --> 00:37:22,960
ufos

992
00:37:26,950 --> 00:37:25,200
be over the persian gulf and then go to

993
00:37:28,790 --> 00:37:26,960
syria and then conduct their military

994
00:37:31,190 --> 00:37:28,800
operations and come back and

995
00:37:32,390 --> 00:37:31,200
that's a huge hazard i mean you don't

996
00:37:34,950 --> 00:37:32,400
you don't need a pilot

997
00:37:35,990 --> 00:37:34,960
shaken you know from a ufo encounter and

998
00:37:38,790 --> 00:37:36,000
then go into a war

999
00:37:40,390 --> 00:37:38,800
zone that's extremely dangerous and so

1000
00:37:42,150 --> 00:37:40,400
there's one reason why when people say

1001
00:37:44,630 --> 00:37:42,160
oh they're just drones and the us

1002
00:37:45,829 --> 00:37:44,640
is just testing them now you're going to

1003
00:37:49,030 --> 00:37:45,839
test them by putting

1004
00:37:52,069 --> 00:37:49,040
pilots in danger in a war zone um

1005
00:37:53,589 --> 00:37:52,079
that's not going to happen what are some

1006
00:37:55,829 --> 00:37:53,599
other arguments against them being

1007
00:37:57,670 --> 00:37:55,839
drones

1008
00:37:59,109 --> 00:37:57,680
i mean first their their accelerations

1009
00:38:02,470 --> 00:37:59,119
that we estimated are

1010
00:38:05,270 --> 00:38:02,480
are way off the charts you um people

1011
00:38:05,750 --> 00:38:05,280
can't handle much more than you know

1012
00:38:09,670 --> 00:38:05,760
than

1013
00:38:12,710 --> 00:38:09,680

10 10 to 15 um g's for

1014
00:38:15,829 --> 00:38:12,720
any period of time 13 g's

1015
00:38:18,230 --> 00:38:15,839
um the new f-35 fighter

1016
00:38:20,310 --> 00:38:18,240
i think is rated for 13 and a half g's

1017
00:38:21,190 --> 00:38:20,320
and at 13 and a half g's its wings will

1018
00:38:23,670 --> 00:38:21,200
rip off

1019
00:38:24,710 --> 00:38:23,680
so you can't accelerate an airplane more

1020
00:38:27,750 --> 00:38:24,720
than about 13

1021
00:38:29,990 --> 00:38:27,760
15 g um

1022
00:38:32,870 --> 00:38:30,000
some missile frames can handle handle

1023
00:38:35,510 --> 00:38:32,880
higher accelerations

1024
00:38:36,950 --> 00:38:35,520
they can maneuver up to about 30 g's of

1025
00:38:40,470 --> 00:38:36,960
acceleration

1026
00:38:41,109 --> 00:38:40,480
and some can withstand structurally

1027
00:38:44,150 --> 00:38:41,119
withstand

1028
00:38:47,190 --> 00:38:44,160
up to about 60 g's

1029
00:38:49,270 --> 00:38:47,200
so most of our equipment can't handle

1030
00:38:50,710 --> 00:38:49,280
our equipment can't handle more than 100

1031
00:38:53,670 --> 00:38:50,720
g's

1032
00:38:55,990 --> 00:38:53,680
and um and that's in one direction let

1033
00:38:57,430 --> 00:38:56,000
alone stopping and then turning around

1034
00:38:58,950 --> 00:38:57,440
yeah well i mean it doesn't matter

1035
00:39:01,270 --> 00:38:58,960
whether you stop and turn around because

1036
00:39:02,230 --> 00:39:01,280
you've got so many g's here and then so

1037
00:39:04,230 --> 00:39:02,240
many g's again

1038
00:39:06,630 --> 00:39:04,240

so they're doing it over and over again

1039
00:39:08,150 --> 00:39:06,640
it's it's insane

1040
00:39:10,150 --> 00:39:08,160
what are these associated with these

1041
00:39:12,390 --> 00:39:10,160
crafts

1042
00:39:14,470 --> 00:39:12,400
well the the highest one we estimated

1043
00:39:17,349 --> 00:39:14,480
was about five thousand

1044
00:39:19,030 --> 00:39:17,359
seven hundred g's um that was the one

1045
00:39:22,150 --> 00:39:19,040
picked up on radar by

1046
00:39:23,510 --> 00:39:22,160
um senior chief kevin day while he was

1047
00:39:26,069 --> 00:39:23,520
on the uss princeton

1048
00:39:28,470 --> 00:39:26,079
with the nimitz carrier group that's the

1049
00:39:33,109 --> 00:39:28,480
one that drops from 28 000 feet to

1050
00:39:35,270 --> 00:39:33,119
sea level in 0.78 seconds

1051
00:39:36,870 --> 00:39:35,280
so you're looking at over 5 000 g's of

1052
00:39:40,790 --> 00:39:36,880
acceleration

1053
00:39:42,390 --> 00:39:40,800
in that case the other situations were a

1054
00:39:44,069 --> 00:39:42,400
bit lower

1055
00:39:47,349 --> 00:39:44,079
i think the lowest ones we had were

1056
00:39:51,829 --> 00:39:47,359
maybe i think the um

1057
00:39:52,310 --> 00:39:51,839
the video from the 2004 nimitz video

1058
00:39:55,030 --> 00:39:52,320
when it

1059
00:39:56,870 --> 00:39:55,040
when the object when the targeting

1060
00:39:58,390 --> 00:39:56,880
computer loses track and the thing takes

1061
00:40:01,510 --> 00:39:58,400
off to the left

1062
00:40:03,990 --> 00:40:01,520
you're looking at about 78 g's

1063
00:40:04,550 --> 00:40:04,000

the object's moving to the left and away

1064
00:40:08,069 --> 00:40:04,560
from the

1065
00:40:12,390 --> 00:40:10,230
see what strikes me about this paper is

1066
00:40:15,190 --> 00:40:12,400
going through it

1067
00:40:15,829 --> 00:40:15,200
if the mathematics isn't beyond high

1068
00:40:18,150 --> 00:40:15,839
school

1069
00:40:20,309 --> 00:40:18,160
or beyond first year that's for sure and

1070
00:40:22,550 --> 00:40:20,319
i'm wondering why is it

1071
00:40:23,990 --> 00:40:22,560
why hasn't an analysis like this which

1072
00:40:25,750 --> 00:40:24,000
seems like

1073
00:40:27,829 --> 00:40:25,760
anyone could have done it why hasn't it

1074
00:40:29,910 --> 00:40:27,839
been done before

1075
00:40:31,670 --> 00:40:29,920
this is simply the stigma against

1076
00:40:34,950 --> 00:40:31,680
analyzing i think that's the problem

1077
00:40:35,670 --> 00:40:34,960
i mean you've got you've got numerous

1078
00:40:38,230 --> 00:40:35,680
capable

1079
00:40:39,349 --> 00:40:38,240
physicists who have commented on these

1080
00:40:42,470 --> 00:40:39,359
things

1081
00:40:44,710 --> 00:40:42,480
and you've got enough information to

1082
00:40:46,950 --> 00:40:44,720
basically to do a back of the envelope

1083
00:40:48,870 --> 00:40:46,960
estimation of the acceleration

1084
00:40:50,470 --> 00:40:48,880
and they're more willing to say well

1085
00:40:52,309 --> 00:40:50,480
it's probably an atmospheric effect

1086
00:40:53,990 --> 00:40:52,319
who knows who knows what it could be

1087
00:40:56,630 --> 00:40:54,000
that's usually the response you get from

1088
00:41:00,230 --> 00:40:56,640

a professional physicist which is

1089
00:41:01,510 --> 00:41:00,240
problematic this is a calculation they

1090
00:41:03,990 --> 00:41:01,520
ought to be able to do

1091
00:41:05,510 --> 00:41:04,000
who else in the physics community

1092
00:41:07,589 --> 00:41:05,520
professional physics community is

1093
00:41:11,030 --> 00:41:07,599
studying this besides you and your

1094
00:41:13,589 --> 00:41:11,040
co-author ah well let's see my

1095
00:41:16,150 --> 00:41:13,599
um a colleague of mine matthew chidagas

1096
00:41:17,270 --> 00:41:16,160
at um university albany is also studying

1097
00:41:20,790 --> 00:41:17,280
this

1098
00:41:25,510 --> 00:41:20,800
um other physicists

1099
00:41:30,950 --> 00:41:29,109
um people let's see

1100
00:41:32,710 --> 00:41:30,960
i don't know if they're all physicists

1101
00:41:34,309 --> 00:41:32,720
um some are engineers

1102
00:41:36,390 --> 00:41:34,319
do you know of any physicists who are

1103
00:41:38,309 --> 00:41:36,400
interested but tell you this behind

1104
00:41:40,870 --> 00:41:38,319
closed doors

1105
00:41:41,589 --> 00:41:40,880
yeah that's basically the the situation

1106
00:41:44,870 --> 00:41:41,599
you've got a

1107
00:41:45,750 --> 00:41:44,880
number of people who are interested in

1108
00:41:49,349 --> 00:41:45,760
studying this

1109
00:41:51,270 --> 00:41:49,359
and the problem is there's a paucity of

1110
00:41:53,750 --> 00:41:51,280
data we don't we don't have

1111
00:41:54,790 --> 00:41:53,760
any real data to work with um for the

1112
00:41:57,829 --> 00:41:54,800
most part

1113
00:41:59,510 --> 00:41:57,839

you have you know witness testimony and

1114
00:42:02,950 --> 00:41:59,520
some of that paper is based on witness

1115
00:42:03,990 --> 00:42:02,960
testimony and we did the best we could

1116
00:42:07,109 --> 00:42:04,000
with it

1117
00:42:09,750 --> 00:42:07,119
um and and i think it gives you a

1118
00:42:13,510 --> 00:42:09,760
ballpark estimate of what was observed

1119
00:42:15,589 --> 00:42:13,520
but but you have to you really want

1120
00:42:17,589 --> 00:42:15,599
um you really want radar data you really

1121
00:42:19,349 --> 00:42:17,599
want to be able to triangulate positions

1122
00:42:21,430 --> 00:42:19,359
with multiple cameras you want to do all

1123
00:42:24,710 --> 00:42:21,440
sorts of things like this

1124
00:42:28,630 --> 00:42:26,790
are these spacecraft getting faster with

1125
00:42:31,109 --> 00:42:28,640
time what i mean by that

1126
00:42:32,150 --> 00:42:31,119
is let's say someone was analyzing

1127
00:42:33,910 --> 00:42:32,160
earth's craft

1128
00:42:35,910 --> 00:42:33,920
i imagine that what they would see is

1129
00:42:38,630 --> 00:42:35,920
our top speed would increase over the

1130
00:42:39,670 --> 00:42:38,640
decades because it has however with

1131
00:42:41,109 --> 00:42:39,680
these crafts

1132
00:42:43,190 --> 00:42:41,119
do you see them as being predominantly

1133
00:42:44,790 --> 00:42:43,200
the same since the 60s or since the

1134
00:42:46,230 --> 00:42:44,800
50s since you guys had since that's a

1135
00:42:49,349 --> 00:42:46,240
good question i mean i don't

1136
00:42:51,430 --> 00:42:49,359
think that we have that information um

1137
00:42:52,950 --> 00:42:51,440
you'd have to look over look at them for

1138
00:42:56,069 --> 00:42:52,960

a very long period of time

1139
00:42:58,309 --> 00:42:56,079
and there have been sightings of

1140
00:42:59,750 --> 00:42:58,319
objects like this and if they are alien

1141
00:43:01,750 --> 00:42:59,760
spacecraft which we really haven't

1142
00:43:04,790 --> 00:43:01,760
proven that that's the case yet

1143
00:43:07,349 --> 00:43:04,800
um the you know if they are alien

1144
00:43:10,150 --> 00:43:07,359
spacecraft then we wouldn't know

1145
00:43:12,069 --> 00:43:10,160
you know from some of the roman reports

1146
00:43:14,710 --> 00:43:12,079
of flying shields

1147
00:43:16,390 --> 00:43:14,720
uh we aren't able to estimate speeds and

1148
00:43:17,030 --> 00:43:16,400
accelerations in those cases we don't

1149
00:43:19,589 --> 00:43:17,040
have that

1150
00:43:21,670 --> 00:43:19,599
detailed information so what's the

1151
00:43:23,430 --> 00:43:21,680
romans report of flying shields

1152
00:43:25,349 --> 00:43:23,440
oh there's several there's several

1153
00:43:28,870 --> 00:43:25,359
reports in roman history of

1154
00:43:29,829 --> 00:43:28,880
um or orbus claipayus i think they're

1155
00:43:33,589 --> 00:43:29,839
called

1156
00:43:36,150 --> 00:43:33,599
shields basically

1157
00:43:37,190 --> 00:43:36,160
and so i can send you references for

1158
00:43:40,870 --> 00:43:37,200
this there's a

1159
00:43:44,390 --> 00:43:40,880
um there's a couple of papers um

1160
00:43:46,630 --> 00:43:44,400
one on ufos and classical antiquity

1161
00:43:47,990 --> 00:43:46,640
and um and another paper on the same

1162
00:43:49,990 --> 00:43:48,000
topic

1163
00:43:51,270 --> 00:43:50,000

yes do you mind making a note to send

1164
00:43:54,470 --> 00:43:51,280
that to me later yeah

1165
00:43:55,990 --> 00:43:54,480
certainly you're only sending me about

1166
00:43:59,030 --> 00:43:56,000
romans or are you sending me

1167
00:44:01,030 --> 00:43:59,040
is there a list of ufo sightings or

1168
00:44:02,230 --> 00:44:01,040
potential ufo sightings across history

1169
00:44:05,589 --> 00:44:02,240
there's a book um

1170
00:44:06,309 --> 00:44:05,599
by jacques fellais um i keep hearing

1171
00:44:08,550 --> 00:44:06,319
about this

1172
00:44:10,870 --> 00:44:08,560
called wonders called wonders in the sky

1173
00:44:13,829 --> 00:44:10,880
and he has a compilation of

1174
00:44:15,430 --> 00:44:13,839
of curious accounts basically that could

1175
00:44:16,790 --> 00:44:15,440
be interpreted as

1176
00:44:19,750 --> 00:44:16,800
you know maybe the same type of

1177
00:44:25,750 --> 00:44:23,190
is he still alive yeah yeah he lives in

1178
00:44:29,910 --> 00:44:25,760
the bay area

1179
00:44:33,190 --> 00:44:31,589
as a physicist you want to stay within

1180
00:44:36,230 --> 00:44:33,200
what you know

1181
00:44:37,430 --> 00:44:36,240
but if you don't mind speculating why do

1182
00:44:39,670 --> 00:44:37,440
you think they're shutting down

1183
00:44:41,030 --> 00:44:39,680
our nuclear devices do you think that

1184
00:44:42,309 --> 00:44:41,040
that's just a side effect it's

1185
00:44:43,829 --> 00:44:42,319
inadvertent like maybe when they

1186
00:44:44,309 --> 00:44:43,839
accelerate that happens for whatever

1187
00:44:45,990 --> 00:44:44,319
reason

1188
00:44:47,510 --> 00:44:46,000

or do you think it's purposeful why do

1189
00:44:50,550 --> 00:44:47,520
they selectively shut it down in this

1190
00:44:53,349 --> 00:44:50,560
area and only at certain times

1191
00:44:54,790 --> 00:44:53,359
that's a good question i don't know how

1192
00:44:55,829 --> 00:44:54,800
i don't know the manner in which they

1193
00:44:57,910 --> 00:44:55,839
were shut down

1194
00:44:59,750 --> 00:44:57,920
i mean this stuff is still i mean i

1195
00:45:01,750 --> 00:44:59,760
don't think i don't think

1196
00:45:03,030 --> 00:45:01,760
the military has admitted that that's

1197
00:45:05,910 --> 00:45:03,040
actually happened

1198
00:45:06,630 --> 00:45:05,920
you have people who worked at these

1199
00:45:09,589 --> 00:45:06,640
sites who

1200
00:45:11,510 --> 00:45:09,599
claim that it happened um the most

1201
00:45:15,109 --> 00:45:11,520
detail i've heard was from robert

1202
00:45:16,710 --> 00:45:15,119
salas and he said that i believe it was

1203
00:45:18,420 --> 00:45:16,720
him and he said that it was a

1204
00:45:20,790 --> 00:45:18,430
failure of the um

1205
00:45:23,030 --> 00:45:20,800
[Music]

1206
00:45:25,589 --> 00:45:23,040
basically a failure of the of the

1207
00:45:29,349 --> 00:45:25,599
navigation and guidance systems

1208
00:45:31,670 --> 00:45:29,359
and that then led to a shutdown

1209
00:45:32,950 --> 00:45:31,680
so that's curious because now if you

1210
00:45:35,910 --> 00:45:32,960
have the inertial

1211
00:45:36,950 --> 00:45:35,920
nav you know inertial navigation systems

1212
00:45:40,150 --> 00:45:36,960
failing

1213
00:45:42,069 --> 00:45:40,160

you know could that be due to how the

1214
00:45:46,309 --> 00:45:42,079
craft operates

1215
00:45:48,230 --> 00:45:46,319
so maybe it's just a side side effect

1216
00:45:50,710 --> 00:45:48,240
i mean i i mean at this point you know

1217
00:45:51,349 --> 00:45:50,720
this is extremely hypothetical so i am

1218
00:45:53,910 --> 00:45:51,359
just

1219
00:45:56,550 --> 00:45:53,920
making up stories here but i mean if you

1220
00:45:58,550 --> 00:45:56,560
have a craft that basically is somehow

1221
00:45:59,990 --> 00:45:58,560
warping space time or affecting space

1222
00:46:01,990 --> 00:46:00,000
time and you've got an inertial

1223
00:46:02,790 --> 00:46:02,000
navigation system sitting nearby that

1224
00:46:06,150 --> 00:46:02,800
could

1225
00:46:07,910 --> 00:46:06,160
affect it so and then if their systems

1226
00:46:09,109 --> 00:46:07,920
are set up so that they shut down

1227
00:46:11,190 --> 00:46:09,119
whenever one of these things goes

1228
00:46:11,670 --> 00:46:11,200
haywire then the ufo flying over it

1229
00:46:13,670 --> 00:46:11,680
could

1230
00:46:15,750 --> 00:46:13,680
be enough to trigger that to shut down

1231
00:46:16,150 --> 00:46:15,760
is it on purpose is it an accident i

1232
00:46:17,990 --> 00:46:16,160
don't

1233
00:46:20,069 --> 00:46:18,000
i mean these these things have to be

1234
00:46:21,589 --> 00:46:20,079
studied and we have just gotten to the

1235
00:46:23,589 --> 00:46:21,599
point where

1236
00:46:24,790 --> 00:46:23,599
people are admitting that they're real i

1237
00:46:27,030 --> 00:46:24,800
mean after

1238
00:46:28,950 --> 00:46:27,040

after 80 years i think that's a little

1239
00:46:30,950 --> 00:46:28,960
to me i find that a little scary

1240
00:46:32,790 --> 00:46:30,960
and we've had this this going on for

1241
00:46:33,990 --> 00:46:32,800
about 80 years and it took us 80 years

1242
00:46:36,309 --> 00:46:34,000
to decide that it's

1243
00:46:37,109 --> 00:46:36,319
they're real um but we still don't know

1244
00:46:40,230 --> 00:46:37,119
what they are

1245
00:46:42,790 --> 00:46:40,240
you know what they're doing here 80

1246
00:46:45,430 --> 00:46:42,800
years you're referring to the 50s

1247
00:46:46,710 --> 00:46:45,440
from the 40s yeah late 40s there aren't

1248
00:46:49,750 --> 00:46:46,720
any reports

1249
00:46:51,349 --> 00:46:49,760
from the u.s government of ufos prior to

1250
00:46:52,630 --> 00:46:51,359
the 40s

1251
00:46:55,030 --> 00:46:52,640
i don't know about from the u.s

1252
00:46:59,510 --> 00:46:55,040
government there are reports of the ufos

1253
00:47:00,870 --> 00:46:59,520
prior to that um easily into the 1800s

1254
00:47:02,950 --> 00:47:00,880
numerous ones yeah

1255
00:47:04,470 --> 00:47:02,960
by ship captains and things like this

1256
00:47:06,390 --> 00:47:04,480
these things have been seen for a long

1257
00:47:07,109 --> 00:47:06,400
time which is another argument against

1258
00:47:11,750 --> 00:47:07,119
them being

1259
00:47:13,589 --> 00:47:11,760
american or russian chinese drones

1260
00:47:15,670 --> 00:47:13,599
they've been observed well before people

1261
00:47:17,109 --> 00:47:15,680
could fly so

1262
00:47:18,870 --> 00:47:17,119
there's someone who came out recently i

1263
00:47:21,190 --> 00:47:18,880

believe they're israeli

1264
00:47:22,549 --> 00:47:21,200
talking about ufos i don't know i forgot

1265
00:47:23,990 --> 00:47:22,559
the person's name i don't know the story

1266
00:47:25,190 --> 00:47:24,000
do you mind edifying me as well as the

1267
00:47:27,670 --> 00:47:25,200
audience

1268
00:47:30,069 --> 00:47:27,680
oh yeah well that was an interesting

1269
00:47:31,910 --> 00:47:30,079
story i don't remember his position and

1270
00:47:35,589 --> 00:47:31,920
i don't remember his name but he was

1271
00:47:39,990 --> 00:47:35,599
in the high up in the israeli military

1272
00:47:43,829 --> 00:47:42,069
yeah is he the one israeli director of

1273
00:47:45,349 --> 00:47:43,839
the space program it said

1274
00:47:48,390 --> 00:47:45,359
right so is he the one that claimed that

1275
00:47:51,510 --> 00:47:48,400
they were in contact with with

1276
00:47:53,910 --> 00:47:51,520
alien alien civilization here

1277
00:47:55,829 --> 00:47:53,920
for avi loeb from earlier today that

1278
00:47:57,510 --> 00:47:55,839
talks about this so the question was

1279
00:47:59,349 --> 00:47:57,520
okay i would like to hear avi loeb's

1280
00:47:59,990 --> 00:47:59,359
opinion on the claims of former israeli

1281
00:48:02,069 --> 00:48:00,000
director

1282
00:48:03,910 --> 00:48:02,079
of the space program hayim ashad brought

1283
00:48:05,109 --> 00:48:03,920
forward he must have heard about this so

1284
00:48:06,630 --> 00:48:05,119
and so they went through the news

1285
00:48:09,589 --> 00:48:06,640
briefly

1286
00:48:10,710 --> 00:48:09,599
um was it a hoax i guess this person

1287
00:48:13,990 --> 00:48:10,720
isn't

1288
00:48:14,710 --> 00:48:14,000

recapitulating what hen or hem a shed

1289
00:48:16,710 --> 00:48:14,720
said

1290
00:48:18,549 --> 00:48:16,720
because he's assuming obviously about it

1291
00:48:21,990 --> 00:48:18,559
some government officials

1292
00:48:25,109 --> 00:48:22,000
you know have had some pretty um pretty

1293
00:48:26,309 --> 00:48:25,119
exciting or interesting claims and it's

1294
00:48:29,829 --> 00:48:26,319
you know these still aren't

1295
00:48:33,349 --> 00:48:31,829
it's it's difficult it's difficult to

1296
00:48:34,390 --> 00:48:33,359
know how much of it is a claim how much

1297
00:48:37,510 --> 00:48:34,400
of it is a mistake

1298
00:48:40,710 --> 00:48:37,520
how much of it is

1299
00:48:42,630 --> 00:48:40,720
a problem with the individual you

1300
00:48:44,710 --> 00:48:42,640
you know we still have all of those

1301
00:48:46,790 --> 00:48:44,720
questions

1302
00:48:48,870 --> 00:48:46,800
when i spoke to jeremy corbell he seemed

1303
00:48:51,430 --> 00:48:48,880
to think that the aliens were

1304
00:48:53,589 --> 00:48:51,440
shutting down the nuclear arms as a flex

1305
00:48:55,349 --> 00:48:53,599
of their sovereignty

1306
00:48:56,790 --> 00:48:55,359
and well what you're saying is it might

1307
00:48:58,950 --> 00:48:56,800
be inadvertent

1308
00:49:00,069 --> 00:48:58,960
i'm also wondering why is it that people

1309
00:49:02,309 --> 00:49:00,079
can come out

1310
00:49:03,190 --> 00:49:02,319
like david fravor and so on other people

1311
00:49:05,349 --> 00:49:03,200
like you mentioned

1312
00:49:06,230 --> 00:49:05,359
from the government and not be sued by

1313
00:49:09,589 --> 00:49:06,240

the government or

1314
00:49:12,069 --> 00:49:09,599
destroyed

1315
00:49:13,430 --> 00:49:12,079
killed how are they allowed to speak

1316
00:49:15,109 --> 00:49:13,440
about it

1317
00:49:16,870 --> 00:49:15,119
i know you don't particularly like bob

1318
00:49:17,430 --> 00:49:16,880
lazar or believe bob lazar but let's

1319
00:49:20,630 --> 00:49:17,440
imagine

1320
00:49:22,549 --> 00:49:20,640
how is he allowed

1321
00:49:24,630 --> 00:49:22,559
there are people like him maybe not to

1322
00:49:26,470 --> 00:49:24,640
the same degree

1323
00:49:28,870 --> 00:49:26,480
right i don't that's a good question i

1324
00:49:30,870 --> 00:49:28,880
don't know um

1325
00:49:32,950 --> 00:49:30,880
i don't know much about workings in the

1326
00:49:37,270 --> 00:49:32,960
intelligence community so i'm not sure

1327
00:49:40,950 --> 00:49:37,280
how they would operate they may have

1328
00:49:41,829 --> 00:49:40,960
um opted to eliminated individuals in

1329
00:49:45,430 --> 00:49:41,839
the past

1330
00:49:48,549 --> 00:49:45,440
um i think at this point it would be

1331
00:49:50,230 --> 00:49:48,559
rather you know it would be fishy and

1332
00:49:53,270 --> 00:49:50,240
would probably draw more attention

1333
00:49:59,270 --> 00:49:57,430
so i don't know if i don't know and

1334
00:50:01,109 --> 00:49:59,280
you know if they you know if you have a

1335
00:50:02,309 --> 00:50:01,119
lawsuit where you sue them for talking

1336
00:50:04,069 --> 00:50:02,319
about this well then

1337
00:50:07,510 --> 00:50:04,079
now you've basically admitted that it's

1338
00:50:10,950 --> 00:50:07,520

true or some aspect of it's true

1339
00:50:12,549 --> 00:50:10,960
and so that would be a problem too

1340
00:50:14,870 --> 00:50:12,559
something else that's puzzled me about

1341
00:50:17,349 --> 00:50:14,880
aliens at all is that

1342
00:50:18,069 --> 00:50:17,359
our rate if i'm just going by our rate

1343
00:50:20,950 --> 00:50:18,079
of

1344
00:50:21,990 --> 00:50:20,960
technological improvement is drastic

1345
00:50:23,670 --> 00:50:22,000
every decade and

1346
00:50:25,510 --> 00:50:23,680
for sure every century so some people

1347
00:50:26,549 --> 00:50:25,520
would critique every decade like peter

1348
00:50:28,710 --> 00:50:26,559
thiel but at least

1349
00:50:30,790 --> 00:50:28,720
every century that's for sure and when

1350
00:50:32,150 --> 00:50:30,800
you take a look at

1351
00:50:34,309 --> 00:50:32,160
let's imagine these aliens are going

1352
00:50:35,190 --> 00:50:34,319
back to their planet that takes a couple

1353
00:50:38,069 --> 00:50:35,200
years

1354
00:50:40,870 --> 00:50:38,079
it from some other time frame it'll take

1355
00:50:42,150 --> 00:50:40,880
it may take them a

1356
00:50:44,470 --> 00:50:42,160
depending on their accelerations it

1357
00:50:48,069 --> 00:50:44,480
could be a few days to a few months

1358
00:50:49,589 --> 00:50:48,079
um for for us it can take it for us it

1359
00:50:50,710 --> 00:50:49,599
could take a thousand years or a hundred

1360
00:50:52,630 --> 00:50:50,720
couple hundred years so

1361
00:50:54,710 --> 00:50:52,640
yeah so let's just imagine they're going

1362
00:50:57,430 --> 00:50:54,720
back to their little alien civilization

1363
00:50:59,030 --> 00:50:57,440

in some other planet okay then i would

1364
00:51:01,670 --> 00:50:59,040
imagine that that planet

1365
00:51:02,870 --> 00:51:01,680
has increased its age by maybe a few

1366
00:51:04,390 --> 00:51:02,880
decades

1367
00:51:05,910 --> 00:51:04,400
then i would imagine that when they come

1368
00:51:07,990 --> 00:51:05,920
back they should be far

1369
00:51:09,510 --> 00:51:08,000
more technologically advanced each so

1370
00:51:11,109 --> 00:51:09,520
every decade for us when they're going

1371
00:51:12,549 --> 00:51:11,119
and coming back presuming they're going

1372
00:51:14,470 --> 00:51:12,559
and coming back

1373
00:51:15,990 --> 00:51:14,480
i don't see why it should look the same

1374
00:51:16,710 --> 00:51:16,000
at all because i would imagine that if

1375
00:51:19,190 --> 00:51:16,720
it was us

1376
00:51:20,470 --> 00:51:19,200
we would look vastly different every

1377
00:51:21,910 --> 00:51:20,480
century or so especially

1378
00:51:23,829 --> 00:51:21,920
century from now maybe our planes look

1379
00:51:26,950 --> 00:51:23,839
like triangles maybe a century

1380
00:51:27,990 --> 00:51:26,960
from maybe 200 years from now our planes

1381
00:51:29,670 --> 00:51:28,000
would look like dust

1382
00:51:31,510 --> 00:51:29,680
and then maybe farther it'll look like a

1383
00:51:32,870 --> 00:51:31,520
planet and so on you understand the idea

1384
00:51:34,790 --> 00:51:32,880
yeah so why do you think it is that

1385
00:51:36,950 --> 00:51:34,800
there's somewhat of a constancy

1386
00:51:38,470 --> 00:51:36,960
of the reports in terms of how they look

1387
00:51:38,950 --> 00:51:38,480
of visual inspection maybe even their

1388
00:51:42,470 --> 00:51:38,960

speed

1389
00:51:44,230 --> 00:51:42,480
of aliens given that we are so

1390
00:51:45,990 --> 00:51:44,240
quick with our technological advancement

1391
00:51:47,430 --> 00:51:46,000
and they're presumably far more advanced

1392
00:51:49,190 --> 00:51:47,440
than us which means their

1393
00:51:50,870 --> 00:51:49,200
trajectory of let's say moore's law or

1394
00:51:52,870 --> 00:51:50,880
whatever it is that they follow

1395
00:51:54,069 --> 00:51:52,880
should be they should be farther along

1396
00:51:55,510 --> 00:51:54,079
in the exponential curve

1397
00:51:57,990 --> 00:51:55,520
no that's an excellent that's an

1398
00:52:00,470 --> 00:51:58,000
excellent question and i

1399
00:52:02,150 --> 00:52:00,480
have a hypothesis that could answer that

1400
00:52:06,390 --> 00:52:02,160
in it

1401
00:52:08,230 --> 00:52:06,400
and i came up with this in response to

1402
00:52:11,510 --> 00:52:08,240
the

1403
00:52:14,790 --> 00:52:11,520
general reaction of so so

1404
00:52:15,510 --> 00:52:14,800
so it's we we we know well that if you

1405
00:52:20,150 --> 00:52:15,520
can

1406
00:52:21,670 --> 00:52:20,160
get a craft up to um relativistic speeds

1407
00:52:23,510 --> 00:52:21,680
if you could engineer something like

1408
00:52:25,030 --> 00:52:23,520
this so yes

1409
00:52:27,190 --> 00:52:25,040
huge engineering fee whatever we don't

1410
00:52:30,549 --> 00:52:27,200
even know how you'd pull it off whatever

1411
00:52:31,109 --> 00:52:30,559
yeah but if you could then time dilation

1412
00:52:34,950 --> 00:52:31,119
works

1413
00:52:38,390 --> 00:52:34,960

the traveler right

1414
00:52:40,790 --> 00:52:38,400
so so you could you could conceivably

1415
00:52:42,549 --> 00:52:40,800
leave your homeworld let's say you come

1416
00:52:44,710 --> 00:52:42,559
from a thousand light years away

1417
00:52:45,990 --> 00:52:44,720
you leave your home world and you travel

1418
00:52:49,670 --> 00:52:46,000
to earth and you

1419
00:52:52,470 --> 00:52:49,680
can travel close to the speed of light

1420
00:52:53,829 --> 00:52:52,480
so you can get here in a few weeks so

1421
00:52:57,270 --> 00:52:53,839
it's a few week trip to earth

1422
00:52:59,510 --> 00:52:57,280
that's nice for you um it will be

1423
00:53:01,030 --> 00:52:59,520
it'll take about a thousand years if if

1424
00:53:02,069 --> 00:53:01,040
that planet's a thousand light years

1425
00:53:03,829 --> 00:53:02,079
away from earth

1426
00:53:05,910 --> 00:53:03,839
it'll take a thousand years in the

1427
00:53:07,510 --> 00:53:05,920
galaxy frame so a thousand years will

1428
00:53:09,430 --> 00:53:07,520
pass on earth and a thousand years will

1429
00:53:12,390 --> 00:53:09,440
pass at home

1430
00:53:13,109 --> 00:53:12,400
and then now they hang out here they go

1431
00:53:14,950 --> 00:53:13,119
into

1432
00:53:16,230 --> 00:53:14,960
you know they land in a meadow and can

1433
00:53:24,870 --> 00:53:16,240
and

1434
00:53:25,910 --> 00:53:24,880
now on the way home it's another

1435
00:53:28,069 --> 00:53:25,920
thousand light years

1436
00:53:29,990 --> 00:53:28,079
so for us in the galaxy's frame it's

1437
00:53:30,710 --> 00:53:30,000
going to take another thousand years for

1438
00:53:33,910 --> 00:53:30,720

them to

1439
00:53:34,470 --> 00:53:33,920
get home um maybe a couple weeks for

1440
00:53:39,109 --> 00:53:34,480
them

1441
00:53:42,069 --> 00:53:39,119
a few month trip

1442
00:53:43,430 --> 00:53:42,079
um has turned into a 2000 year trip back

1443
00:53:46,630 --> 00:53:43,440
at home

1444
00:53:48,390 --> 00:53:46,640
and the argument you know while while

1445
00:53:50,710 --> 00:53:48,400
relativity would work in favor of the

1446
00:53:51,109 --> 00:53:50,720
traveler the question is who would do

1447
00:53:54,390 --> 00:53:51,119
that

1448
00:53:55,990 --> 00:53:54,400
because what society would ever conceive

1449
00:53:59,430 --> 00:53:56,000
of a mission that would take 2

1450
00:54:01,430 --> 00:53:59,440
000 years because the people who

1451
00:54:03,430 --> 00:54:01,440
designed the mission are never going to

1452
00:54:05,750 --> 00:54:03,440
see the results of it

1453
00:54:07,910 --> 00:54:05,760
and the travelers are going to come back

1454
00:54:09,910 --> 00:54:07,920
to a culture that's totally different

1455
00:54:13,430 --> 00:54:09,920
than the culture they left because of

1456
00:54:14,710 --> 00:54:13,440
the the the um reasons that you're

1457
00:54:18,630 --> 00:54:14,720
stating

1458
00:54:21,910 --> 00:54:18,640
so so why would anyone do this well the

1459
00:54:24,950 --> 00:54:21,920
the supposition is that they are

1460
00:54:26,630 --> 00:54:24,960
going to go home um and that they live

1461
00:54:29,190 --> 00:54:26,640
on a planet and i think that's

1462
00:54:31,109 --> 00:54:29,200
you know that that's what we have

1463
00:54:33,670 --> 00:54:31,119

implicitly assumed there

1464
00:54:34,630 --> 00:54:33,680
what we've neglected to remember is that

1465
00:54:36,630 --> 00:54:34,640
even on earth

1466
00:54:39,270 --> 00:54:36,640
there exists nomadic tribes and there

1467
00:54:42,309 --> 00:54:39,280
still exists nomadic tribes

1468
00:54:45,349 --> 00:54:42,319
so you could pull this off if you were

1469
00:54:46,549 --> 00:54:45,359
a nomadic society not a planet-bound

1470
00:54:49,349 --> 00:54:46,559
society

1471
00:54:51,030 --> 00:54:49,359
so imagine you know you and me we want

1472
00:54:51,589 --> 00:54:51,040
to go space traveling but we don't want

1473
00:54:54,069 --> 00:54:51,599
to

1474
00:54:56,470 --> 00:54:54,079
be ten you know a thousand years apart

1475
00:55:00,309 --> 00:54:56,480
um i'll head off to

1476
00:55:02,150 --> 00:55:00,319
um to the star rigel or something 900

1477
00:55:05,190 --> 00:55:02,160
light years away you pick another

1478
00:55:08,630 --> 00:55:05,200
place to go about about as distant

1479
00:55:11,190 --> 00:55:08,640
and we plan to meet back up here at

1480
00:55:13,109 --> 00:55:11,200
you know a certain time in the future so

1481
00:55:15,190 --> 00:55:13,119
we can plan our trip accordingly so that

1482
00:55:17,670 --> 00:55:15,200
we come back here at the same time

1483
00:55:18,789 --> 00:55:17,680
and it may be 2 000 years in earth's

1484
00:55:20,390 --> 00:55:18,799
future but

1485
00:55:21,990 --> 00:55:20,400
you know we don't care we can still meet

1486
00:55:23,589 --> 00:55:22,000
up and compare notes and then we can

1487
00:55:25,510 --> 00:55:23,599
travel off again

1488
00:55:28,069 --> 00:55:25,520

so you can imagine that you could have a

1489
00:55:30,309 --> 00:55:28,079
whole breakaway civilization like this

1490
00:55:32,230 --> 00:55:30,319
where it literally is a civil

1491
00:55:34,069 --> 00:55:32,240
civilization of travelers

1492
00:55:35,829 --> 00:55:34,079
and that's what they do they travel and

1493
00:55:38,549 --> 00:55:35,839
they travel and they explore

1494
00:55:39,670 --> 00:55:38,559
and they periodically meet up they have

1495
00:55:41,510 --> 00:55:39,680
meet up points

1496
00:55:43,510 --> 00:55:41,520
and meet up times that are all

1497
00:55:44,950 --> 00:55:43,520
pre-arranged or they have some algorithm

1498
00:55:47,670 --> 00:55:44,960
for this

1499
00:55:48,549 --> 00:55:47,680
and um they can then exchange goods they

1500
00:55:51,670 --> 00:55:48,559
can exchange

1501
00:55:53,589 --> 00:55:51,680
information and travel again and what

1502
00:55:55,430 --> 00:55:53,599
they're basically doing is they're using

1503
00:55:57,270 --> 00:55:55,440
relativity in their favor

1504
00:55:59,109 --> 00:55:57,280
using time dilation in their favor and

1505
00:56:01,270 --> 00:55:59,119
they're basically

1506
00:56:02,870 --> 00:56:01,280
but but they're not just space traveling

1507
00:56:03,910 --> 00:56:02,880
they're also time traveling into the

1508
00:56:05,589 --> 00:56:03,920
future right

1509
00:56:07,430 --> 00:56:05,599
so they're they're traveling through

1510
00:56:08,789 --> 00:56:07,440
space interstellar space but they're

1511
00:56:10,470 --> 00:56:08,799
also traveling through time

1512
00:56:13,270 --> 00:56:10,480
by racing forward into the future with

1513
00:56:15,109 --> 00:56:13,280

respect to the rest of the galaxy

1514
00:56:16,390 --> 00:56:15,119
so all of them and their friends are

1515
00:56:19,510 --> 00:56:16,400
also traveling around

1516
00:56:21,430 --> 00:56:19,520
to meet up at the same 2000 year future

1517
00:56:23,589 --> 00:56:21,440
relative to the galaxy yeah they might

1518
00:56:25,030 --> 00:56:23,599
not they might not have a single meet-up

1519
00:56:25,510 --> 00:56:25,040
place they might have multiple meet-up

1520
00:56:27,750 --> 00:56:25,520
places

1521
00:56:30,230 --> 00:56:27,760
and just randomly meet up but yeah you

1522
00:56:32,150 --> 00:56:30,240
could do it various ways

1523
00:56:33,910 --> 00:56:32,160
and if that was the situation then you

1524
00:56:34,789 --> 00:56:33,920
could take advantage of relativity to

1525
00:56:38,150 --> 00:56:34,799
travel

1526
00:56:41,270 --> 00:56:38,160
you know galactic distances

1527
00:56:43,670 --> 00:56:41,280
and um and

1528
00:56:44,870 --> 00:56:43,680
the advantages i mean it would be very

1529
00:56:48,789 --> 00:56:44,880
interesting because

1530
00:56:51,510 --> 00:56:48,799
you could um so imagine that you

1531
00:56:53,190 --> 00:56:51,520
accelerate you know at a thousand if you

1532
00:56:54,870 --> 00:56:53,200
could accelerate at a thousand g

1533
00:56:57,109 --> 00:56:54,880
like you know similar to some of these

1534
00:56:59,109 --> 00:56:57,119
objects we've observed

1535
00:57:00,549 --> 00:56:59,119
you could accelerate at 1000g halfway

1536
00:57:02,470 --> 00:57:00,559
decelerated 1000g

1537
00:57:04,150 --> 00:57:02,480
the other half you can get from one side

1538
00:57:04,789 --> 00:57:04,160

of the galaxy to the other in just a

1539
00:57:09,510 --> 00:57:04,799
couple

1540
00:57:11,190 --> 00:57:09,520
so let's say it takes you three months

1541
00:57:13,270 --> 00:57:11,200
to get from one side of the galaxy to

1542
00:57:15,910 --> 00:57:13,280
the other and then you can come back

1543
00:57:16,950 --> 00:57:15,920
and when you come back it's taking you a

1544
00:57:19,510 --> 00:57:16,960
six month trip

1545
00:57:21,109 --> 00:57:19,520
but you know in the galaxy's frame it's

1546
00:57:22,789 --> 00:57:21,119
going to be about a hundred thousand

1547
00:57:26,549 --> 00:57:22,799
years later

1548
00:57:29,190 --> 00:57:26,559
so you get to travel through time and

1549
00:57:31,349 --> 00:57:29,200
and so now your perspective of the

1550
00:57:34,630 --> 00:57:31,359
universe is very different

1551
00:57:36,950 --> 00:57:34,640
um first when you first

1552
00:57:39,190 --> 00:57:36,960
when people look at you they're going to

1553
00:57:41,109 --> 00:57:39,200
see the same ships

1554
00:57:42,789 --> 00:57:41,119
you're traveling in the same craft and

1555
00:57:44,789 --> 00:57:42,799
why do these craft not evolve

1556
00:57:46,630 --> 00:57:44,799
because it's actually the same one it

1557
00:57:49,270 --> 00:57:46,640
could actually be the same craft

1558
00:57:51,670 --> 00:57:49,280
so the same craft that was observed in

1559
00:57:54,309 --> 00:57:51,680
roman times could literally be the same

1560
00:57:54,870 --> 00:57:54,319
object with the same you know beings in

1561
00:57:56,789 --> 00:57:54,880
it

1562
00:57:58,390 --> 00:57:56,799
you know two thousand years later they

1563
00:58:00,630 --> 00:57:58,400

could literally be the same options

1564
00:58:02,390 --> 00:58:00,640
fascinating fascinating fascinating so

1565
00:58:03,190 --> 00:58:02,400
let's imagine this is a 10-day journey

1566
00:58:06,230 --> 00:58:03,200
for them

1567
00:58:08,549 --> 00:58:06,240
it's a couple days yeah so

1568
00:58:09,589 --> 00:58:08,559
they would be you so they might be very

1569
00:58:13,109 --> 00:58:09,599
now for them

1570
00:58:15,589 --> 00:58:13,119
we are ephemeral right and

1571
00:58:17,670 --> 00:58:15,599
um because they're when they come back

1572
00:58:19,430 --> 00:58:17,680
you and i are going to be gone so

1573
00:58:21,109 --> 00:58:19,440
there's no point in making friends

1574
00:58:22,789 --> 00:58:21,119
there's no point in landing on the white

1575
00:58:23,829 --> 00:58:22,799
house lawn and introducing yourself to

1576
00:58:25,589 --> 00:58:23,839
the president

1577
00:58:27,030 --> 00:58:25,599
because the next time they come back the

1578
00:58:28,230 --> 00:58:27,040
united states isn't even going to be

1579
00:58:31,349 --> 00:58:28,240
here

1580
00:58:33,030 --> 00:58:31,359
it'll be something else another culture

1581
00:58:35,349 --> 00:58:33,040
so there's no point in getting to know

1582
00:58:38,069 --> 00:58:35,359
the locals

1583
00:58:39,589 --> 00:58:38,079
so it could explain why they you know

1584
00:58:41,109 --> 00:58:39,599
and if they study

1585
00:58:42,710 --> 00:58:41,119
you could then actually study a

1586
00:58:44,710 --> 00:58:42,720
civilization so their

1587
00:58:46,390 --> 00:58:44,720
concept of a civilization and how you

1588
00:58:48,230 --> 00:58:46,400

study civilizations would be very

1589
00:58:51,670 --> 00:58:48,240
different you can actually watch

1590
00:58:53,510 --> 00:58:51,680
civilizations evolve right right

1591
00:58:55,750 --> 00:58:53,520
we're kind of like fruit flies to them

1592
00:58:58,789 --> 00:58:55,760
right now so they could

1593
00:59:00,390 --> 00:58:58,799
oh that's right that's it's fascinating

1594
00:59:02,789 --> 00:59:00,400
fascinating

1595
00:59:03,990 --> 00:59:02,799
so it would be like imagine for the

1596
00:59:06,150 --> 00:59:04,000
people listening

1597
00:59:07,670 --> 00:59:06,160
to get some to get another analogy for

1598
00:59:09,430 --> 00:59:07,680
me as well is

1599
00:59:10,710 --> 00:59:09,440
i'm pressing play on a movie and then

1600
00:59:11,990 --> 00:59:10,720
i'm speeding up the movie you know you

1601
00:59:12,390 --> 00:59:12,000
can do that on google you can speed up

1602
00:59:18,870 --> 00:59:12,400
by

1603
00:59:20,150 --> 00:59:18,880
a thousand or whatever maybe a million x

1604
00:59:21,349 --> 00:59:20,160
and then every once in a while you come

1605
00:59:22,470 --> 00:59:21,359
into the room you're like oh that's an

1606
00:59:24,150 --> 00:59:22,480
interesting part of the movie then you

1607
00:59:26,230 --> 00:59:24,160
walk out of the room then you come back

1608
00:59:27,829 --> 00:59:26,240
okay so for you it's just a couple days

1609
00:59:29,109 --> 00:59:27,839
and you have a few of your friends who

1610
00:59:31,030 --> 00:59:29,119
are doing something similar

1611
00:59:32,710 --> 00:59:31,040
so from the movies perspective if they

1612
00:59:34,230 --> 00:59:32,720
were to look out they would see

1613
00:59:37,430 --> 00:59:34,240

oh there's someone who has similar

1614
00:59:39,750 --> 00:59:37,440
characteristics as the person before

1615
00:59:41,270 --> 00:59:39,760
fascinating fascinating why do you think

1616
00:59:44,309 --> 00:59:41,280
it is that aliens look

1617
00:59:47,510 --> 00:59:44,319
somewhat like us at least

1618
00:59:49,510 --> 00:59:47,520
when at least from the reports

1619
00:59:51,190 --> 00:59:49,520
and again right right and again we're

1620
00:59:52,870 --> 00:59:51,200
taking some of these reports to be

1621
00:59:54,150 --> 00:59:52,880
serious because just like we're taking

1622
00:59:55,510 --> 00:59:54,160
some of the reports of the crap to be

1623
00:59:57,829 --> 00:59:55,520
serious

1624
00:59:58,710 --> 00:59:57,839
it seems like it's not that wild they're

1625
01:00:02,549 --> 00:59:58,720
not octopus

1626
01:00:05,990 --> 01:00:02,559
they're people with two eyes four limbs

1627
01:00:10,230 --> 01:00:06,000
so that's a good question um i don't

1628
01:00:13,670 --> 01:00:10,240
have a good answer for that i would

1629
01:00:15,109 --> 01:00:13,680
imagine that a pasta if if that's really

1630
01:00:18,309 --> 01:00:15,119
the case then i imagine

1631
01:00:20,870 --> 01:00:18,319
that the it could very well be as

1632
01:00:22,150 --> 01:00:20,880
a situation of convergent evolution

1633
01:00:24,710 --> 01:00:22,160
right um

1634
01:00:26,549 --> 01:00:24,720
and we we don't really understand yet

1635
01:00:30,390 --> 01:00:26,559
how

1636
01:00:32,789 --> 01:00:30,400
you know different environmental factors

1637
01:00:34,230 --> 01:00:32,799
affect evolution but you know we can

1638
01:00:35,510 --> 01:00:34,240

look at earth's history and get some

1639
01:00:37,910 --> 01:00:35,520
ideas so

1640
01:00:40,069 --> 01:00:37,920
uh fish shapes right fish shapes the

1641
01:00:41,750 --> 01:00:40,079
fish shape works great in water right

1642
01:00:43,109 --> 01:00:41,760
nice and streamlined if you're shaped

1643
01:00:44,549 --> 01:00:43,119
like a fish

1644
01:00:46,390 --> 01:00:44,559
and there have been other things with

1645
01:00:46,789 --> 01:00:46,400
fish shapes right the same shapes you've

1646
01:00:49,109 --> 01:00:46,799
had

1647
01:00:50,069 --> 01:00:49,119
um you have fish that are fish shaped

1648
01:00:51,910 --> 01:00:50,079
you have

1649
01:00:54,069 --> 01:00:51,920
reptiles that are fish shaped the

1650
01:00:56,789 --> 01:00:54,079
ichthyosaurs right and you have

1651
01:00:58,150 --> 01:00:56,799
um mammals that are fish shaped whales

1652
01:01:00,870 --> 01:00:58,160
and dolphins

1653
01:01:01,430 --> 01:01:00,880
so that same shape evolved multiple

1654
01:01:05,589 --> 01:01:01,440
times

1655
01:01:12,069 --> 01:01:08,630
so having two free hands

1656
01:01:15,030 --> 01:01:12,079
is very useful to building spaceships so

1657
01:01:15,829 --> 01:01:15,040
maybe if you look like an optic octopus

1658
01:01:17,910 --> 01:01:15,839
and you're very

1659
01:01:19,430 --> 01:01:17,920
brilliant you don't you know or if

1660
01:01:21,829 --> 01:01:19,440
you're a dolphin

1661
01:01:25,030 --> 01:01:21,839
dolphins don't have thumbs go back to an

1662
01:01:27,750 --> 01:01:26,470
you said dolphins don't have thumbs so

1663
01:01:29,510 --> 01:01:27,760

they're not going to build spaceships it

1664
01:01:31,829 --> 01:01:29,520
doesn't matter how smart they are

1665
01:01:35,750 --> 01:01:31,839
that's not going to happen and so it

1666
01:01:40,309 --> 01:01:38,789
another just to go off on a speculative

1667
01:01:41,670 --> 01:01:40,319
jump i've heard this

1668
01:01:43,030 --> 01:01:41,680
said by some of the people who have

1669
01:01:44,230 --> 01:01:43,040
encountered aliens or supposedly

1670
01:01:47,349 --> 01:01:44,240
encounter aliens

1671
01:01:50,150 --> 01:01:47,359
that we're an experiment so one is that

1672
01:01:51,190 --> 01:01:50,160
okay this is just what happens with

1673
01:01:53,270 --> 01:01:51,200
convergent evolution

1674
01:01:54,630 --> 01:01:53,280
but another is that they somehow caused

1675
01:01:55,670 --> 01:01:54,640
us

1676
01:01:57,510 --> 01:01:55,680
and then that's why there's a

1677
01:01:59,589 --> 01:01:57,520
correlation and that one is fascinating

1678
01:02:00,710 --> 01:01:59,599
because i remember hearing someone say

1679
01:02:02,150 --> 01:02:00,720
it might have been lazar it might have

1680
01:02:03,029 --> 01:02:02,160
been someone else say that i don't think

1681
01:02:05,270 --> 01:02:03,039
it was lazar

1682
01:02:06,470 --> 01:02:05,280
someone say that the aliens referred to

1683
01:02:08,069 --> 01:02:06,480
us you know

1684
01:02:09,829 --> 01:02:08,079
this is obviously presuming that we can

1685
01:02:13,270 --> 01:02:09,839
speak to them or that they it's all true

1686
01:02:15,190 --> 01:02:13,280
the aliens refer to us as carriers or of

1687
01:02:17,589 --> 01:02:15,200
vessels of something

1688
01:02:19,270 --> 01:02:17,599

of what that's scary let's just imagine

1689
01:02:22,710 --> 01:02:19,280
it's true of what

1690
01:02:26,309 --> 01:02:22,720
of consciousness of a soul of

1691
01:02:28,150 --> 01:02:26,319
biological material of what

1692
01:02:30,230 --> 01:02:28,160
yeah some of these yeah some of these

1693
01:02:33,430 --> 01:02:30,240
stories are very strange

1694
01:02:35,829 --> 01:02:33,440
and it's really hard to

1695
01:02:37,430 --> 01:02:35,839
know what to make of them um it's it's

1696
01:02:40,069 --> 01:02:37,440
far easier to just say

1697
01:02:41,510 --> 01:02:40,079
it's got to be nonsense right and we've

1698
01:02:43,750 --> 01:02:41,520
but we've been down that road

1699
01:02:45,270 --> 01:02:43,760
several times now well you you just gave

1700
01:02:46,630 --> 01:02:45,280
me such an you just

1701
01:02:47,829 --> 01:02:46,640
i don't know was this something you've

1702
01:02:49,270 --> 01:02:47,839
been working on for a little while that

1703
01:02:49,910 --> 01:02:49,280
little theory where they come in and out

1704
01:02:53,109 --> 01:02:49,920
and

1705
01:02:54,390 --> 01:02:53,119
yeah for for about a year yeah about no

1706
01:02:57,510 --> 01:02:54,400
i came up with it about

1707
01:03:00,549 --> 01:02:57,520
two years ago and i presented that idea

1708
01:03:02,069 --> 01:03:00,559
at the one of the conferences with the

1709
01:03:06,069 --> 01:03:02,079
society for

1710
01:03:09,109 --> 01:03:06,079
um scientific coalition for uap

1711
01:03:09,430 --> 01:03:09,119
studies so i presented it to them i have

1712
01:03:12,470 --> 01:03:09,440
a

1713
01:03:13,910 --> 01:03:12,480

the link to

1714
01:03:15,510 --> 01:03:13,920
please write that down if you don't mind

1715
01:03:17,109 --> 01:03:15,520
because even if i don't

1716
01:03:18,710 --> 01:03:17,119
watch it which i hopefully do i

1717
01:03:20,470 --> 01:03:18,720
hopefully get the time to watch it i'll

1718
01:03:25,349 --> 01:03:20,480
still include it in the description

1719
01:03:29,349 --> 01:03:27,510
yeah i've i've started writing that up

1720
01:03:32,710 --> 01:03:29,359
as a paper but i haven't finished that

1721
01:03:35,990 --> 01:03:34,789
right there are two facts about aliens

1722
01:03:37,510 --> 01:03:36,000
that always

1723
01:03:39,430 --> 01:03:37,520
troubled me about them so one is that

1724
01:03:40,950 --> 01:03:39,440
they look too much like us there's two

1725
01:03:42,150 --> 01:03:40,960
human in other words but we just

1726
01:03:44,150 --> 01:03:42,160
found a way to get around that one

1727
01:03:44,549 --> 01:03:44,160
convergent or two they caused us in some

1728
01:03:47,029 --> 01:03:44,559
way

1729
01:03:48,549 --> 01:03:47,039
and then number two is that the rate of

1730
01:03:52,470 --> 01:03:48,559
technological progress should be

1731
01:03:54,150 --> 01:03:52,480
should be so far so quick that

1732
01:03:55,829 --> 01:03:54,160
they would be unrecognizable there would

1733
01:03:57,829 --> 01:03:55,839
be no

1734
01:03:59,430 --> 01:03:57,839
through line to even call them aliens

1735
01:03:59,990 --> 01:03:59,440
across the decades especially across the

1736
01:04:01,430 --> 01:04:00,000
centuries

1737
01:04:03,270 --> 01:04:01,440
but you've managed to find a way around

1738
01:04:04,470 --> 01:04:03,280

that as well that's fascinating

1739
01:04:07,829 --> 01:04:04,480
that's fascinating so now what i'm

1740
01:04:09,589 --> 01:04:07,839
wondering i'm sorry to get off on this

1741
01:04:11,510 --> 01:04:09,599
idea shooting back and forth no these

1742
01:04:13,029 --> 01:04:11,520
are fun things to think about

1743
01:04:15,270 --> 01:04:13,039
great great great now what i'm wondering

1744
01:04:17,829 --> 01:04:15,280
is imagine if

1745
01:04:18,789 --> 01:04:17,839
i have a let's just say fish tank for

1746
01:04:21,829 --> 01:04:18,799
lack of a better word

1747
01:04:25,029 --> 01:04:21,839
and that fish tank i can turn up

1748
01:04:26,549 --> 01:04:25,039
the rate at which time passes on it so

1749
01:04:28,789 --> 01:04:26,559
again this is like that movie analogy

1750
01:04:31,190 --> 01:04:28,799
it's going at a trillion times our speed

1751
01:04:32,069 --> 01:04:31,200
okay so i'm turning it up what i want to

1752
01:04:34,789 --> 01:04:32,079
do is i want to

1753
01:04:36,150 --> 01:04:34,799
test out imagine i'm just testing out

1754
01:04:37,430 --> 01:04:36,160
how is life going to work in this

1755
01:04:39,270 --> 01:04:37,440
scenario

1756
01:04:41,430 --> 01:04:39,280
so i can start it maybe it's even

1757
01:04:44,870 --> 01:04:41,440
there's a word for this panspermia

1758
01:04:45,990 --> 01:04:44,880
yeah right okay so i test out what it's

1759
01:04:46,630 --> 01:04:46,000
going to look like then i come back and

1760
01:04:49,190 --> 01:04:46,640
i look

1761
01:04:51,349 --> 01:04:49,200
what is i wonder if that's what's going

1762
01:04:54,150 --> 01:04:51,359
on wonder if we are just some experiment

1763
01:04:55,750 --> 01:04:54,160

for them the whole alien abduction

1764
01:04:57,829 --> 01:04:55,760
phenomenon is very strange

1765
01:04:59,349 --> 01:04:57,839
there's a lot of strange aspects to it

1766
01:05:02,950 --> 01:04:59,359
and one thing that

1767
01:05:04,710 --> 01:05:02,960
bothers me is that the if the

1768
01:05:07,270 --> 01:05:04,720
number of people who claim to be

1769
01:05:08,069 --> 01:05:07,280
abducted are if that's actually correct

1770
01:05:11,829 --> 01:05:08,079
if they actually

1771
01:05:15,190 --> 01:05:11,839
have been then then the question is why

1772
01:05:17,670 --> 01:05:15,200
and what are they doing to them because

1773
01:05:19,190 --> 01:05:17,680
you don't need to you don't need to

1774
01:05:21,430 --> 01:05:19,200
abduct a million people to do a

1775
01:05:24,870 --> 01:05:21,440
scientific experiment on

1776
01:05:28,150 --> 01:05:24,880
on the human body right um you

1777
01:05:29,990 --> 01:05:28,160
only need maybe a thousand or so so

1778
01:05:31,990 --> 01:05:30,000
way too many people are getting abducted

1779
01:05:32,789 --> 01:05:32,000
so the question is what is actually

1780
01:05:34,630 --> 01:05:32,799
happening

1781
01:05:36,789 --> 01:05:34,640
would be the next question i'd have if

1782
01:05:38,950 --> 01:05:36,799
the if the abductions are real of course

1783
01:05:40,870 --> 01:05:38,960
right right have you found any credible

1784
01:05:41,990 --> 01:05:40,880
evidence to the alien abductions and

1785
01:05:44,630 --> 01:05:42,000
have you found any

1786
01:05:46,069 --> 01:05:44,640
material that's foreign embedded within

1787
01:05:48,390 --> 01:05:46,079
some people i know that some people

1788
01:05:54,150 --> 01:05:51,829

no i know that there are is

1789
01:05:56,230 --> 01:05:54,160
a group at least one group that is

1790
01:05:58,069 --> 01:05:56,240
studying alien abductions in a more

1791
01:05:59,029 --> 01:05:58,079
detailed way but that's all that i know

1792
01:06:03,750 --> 01:05:59,039
about

1793
01:06:09,190 --> 01:06:03,760
lazar

1794
01:06:11,190 --> 01:06:09,200
that i'm not suspicious or suspicious

1795
01:06:12,309 --> 01:06:11,200
i'm just curious because someone who

1796
01:06:15,109 --> 01:06:12,319
studies aliens

1797
01:06:16,870 --> 01:06:15,119
to me they they just want they just

1798
01:06:18,950 --> 01:06:16,880
accept what bob says especially because

1799
01:06:22,789 --> 01:06:18,960
it validates what they've been thinking

1800
01:06:26,950 --> 01:06:22,799
right i'm suspicious because

1801
01:06:28,390 --> 01:06:26,960
he has supposedly as a background in

1802
01:06:31,510 --> 01:06:28,400
physics he claims to have

1803
01:06:31,990 --> 01:06:31,520
have a master's degree in physics and

1804
01:06:36,069 --> 01:06:32,000
when he

1805
01:06:42,789 --> 01:06:39,510
he he's careful about describing

1806
01:06:45,750 --> 01:06:42,799
the physics with

1807
01:06:47,910 --> 01:06:45,760
enough detail to be tantalizing but not

1808
01:06:52,309 --> 01:06:47,920
enough detail for you to be able to tell

1809
01:06:55,589 --> 01:06:53,990
can that not simply be a function of

1810
01:06:57,750 --> 01:06:55,599
ignorance so for example

1811
01:06:59,510 --> 01:06:57,760
he just doesn't know beyond that point

1812
01:07:00,069 --> 01:06:59,520
because it's not clear how the craft

1813
01:07:02,470 --> 01:07:00,079

work

1814
01:07:04,470 --> 01:07:02,480
that could be that could be part of it

1815
01:07:10,150 --> 01:07:04,480
he just might not know

1816
01:07:14,309 --> 01:07:11,910
yeah no i mean that could be part of it

1817
01:07:17,589 --> 01:07:14,319
i just i just get the impression that

1818
01:07:19,190 --> 01:07:17,599
that he is walking that he's i get the

1819
01:07:20,870 --> 01:07:19,200
impression he's purposefully walking

1820
01:07:22,870 --> 01:07:20,880
that line between

1821
01:07:25,029 --> 01:07:22,880
you know of giving enough information to

1822
01:07:28,710 --> 01:07:25,039
be tantalizing and sound

1823
01:07:31,190 --> 01:07:28,720
sounding um you know realistic

1824
01:07:33,670 --> 01:07:31,200
without giving you enough information to

1825
01:07:35,670 --> 01:07:33,680
be able to test it

1826
01:07:37,670 --> 01:07:35,680
have you watched any of his technical

1827
01:07:38,470 --> 01:07:37,680
talks i only know of one maybe there are

1828
01:07:41,349 --> 01:07:38,480
more

1829
01:07:42,069 --> 01:07:41,359
i don't know if i sent it to you there

1830
01:07:43,750 --> 01:07:42,079
is one

1831
01:07:45,349 --> 01:07:43,760
80s i don't know i would like to see it

1832
01:07:47,029 --> 01:07:45,359
i guess i'd like to watch it

1833
01:07:48,789 --> 01:07:47,039
i should have sent that to you because

1834
01:07:50,230 --> 01:07:48,799
he talks about how he thinks the craft

1835
01:07:52,230 --> 01:07:50,240
work and there are

1836
01:07:53,990 --> 01:07:52,240
diagrams and then he also refers to

1837
01:07:55,029 --> 01:07:54,000
element 115 i'm sure you've heard that

1838
01:07:57,349 --> 01:07:55,039

over and over

1839
01:07:59,190 --> 01:07:57,359
right which is interesting because he

1840
01:08:01,190 --> 01:07:59,200
associates the strong force

1841
01:08:02,870 --> 01:08:01,200
as gravity number two or gravity number

1842
01:08:05,109 --> 01:08:02,880
one which is

1843
01:08:06,230 --> 01:08:05,119
to me one of the reasons i got

1844
01:08:08,390 --> 01:08:06,240
interested in this kevin

1845
01:08:10,069 --> 01:08:08,400
is because i'm interested in the

1846
01:08:11,910 --> 01:08:10,079
fundamental laws

1847
01:08:13,990 --> 01:08:11,920
of the universe and so how do you unify

1848
01:08:15,910 --> 01:08:14,000
qft with gr

1849
01:08:17,269 --> 01:08:15,920
okay now if you're claiming that the

1850
01:08:17,910 --> 01:08:17,279
strong force has something to do with

1851
01:08:20,309 --> 01:08:17,920
gravity

1852
01:08:21,829 --> 01:08:20,319
that to me is extremely interesting

1853
01:08:24,149 --> 01:08:21,839
right

1854
01:08:24,950 --> 01:08:24,159
yeah have you heard him talk about the

1855
01:08:26,390 --> 01:08:24,960
strong force

1856
01:08:28,630 --> 01:08:26,400
in that manner and then what's wrong

1857
01:08:29,749 --> 01:08:28,640
well i've heard that he said that but

1858
01:08:31,910 --> 01:08:29,759
that's all that i

1859
01:08:32,950 --> 01:08:31,920
i know about it i would yeah so i'd like

1860
01:08:35,189 --> 01:08:32,960
to watch that talk

1861
01:08:36,630 --> 01:08:35,199
actually that would be fun me and you

1862
01:08:38,070 --> 01:08:36,640
have to have another conversation after

1863
01:08:39,910 --> 01:08:38,080

you watch all right

1864
01:08:41,110 --> 01:08:39,920
if you don't mind that'll be no i would

1865
01:08:42,630 --> 01:08:41,120
love to

1866
01:08:44,470 --> 01:08:42,640
okay you said i've been in contact with

1867
01:08:47,189 --> 01:08:44,480
eric bart who is currently

1868
01:08:48,630 --> 01:08:47,199
a pi at skinwalker ranch pi meaning

1869
01:08:51,030 --> 01:08:48,640
private investigator

1870
01:08:52,709 --> 01:08:51,040
uh no principal investigator like he's

1871
01:08:55,829 --> 01:08:52,719
the principal scientist

1872
01:08:59,030 --> 01:08:55,839
he is working for um

1873
01:09:01,110 --> 01:08:59,040
brandon fugle who owns the ranch and

1874
01:09:03,510 --> 01:09:01,120
um and they're performing their own

1875
01:09:05,349 --> 01:09:03,520
studies so

1876
01:09:07,269 --> 01:09:05,359
so i don't really get a lot of

1877
01:09:10,550 --> 01:09:07,279
information from him about

1878
01:09:13,430 --> 01:09:10,560
you know events or details so um

1879
01:09:14,709 --> 01:09:13,440
but we have talked about you know

1880
01:09:16,229 --> 01:09:14,719
possibly

1881
01:09:18,309 --> 01:09:16,239
you know sharing information at some

1882
01:09:19,829 --> 01:09:18,319
point he's contacting you because you're

1883
01:09:21,510 --> 01:09:19,839
one of the few that are actually taking

1884
01:09:25,030 --> 01:09:21,520
this seriously or you contacted him

1885
01:09:27,269 --> 01:09:25,040
i contacted him initially because i was

1886
01:09:28,390 --> 01:09:27,279
i was working and i'm still working on

1887
01:09:33,189 --> 01:09:28,400
trying to get

1888
01:09:36,229 --> 01:09:33,199

satellite imagery of ufos or uaps

1889
01:09:37,110 --> 01:09:36,239
and since they had had sightings on the

1890
01:09:41,349 --> 01:09:37,120
ranch

1891
01:09:42,789 --> 01:09:41,359
um and they know the place and the time

1892
01:09:44,070 --> 01:09:42,799
they might those would be good

1893
01:09:48,309 --> 01:09:44,080
candidates to get

1894
01:09:50,789 --> 01:09:48,319
um archived satellite imagery

1895
01:09:52,950 --> 01:09:50,799
so you could get get a third-party

1896
01:09:53,510 --> 01:09:52,960
confirmation that you know from space

1897
01:09:56,070 --> 01:09:53,520
that yeah

1898
01:09:57,830 --> 01:09:56,080
there's a there's a disc there hovering

1899
01:09:59,350 --> 01:09:57,840
over the ground

1900
01:10:01,350 --> 01:09:59,360
why can't you do that with any of the

1901
01:10:02,870 --> 01:10:01,360
other reports

1902
01:10:04,709 --> 01:10:02,880
you you can obviously some of them are

1903
01:10:06,149 --> 01:10:04,719
older but what about yeah well you

1904
01:10:08,550 --> 01:10:06,159
should you should be able to

1905
01:10:09,189 --> 01:10:08,560
and i've been working in that direction

1906
01:10:12,310 --> 01:10:09,199
so

1907
01:10:14,830 --> 01:10:12,320
the difficulties i've had mainly have to

1908
01:10:17,910 --> 01:10:14,840
do with

1909
01:10:19,669 --> 01:10:17,920
um my contacts at the satellite

1910
01:10:21,350 --> 01:10:19,679
companies you know they're usually doing

1911
01:10:25,189 --> 01:10:21,360
this as a favor

1912
01:10:26,950 --> 01:10:25,199
um pulling images and and once

1913
01:10:29,110 --> 01:10:26,960

you know we get to the point where they

1914
01:10:31,030 --> 01:10:29,120
realize that i'm looking for ufo images

1915
01:10:33,030 --> 01:10:31,040
then i think it's

1916
01:10:34,870 --> 01:10:33,040
like well you know their opinion becomes

1917
01:10:37,110 --> 01:10:34,880
more like well i have real work to do

1918
01:10:39,189 --> 01:10:37,120
so well that's gonna have to sit up go

1919
01:10:41,030 --> 01:10:39,199
to the back burner

1920
01:10:42,550 --> 01:10:41,040
it's unfortunate because i think it's a

1921
01:10:44,790 --> 01:10:42,560
you know potentially you have

1922
01:10:45,990 --> 01:10:44,800
a big discovery and this third-party

1923
01:10:49,669 --> 01:10:46,000
data would be

1924
01:10:53,189 --> 01:10:49,679
really useful and um

1925
01:10:55,350 --> 01:10:53,199
so i i am still hopeful that we can do

1926
01:10:57,430 --> 01:10:55,360
something like this

1927
01:10:58,950 --> 01:10:57,440
there are satellites orbiting the earth

1928
01:11:00,550 --> 01:10:58,960
that are taking pictures of virtually

1929
01:11:01,110 --> 01:11:00,560
every part of the earth and their third

1930
01:11:02,870 --> 01:11:01,120
party

1931
01:11:04,390 --> 01:11:02,880
that doesn't violate any laws by the

1932
01:11:06,550 --> 01:11:04,400
government no

1933
01:11:08,310 --> 01:11:06,560
i know i i don't know what the laws are

1934
01:11:09,990 --> 01:11:08,320
but um but i know that they

1935
01:11:11,510 --> 01:11:10,000
that there are several companies that

1936
01:11:14,630 --> 01:11:11,520
have global coverage

1937
01:11:16,470 --> 01:11:14,640
um and very

1938
01:11:18,630 --> 01:11:16,480

you know relatively short time intervals

1939
01:11:20,070 --> 01:11:18,640
so

1940
01:11:22,870 --> 01:11:20,080
that's interesting i didn't know about

1941
01:11:24,229 --> 01:11:22,880
that as for spacecraft so this is

1942
01:11:25,750 --> 01:11:24,239
we're nearing the end of our spacecraft

1943
01:11:26,630 --> 01:11:25,760
question then we'll get to the physics

1944
01:11:29,590 --> 01:11:26,640
okay

1945
01:11:30,709 --> 01:11:29,600
great so as for the ufo spacecraft do

1946
01:11:33,270 --> 01:11:30,719
you imagine that they're

1947
01:11:35,590 --> 01:11:33,280
taking advantage of some new physics and

1948
01:11:37,750 --> 01:11:35,600
when i say new physics what i mean is

1949
01:11:39,189 --> 01:11:37,760
physics that we don't understand so

1950
01:11:40,709 --> 01:11:39,199
maybe like lazar is correct with the

1951
01:11:42,390 --> 01:11:40,719
strong force being a gravitational one

1952
01:11:46,149 --> 01:11:42,400
or maybe there's a fifth force

1953
01:11:48,709 --> 01:11:46,159
or maybe they're utilizing your

1954
01:11:50,470 --> 01:11:48,719
partially ordered set manner of

1955
01:11:51,189 --> 01:11:50,480
constructing space time from the ground

1956
01:11:52,790 --> 01:11:51,199
up

1957
01:11:54,390 --> 01:11:52,800
or do you think it's just technological

1958
01:11:55,910 --> 01:11:54,400
sophistication in the same way that a

1959
01:11:58,550 --> 01:11:55,920
cell phone if

1960
01:12:00,630 --> 01:11:58,560
the cell phone isn't using any new

1961
01:12:02,790 --> 01:12:00,640
physics quote unquote

1962
01:12:04,070 --> 01:12:02,800
since the 1950s we pretty much could

1963
01:12:05,990 --> 01:12:04,080

understand how this operated

1964
01:12:07,270 --> 01:12:06,000
it's just the technical sophistication

1965
01:12:07,990 --> 01:12:07,280
do you imagine it's technical

1966
01:12:09,990 --> 01:12:08,000
sophistication

1967
01:12:11,669 --> 01:12:10,000
or the utilization of new physics it's a

1968
01:12:15,110 --> 01:12:11,679
good question

1969
01:12:17,270 --> 01:12:15,120
i suspect that there is some new physics

1970
01:12:19,350 --> 01:12:17,280
and the reason i think that is because

1971
01:12:21,590 --> 01:12:19,360
we don't see

1972
01:12:24,470 --> 01:12:21,600
these things appear to be violating

1973
01:12:26,790 --> 01:12:24,480
conservation of momentum

1974
01:12:28,950 --> 01:12:26,800
so when the object takes off you know at

1975
01:12:30,470 --> 01:12:28,960
this huge acceleration

1976
01:12:32,149 --> 01:12:30,480
there's going to be something moving the

1977
01:12:35,030 --> 01:12:32,159
other way right um

1978
01:12:36,630 --> 01:12:35,040
and that we don't observe that so you

1979
01:12:39,910 --> 01:12:36,640
have that problem

1980
01:12:43,750 --> 01:12:39,920
the fact that they move through air

1981
01:12:46,790 --> 01:12:43,760
almost effortlessly with no sonic booms

1982
01:12:50,070 --> 01:12:46,800
um is a problem

1983
01:12:51,270 --> 01:12:50,080
the uh yeah so for instance that the tic

1984
01:12:53,350 --> 01:12:51,280
tac object that was

1985
01:12:54,709 --> 01:12:53,360
observed on radar to drop from 28 000

1986
01:12:57,270 --> 01:12:54,719
feet to sea level

1987
01:13:00,630 --> 01:12:57,280
in 0.78 seconds at the midpoint it had

1988
01:13:03,669 --> 01:13:00,640

to be going about 35 000 miles an hour

1989
01:13:05,830 --> 01:13:03,679
that's mach 60 right that's great

1990
01:13:07,350 --> 01:13:05,840
and that and that's as fast as the new

1991
01:13:10,390 --> 01:13:07,360
horizons probe

1992
01:13:12,950 --> 01:13:10,400
that went to pluto so that little

1993
01:13:15,110 --> 01:13:12,960
that little tic tac object basically as

1994
01:13:16,950 --> 01:13:15,120
it dropped to sea level

1995
01:13:18,790 --> 01:13:16,960
accelerated to the speed of the new

1996
01:13:22,390 --> 01:13:18,800
horizons probe

1997
01:13:25,510 --> 01:13:22,400
within 0.4 seconds

1998
01:13:28,229 --> 01:13:25,520
which is really remarkable

1999
01:13:28,950 --> 01:13:28,239
um and so it did that without a sonic

2000
01:13:32,229 --> 01:13:28,960
boom

2001
01:13:33,270 --> 01:13:32,239
and um and it's not clear how that's

2002
01:13:34,870 --> 01:13:33,280
possible so

2003
01:13:36,709 --> 01:13:34,880
it really does look like there's some

2004
01:13:40,470 --> 01:13:36,719
new physics involved

2005
01:13:43,030 --> 01:13:40,480
um and then for people who then question

2006
01:13:45,110 --> 01:13:43,040
the you know there's the question always

2007
01:13:46,310 --> 01:13:45,120
often comes up why do you assume that

2008
01:13:49,430 --> 01:13:46,320
these are x

2009
01:13:50,149 --> 01:13:49,440
these are spacecraft and the answer is

2010
01:13:52,390 --> 01:13:50,159
really simple

2011
01:13:53,590 --> 01:13:52,400
because they travel at the speeds of

2012
01:13:57,189 --> 01:13:53,600
spacecraft

2013
01:13:59,830 --> 01:13:57,199

that's they travel at those speeds

2014
01:14:00,229 --> 01:13:59,840
and they travel with accelerations that

2015
01:14:03,590 --> 01:14:00,239
could

2016
01:14:05,110 --> 01:14:03,600
would not only make them viable

2017
01:14:05,590 --> 01:14:05,120
interstellar craft but it would make

2018
01:14:10,950 --> 01:14:05,600
them

2019
01:14:14,709 --> 01:14:13,270
do you believe that they have some base

2020
01:14:15,590 --> 01:14:14,719
on earth that's actually where i thought

2021
01:14:17,510 --> 01:14:15,600
you were going with your

2022
01:14:19,030 --> 01:14:17,520
little theory before when we were

2023
01:14:21,510 --> 01:14:19,040
talking about

2024
01:14:22,470 --> 01:14:21,520
why the traveling and the yeah yeah yeah

2025
01:14:22,790 --> 01:14:22,480
i thought that you were going to say

2026
01:14:24,950 --> 01:14:22,800
that

2027
01:14:26,149 --> 01:14:24,960
well perhaps they're not going home

2028
01:14:27,030 --> 01:14:26,159
perhaps they're not leaving earth i

2029
01:14:28,390 --> 01:14:27,040
thought you were going there but do you

2030
01:14:31,669 --> 01:14:28,400
believe that they have some space

2031
01:14:33,030 --> 01:14:31,679
sorry some base on earth maybe under the

2032
01:14:34,470 --> 01:14:33,040
water maybe on the other side of the

2033
01:14:36,950 --> 01:14:34,480
moon or something i think there's been

2034
01:14:38,870 --> 01:14:36,960
there's been a lot of suspicion that you

2035
01:14:40,310 --> 01:14:38,880
know a lot of talk that there could be

2036
01:14:42,950 --> 01:14:40,320
underwater bases

2037
01:14:44,870 --> 01:14:42,960
um you know 75 percent of the earth

2038
01:14:47,910 --> 01:14:44,880

surfaces water

2039
01:14:48,149 --> 01:14:47,920
and we really have very little access to

2040
01:14:50,630 --> 01:14:48,159
it

2041
01:14:52,790 --> 01:14:50,640
so if you are going to hide out

2042
01:14:56,149 --> 01:14:52,800
somewhere that's perfect

2043
01:14:58,630 --> 01:14:56,159
um and then to be honest if you're

2044
01:15:00,310 --> 01:14:58,640
if you're aquatic in the first place

2045
01:15:01,830 --> 01:15:00,320
let's say that you come from an aquatic

2046
01:15:05,189 --> 01:15:01,840
environment

2047
01:15:08,870 --> 01:15:05,199
going to be much better

2048
01:15:11,430 --> 01:15:08,880
to live in than atmospheric environments

2049
01:15:13,270 --> 01:15:11,440
atmospheres have a low heat capacity so

2050
01:15:15,910 --> 01:15:13,280
the temperature varies a lot

2051
01:15:17,830 --> 01:15:15,920
throughout the day even right you get

2052
01:15:20,709 --> 01:15:17,840
huge temperature variations

2053
01:15:22,550 --> 01:15:20,719
um and then going from planet to planet

2054
01:15:23,430 --> 01:15:22,560
you have huge temperature variations in

2055
01:15:25,110 --> 01:15:23,440
the atmosphere

2056
01:15:27,270 --> 01:15:25,120
you know go to mars and you're looking

2057
01:15:27,750 --> 01:15:27,280
at 100 degrees below zero fahrenheit you

2058
01:15:29,830 --> 01:15:27,760
go

2059
01:15:31,669 --> 01:15:29,840
to venus and you're looking at 800

2060
01:15:33,830 --> 01:15:31,679
degrees fahrenheit

2061
01:15:35,110 --> 01:15:33,840
it's dramatic and the air pressure is

2062
01:15:37,110 --> 01:15:35,120
dramatically different

2063
01:15:38,790 --> 01:15:37,120

you know from planet to planet so here

2064
01:15:41,030 --> 01:15:38,800
we have one atmosphere of air pressure

2065
01:15:43,189 --> 01:15:41,040
you go to mars it's 1 100th

2066
01:15:44,550 --> 01:15:43,199
and you go to venus it's a hundred times

2067
01:15:46,709 --> 01:15:44,560
you know so you've got four

2068
01:15:48,470 --> 01:15:46,719
orders of magnitude of variation of air

2069
01:15:52,229 --> 01:15:48,480
pressure

2070
01:15:54,149 --> 01:15:52,239
and and um

2071
01:15:56,470 --> 01:15:54,159
and then of course air doesn't do much

2072
01:15:58,630 --> 01:15:56,480
for protecting you from cosmic rays

2073
01:16:00,149 --> 01:15:58,640
and meteorites right so there's all

2074
01:16:02,390 --> 01:16:00,159
sorts of problems with living

2075
01:16:03,270 --> 01:16:02,400
on a surface protected only by an

2076
01:16:05,350 --> 01:16:03,280
atmosphere

2077
01:16:07,510 --> 01:16:05,360
but if you live in an ocean you know

2078
01:16:08,070 --> 01:16:07,520
going to another planet with an ocean is

2079
01:16:09,910 --> 01:16:08,080
actually

2080
01:16:11,910 --> 01:16:09,920
a pretty good thing if you if you know

2081
01:16:14,310 --> 01:16:11,920
it's a water ocean

2082
01:16:16,950 --> 01:16:14,320
then a water ocean on another planet is

2083
01:16:19,430 --> 01:16:16,960
going to be between the temperatures of

2084
01:16:22,149 --> 01:16:19,440
you know 32 degrees fahrenheit and you

2085
01:16:25,189 --> 01:16:22,159
know 212 degrees fahrenheit

2086
01:16:27,110 --> 01:16:25,199
so so the temperatures aren't going to

2087
01:16:29,430 --> 01:16:27,120
change dramatically from

2088
01:16:30,550 --> 01:16:29,440

ocean to ocean going from one planet to

2089
01:16:34,070 --> 01:16:30,560
another

2090
01:16:36,149 --> 01:16:34,080
and you can and because water's not

2091
01:16:38,550 --> 01:16:36,159
compressible the the pressures aren't

2092
01:16:40,070 --> 01:16:38,560
going to change that dramatically either

2093
01:16:42,550 --> 01:16:40,080
um the pressures are going to be a

2094
01:16:45,510 --> 01:16:42,560
function of gravity but

2095
01:16:46,950 --> 01:16:45,520
you know a very deep ocean on europa

2096
01:16:49,030 --> 01:16:46,960
either pressure

2097
01:16:50,550 --> 01:16:49,040
you know the pressure halfway down maybe

2098
01:16:53,189 --> 01:16:50,560
30 miles down into

2099
01:16:54,950 --> 01:16:53,199
europa's ocean is going to be similar to

2100
01:16:56,870 --> 01:16:54,960
the pressure at the bottom of our oceans

2101
01:17:00,070 --> 01:16:56,880
only five miles down

2102
01:17:02,950 --> 01:17:00,080
so so you can actually find a nice

2103
01:17:04,790 --> 01:17:02,960
place to hang out if that's your

2104
01:17:06,709 --> 01:17:04,800
pressure you're used to

2105
01:17:08,310 --> 01:17:06,719
you know the only different the main

2106
01:17:12,310 --> 01:17:08,320
differences are going to be

2107
01:17:14,149 --> 01:17:12,320
um the chemicals dissolved in the ocean

2108
01:17:16,229 --> 01:17:14,159
so are there some chemicals that are

2109
01:17:18,870 --> 01:17:16,239
poisonous to you in that ocean

2110
01:17:19,350 --> 01:17:18,880
or biologics you know if there's you

2111
01:17:21,110 --> 01:17:19,360
know

2112
01:17:23,430 --> 01:17:21,120
bacteria and things like this that could

2113
01:17:25,350 --> 01:17:23,440

be problematic too

2114
01:17:26,550 --> 01:17:25,360
but otherwise going from one ocean to

2115
01:17:29,590 --> 01:17:26,560
another is almost

2116
01:17:31,750 --> 01:17:29,600
going to be going pro for the most part

2117
01:17:33,350 --> 01:17:31,760
you know for survival purposes will be

2118
01:17:35,669 --> 01:17:33,360
very similar

2119
01:17:37,350 --> 01:17:35,679
do you think that if we were to pass

2120
01:17:39,350 --> 01:17:37,360
over an alien civilization

2121
01:17:40,390 --> 01:17:39,360
presuming they're underwater and we were

2122
01:17:42,229 --> 01:17:40,400
able to

2123
01:17:44,870 --> 01:17:42,239
see them that they would sense us and

2124
01:17:46,229 --> 01:17:44,880
then relocate quickly or they would just

2125
01:17:49,750 --> 01:17:46,239
allow us to observe them

2126
01:17:50,709 --> 01:17:49,760
just speculating oh i don't know that's

2127
01:17:54,550 --> 01:17:50,719
a good question

2128
01:17:55,830 --> 01:17:54,560
um yeah it's hard to speculate what

2129
01:17:57,510 --> 01:17:55,840
somebody else would do

2130
01:17:59,510 --> 01:17:57,520
i'm not even sure what humans would do

2131
01:18:02,790 --> 01:17:59,520
in that case so

2132
01:18:04,229 --> 01:18:02,800
right do you think that they're building

2133
01:18:05,430 --> 01:18:04,239
a base or do you think that they're

2134
01:18:07,270 --> 01:18:05,440
somewhat

2135
01:18:08,790 --> 01:18:07,280
they're somehow living in their craft

2136
01:18:10,310 --> 01:18:08,800
underground because there's not much

2137
01:18:13,510 --> 01:18:10,320
room in those crafts and at least i

2138
01:18:15,110 --> 01:18:13,520

don't imagine there to be

2139
01:18:17,750 --> 01:18:15,120
i don't know 300 foot disc would be

2140
01:18:26,310 --> 01:18:17,760
pretty good it depends how many

2141
01:18:29,750 --> 01:18:26,320
how many people you have in there

2142
01:18:31,350 --> 01:18:29,760
hmm that's fascinating this whole topic

2143
01:18:32,870 --> 01:18:31,360
there's so many other questions i had

2144
01:18:34,709 --> 01:18:32,880
for you but

2145
01:18:36,870 --> 01:18:34,719
i just feel like exploring this and

2146
01:18:38,550 --> 01:18:36,880
exploring this and just so you know i'm

2147
01:18:39,350 --> 01:18:38,560
not someone who's into conspiracy

2148
01:18:41,430 --> 01:18:39,360
theories

2149
01:18:42,870 --> 01:18:41,440
or strange phenomenon i'm much like

2150
01:18:43,669 --> 01:18:42,880
yourself i'm pretty sure that's just

2151
01:18:45,430 --> 01:18:43,679
like you

2152
01:18:47,750 --> 01:18:45,440
but this is absolutely fascinating and

2153
01:18:50,630 --> 01:18:47,760
it's it's even frightening

2154
01:18:51,669 --> 01:18:50,640
because what the heck are we like and

2155
01:18:54,229 --> 01:18:51,679
now i'm wondering

2156
01:18:55,510 --> 01:18:54,239
how much of this is actually just an

2157
01:18:58,229 --> 01:18:55,520
experiment by them

2158
01:18:59,189 --> 01:18:58,239
because well that to me makes the most

2159
01:19:00,709 --> 01:18:59,199
sense as to why they

2160
01:19:02,149 --> 01:19:00,719
i don't think convergent evolution would

2161
01:19:04,630 --> 01:19:02,159
produce intelligent creatures that look

2162
01:19:06,630 --> 01:19:04,640
like us each time i don't think so

2163
01:19:08,070 --> 01:19:06,640

it could be the case but i don't buy it

2164
01:19:12,709 --> 01:19:08,080
only because we have one data point

2165
01:19:16,070 --> 01:19:14,390
strange yeah well the problem is that

2166
01:19:18,790 --> 01:19:16,080
the thing the thing that i wonder about

2167
01:19:24,310 --> 01:19:21,910
if they're dna based right if they have

2168
01:19:28,149 --> 01:19:24,320
the same kind of biochemistry that we do

2169
01:19:30,229 --> 01:19:28,159
then then it's hard to

2170
01:19:31,350 --> 01:19:30,239
imagine that we're not related in some

2171
01:19:35,590 --> 01:19:31,360
way right

2172
01:19:37,350 --> 01:19:35,600
so are they from

2173
01:19:38,790 --> 01:19:37,360
you know so then you start wondering

2174
01:19:39,430 --> 01:19:38,800
about all the possible are they from

2175
01:19:42,950 --> 01:19:39,440
here

2176
01:19:44,630 --> 01:19:42,960
which would be very surprising um

2177
01:19:47,270 --> 01:19:44,640
are they from here did we really miss

2178
01:19:48,870 --> 01:19:47,280
something big um

2179
01:19:50,630 --> 01:19:48,880
did they come from here originally and

2180
01:19:54,229 --> 01:19:50,640
go somewhere else and are coming back

2181
01:19:57,350 --> 01:19:54,239
did they are they from another

2182
01:19:59,830 --> 01:19:57,360
another system where there was some kind

2183
01:20:00,870 --> 01:19:59,840
of panspermia between you know that led

2184
01:20:02,550 --> 01:20:00,880
to

2185
01:20:04,310 --> 01:20:02,560
you know biology spreading from one

2186
01:20:05,350 --> 01:20:04,320
system to another so that we're of the

2187
01:20:06,470 --> 01:20:05,360
same

2188
01:20:08,629 --> 01:20:06,480

you know so that we're somehow

2189
01:20:10,709 --> 01:20:08,639
biologically related to one another

2190
01:20:11,750 --> 01:20:10,719
otherwise i'd imagine you would be very

2191
01:20:14,470 --> 01:20:11,760
much

2192
01:20:14,950 --> 01:20:14,480
you know the situation you would expect

2193
01:20:18,310 --> 01:20:14,960
would be

2194
01:20:19,830 --> 01:20:18,320
very much more like what um

2195
01:20:21,830 --> 01:20:19,840
stuart kaufman from the santa fe

2196
01:20:22,790 --> 01:20:21,840
institute would have described where you

2197
01:20:25,590 --> 01:20:22,800
have

2198
01:20:26,229 --> 01:20:25,600
the biology is probably very different

2199
01:20:28,790 --> 01:20:26,239
and you

2200
01:20:31,350 --> 01:20:28,800
run the risk of you know you don't want

2201
01:20:33,510 --> 01:20:31,360
to touch them because you're going to

2202
01:20:34,709 --> 01:20:33,520
you know your biology isn't compatible

2203
01:20:37,030 --> 01:20:34,719
so there's going to be all sorts of

2204
01:20:40,149 --> 01:20:37,040
horrible chemical reactions

2205
01:20:41,350 --> 01:20:40,159
um so we don't want to touch them

2206
01:20:43,189 --> 01:20:41,360
yeah well you don't want to come in

2207
01:20:43,669 --> 01:20:43,199
contact with their organic molecules

2208
01:20:45,030 --> 01:20:43,679
because

2209
01:20:47,590 --> 01:20:45,040
you don't know what kind of reactions

2210
01:20:50,390 --> 01:20:47,600
you'd have

2211
01:20:51,750 --> 01:20:50,400
so you because well so so in stuart

2212
01:20:54,149 --> 01:20:51,760
kaufman's talked about

2213
01:20:54,870 --> 01:20:54,159

auto catalytic sets where you get sets

2214
01:20:57,590 --> 01:20:54,880
of

2215
01:20:57,910 --> 01:20:57,600
organic molecules that auto catalyze

2216
01:21:00,470 --> 01:20:57,920
right

2217
01:21:02,470 --> 01:21:00,480
and so our biology is basically one

2218
01:21:05,110 --> 01:21:02,480
whole system of

2219
01:21:07,270 --> 01:21:05,120
of these types of chemicals so we're all

2220
01:21:10,070 --> 01:21:07,280
compatible with each other but

2221
01:21:10,950 --> 01:21:10,080
if you get another organic molecule and

2222
01:21:12,310 --> 01:21:10,960
that's foreign

2223
01:21:13,830 --> 01:21:12,320
you know that's going to interact with

2224
01:21:17,510 --> 01:21:13,840
different ways and create all sorts of

2225
01:21:21,669 --> 01:21:20,070
i haven't heard of that before yes that

2226
01:21:24,390 --> 01:21:21,679
is stewart kaufman

2227
01:21:25,430 --> 01:21:24,400
stuart kaufman yeah model catalytic sets

2228
01:21:27,669 --> 01:21:25,440
or auto catalytic

2229
01:21:29,030 --> 01:21:27,679
molecules or what auto catalytic sets i

2230
01:21:30,790 --> 01:21:29,040
think it was and he

2231
01:21:34,390 --> 01:21:30,800
i think it was his book at home in the

2232
01:21:37,510 --> 01:21:36,310
but you know the implications from that

2233
01:21:41,030 --> 01:21:37,520
is if there were

2234
01:21:42,709 --> 01:21:41,040
aliens who were truly alien the eu

2235
01:21:45,030 --> 01:21:42,719
and they were but they were you know

2236
01:21:48,550 --> 01:21:45,040
made of you know they're carbon-based

2237
01:21:49,350 --> 01:21:48,560
then the chance that the molecules are

2238
01:21:51,750 --> 01:21:49,360

similar as

2239
01:21:55,430 --> 01:21:51,760
you know are is going to be it's going

2240
01:22:01,590 --> 01:21:58,709
why do you think they mutilate cattle

2241
01:22:03,030 --> 01:22:01,600
that's a good question i don't know i i

2242
01:22:03,590 --> 01:22:03,040
don't know hundreds i don't know if they

2243
01:22:05,750 --> 01:22:03,600
do

2244
01:22:07,110 --> 01:22:05,760
i mean we the real i mean the real

2245
01:22:09,350 --> 01:22:07,120
answer to a lot of these is

2246
01:22:11,030 --> 01:22:09,360
we don't know anything yet about these

2247
01:22:12,790 --> 01:22:11,040
things so and we don't know if these

2248
01:22:14,470 --> 01:22:12,800
things are all related okay sorry

2249
01:22:16,390 --> 01:22:14,480
what could be a reason they mutilate

2250
01:22:18,390 --> 01:22:16,400
cattle let's say like that yeah

2251
01:22:20,390 --> 01:22:18,400
are they doing experiments are they you

2252
01:22:23,510 --> 01:22:20,400
know are they collecting data i don't

2253
01:22:25,750 --> 01:22:23,520
that's a good question i don't know

2254
01:22:26,629 --> 01:22:25,760
well cattle are the most plentiful of

2255
01:22:29,910 --> 01:22:26,639
all the animals

2256
01:22:33,270 --> 01:22:29,920
actually by weight at least

2257
01:22:35,990 --> 01:22:33,280
yeah i had a i had a thought

2258
01:22:37,750 --> 01:22:36,000
i had a an idea and i would share the

2259
01:22:40,070 --> 01:22:37,760
idea with you so this is

2260
01:22:41,990 --> 01:22:40,080
you know not even at the level of a

2261
01:22:43,750 --> 01:22:42,000
hypothesis right or this is just a

2262
01:22:47,110 --> 01:22:43,760
thought

2263
01:22:55,030 --> 01:22:50,390

ray stanford who has

2264
01:22:58,790 --> 01:22:55,040
studied ufos in the 70s it refers to

2265
01:22:59,910 --> 01:22:58,800
a sense of he calls it euphoria spelt

2266
01:23:03,270 --> 01:22:59,920
ufo

2267
01:23:07,189 --> 01:23:03,280
ria euphoria okay and he

2268
01:23:08,229 --> 01:23:07,199
says that when you are near one of these

2269
01:23:11,270 --> 01:23:08,239
craft you have a

2270
01:23:16,470 --> 01:23:11,280
feeling of euphoria and

2271
01:23:19,590 --> 01:23:18,229
variations in the electromagnetic field

2272
01:23:21,669 --> 01:23:19,600
from these things

2273
01:23:23,270 --> 01:23:21,679
and those variations happen around 12

2274
01:23:26,310 --> 01:23:23,280
hertz so

2275
01:23:28,629 --> 01:23:26,320
that's interesting because 12 hertz is

2276
01:23:30,149 --> 01:23:28,639
close to the alpha rhythm frequencies

2277
01:23:31,270 --> 01:23:30,159
that you get in the visual cortex when

2278
01:23:33,189 --> 01:23:31,280
you close your eyes

2279
01:23:34,709 --> 01:23:33,199
okay wait sorry i just want to make sure

2280
01:23:35,830 --> 01:23:34,719
i'm understanding this so who's this

2281
01:23:38,870 --> 01:23:35,840
person who's saying this

2282
01:23:39,590 --> 01:23:38,880
ray stanford okay so ray stanford is

2283
01:23:41,910 --> 01:23:39,600
saying

2284
01:23:43,189 --> 01:23:41,920
that there's a phenomenon called

2285
01:23:45,030 --> 01:23:43,199
euphoria

2286
01:23:46,390 --> 01:23:45,040
yeah okay and he's defining this

2287
01:23:47,350 --> 01:23:46,400
phenomenon right now he's not referring

2288
01:23:49,189 --> 01:23:47,360

to something else

2289
01:23:51,990 --> 01:23:49,199
yeah the phenomenon is the feeling that

2290
01:23:53,669 --> 01:23:52,000
you get the sense of euphoria actually

2291
01:23:55,830 --> 01:23:53,679
um it's about things so it's related to

2292
01:23:57,669 --> 01:23:55,840
euphoria it's related to happening yes

2293
01:23:58,950 --> 01:23:57,679
because i know that some people feel

2294
01:24:01,990 --> 01:23:58,960
abject terror

2295
01:24:03,510 --> 01:24:02,000
yeah so certainly yeah but but but

2296
01:24:05,030 --> 01:24:03,520
he says that when the craft are just

2297
01:24:06,629 --> 01:24:05,040
near even if you're not aware of them

2298
01:24:07,590 --> 01:24:06,639
you'll get that sense of euphoria and

2299
01:24:10,229 --> 01:24:07,600
he's

2300
01:24:11,669 --> 01:24:10,239
he claims to use this to go you know

2301
01:24:13,430 --> 01:24:11,679
he'll have that feeling and then

2302
01:24:14,870 --> 01:24:13,440
go outside and oh yeah there it is

2303
01:24:16,629 --> 01:24:14,880
there's one um

2304
01:24:19,270 --> 01:24:16,639
and takes photos and so he's done that

2305
01:24:21,910 --> 01:24:19,280
in the past and that's what he claims

2306
01:24:22,390 --> 01:24:21,920
so i so i was curious about this because

2307
01:24:25,030 --> 01:24:22,400
he had

2308
01:24:26,310 --> 01:24:25,040
also measured uh variations in the

2309
01:24:29,030 --> 01:24:26,320
electric field that

2310
01:24:30,229 --> 01:24:29,040
are around on the order of 12 hertz

2311
01:24:32,950 --> 01:24:30,239
which is close to our

2312
01:24:34,070 --> 01:24:32,960
alpha variations where where they're

2313
01:24:36,629 --> 01:24:34,080

reported

2314
01:24:37,590 --> 01:24:36,639
yeah so when you when he's taking photos

2315
01:24:39,350 --> 01:24:37,600
of a ufo

2316
01:24:41,030 --> 01:24:39,360
he'll have he has equipment that

2317
01:24:43,270 --> 01:24:41,040
measures you know

2318
01:24:45,110 --> 01:24:43,280
em em fields so he'll measure the

2319
01:24:47,910 --> 01:24:45,120
electric magnetic field

2320
01:24:49,350 --> 01:24:47,920
and you get variations oscillations

2321
01:24:52,550 --> 01:24:49,360
about 12 hertz

2322
01:24:55,669 --> 01:24:52,560
are prominent sometimes so

2323
01:24:57,510 --> 01:24:55,679
the so that kind of caught my attention

2324
01:25:00,390 --> 01:24:57,520
because and this is where the thought

2325
01:25:02,149 --> 01:25:00,400
comes in right this is his claim

2326
01:25:04,470 --> 01:25:02,159
you know i have not seen this myself

2327
01:25:09,110 --> 01:25:04,480
i've not measured it and so i

2328
01:25:12,629 --> 01:25:09,120
i can't you know testify to the

2329
01:25:14,790 --> 01:25:12,639
to how true it is but my thought

2330
01:25:16,550 --> 01:25:14,800
what struck me was that 12 hertz is

2331
01:25:20,229 --> 01:25:16,560
close to your alpha rhythm

2332
01:25:22,149 --> 01:25:20,239
and and um

2333
01:25:23,669 --> 01:25:22,159
and so if you have strong electric and

2334
01:25:25,350 --> 01:25:23,679
magnetic oscillating electric and

2335
01:25:28,470 --> 01:25:25,360
magnetic fields near these things you're

2336
01:25:30,310 --> 01:25:28,480
going to induce currents into the brain

2337
01:25:32,070 --> 01:25:30,320
and if these currents are at 12 hertz

2338
01:25:33,430 --> 01:25:32,080

they couldn't train the algorithm you

2339
01:25:37,189 --> 01:25:33,440
can actually entrain of the

2340
01:25:39,110 --> 01:25:37,199
alpha rhythms so um so you could enter

2341
01:25:41,669 --> 01:25:39,120
and train an alpha rhythm which would

2342
01:25:45,030 --> 01:25:41,679
which could very well make you feel

2343
01:25:47,189 --> 01:25:45,040
you know calm or restful or sleepy or

2344
01:25:48,149 --> 01:25:47,199
you know euphoric or something like that

2345
01:25:50,229 --> 01:25:48,159
now of course

2346
01:25:52,550 --> 01:25:50,239
this could be overridden by the terror

2347
01:25:55,110 --> 01:25:52,560
of seeing you know

2348
01:25:56,310 --> 01:25:55,120
you know this craft and you know aliens

2349
01:25:59,750 --> 01:25:56,320
coming out of it or whatever

2350
01:26:01,590 --> 01:25:59,760
might happen but but it that was my that

2351
01:26:03,669 --> 01:26:01,600
was my thought well maybe maybe that's

2352
01:26:05,270 --> 01:26:03,679
where the euphoria comes from it's comes

2353
01:26:06,229 --> 01:26:05,280
from these oscillations in the electric

2354
01:26:10,550 --> 01:26:06,239
field

2355
01:26:12,390 --> 01:26:10,560
and then it made me think that um

2356
01:26:13,830 --> 01:26:12,400
and i had this thought watching the

2357
01:26:17,510 --> 01:26:13,840
video

2358
01:26:18,950 --> 01:26:17,520
from skinwalker wrench of the disc in

2359
01:26:21,590 --> 01:26:18,960
the sky with the cow

2360
01:26:23,669 --> 01:26:21,600
dying right the cow was dying while the

2361
01:26:26,709 --> 01:26:23,679
disc was hovering over it

2362
01:26:28,870 --> 01:26:26,719
um where was this from this was uh taken

2363
01:26:31,590 --> 01:26:28,880

at skinwalker ranch and it was in

2364
01:26:33,189 --> 01:26:31,600
their there's their tv series their

2365
01:26:35,350 --> 01:26:33,199
documentary series

2366
01:26:37,110 --> 01:26:35,360
right what's the host name dude travis

2367
01:26:38,550 --> 01:26:37,120
travis taylor travis taylor yeah

2368
01:26:39,910 --> 01:26:38,560
is that the series you're referring to

2369
01:26:41,669 --> 01:26:39,920
yeah it's the one yeah i would like to

2370
01:26:42,070 --> 01:26:41,679
talk to travis have you ever spoken to

2371
01:26:45,990 --> 01:26:42,080
him

2372
01:26:48,149 --> 01:26:46,000
interesting guy yeah yeah so so in that

2373
01:26:50,470 --> 01:26:48,159
in that case you had you had the you had

2374
01:26:52,629 --> 01:26:50,480
the the disc is hovering or

2375
01:26:54,390 --> 01:26:52,639
some distance above the cow the cow

2376
01:26:57,910 --> 01:26:54,400
actually died there

2377
01:27:00,149 --> 01:26:57,920
and and it was acting funny beforehand

2378
01:27:02,229 --> 01:27:00,159
and it made me think well

2379
01:27:03,430 --> 01:27:02,239
the cows brains are different sizes and

2380
01:27:06,149 --> 01:27:03,440
i don't know what

2381
01:27:06,550 --> 01:27:06,159
frequency their alpha rhythm is at so i

2382
01:27:09,430 --> 01:27:06,560
thought

2383
01:27:11,189 --> 01:27:09,440
what if what if these craft are inducing

2384
01:27:11,669 --> 01:27:11,199
currents into the cow's brain and then

2385
01:27:13,750 --> 01:27:11,679
it

2386
01:27:15,830 --> 01:27:13,760
makes them panic or something instead of

2387
01:27:19,430 --> 01:27:15,840
giving them the sense of euphoria

2388
01:27:22,470 --> 01:27:19,440

ah that's fascinating and so

2389
01:27:23,910 --> 01:27:22,480
maybe these maybe so what if what if

2390
01:27:25,430 --> 01:27:23,920
they're killing the cows by

2391
01:27:27,669 --> 01:27:25,440
accident so here's just a thought

2392
01:27:30,310 --> 01:27:27,679
they're killing the cows by accident

2393
01:27:31,990 --> 01:27:30,320
right and then they're trying to figure

2394
01:27:34,229 --> 01:27:32,000
out why the cows are dying whenever

2395
01:27:36,070 --> 01:27:34,239
they fly near them right so then they go

2396
01:27:37,510 --> 01:27:36,080
down and they did take some samples and

2397
01:27:38,790 --> 01:27:37,520
collect some data to figure out why the

2398
01:27:42,870 --> 01:27:38,800
cows are dying

2399
01:27:44,470 --> 01:27:42,880
um maybe that it's a thought that's all

2400
01:27:46,149 --> 01:27:44,480
yeah it's a fun thought it's fun to

2401
01:27:49,430 --> 01:27:46,159
think of things

2402
01:27:51,430 --> 01:27:49,440
so yeah yes yes there does seem to be an

2403
01:27:51,990 --> 01:27:51,440
association with radiation especially

2404
01:27:56,950 --> 01:27:52,000
magnetic

2405
01:27:59,270 --> 01:27:56,960
these craft from that tv series

2406
01:28:01,270 --> 01:27:59,280
i recall them saying that all of the cow

2407
01:28:04,870 --> 01:28:01,280
that's kyle's a skinner walker were

2408
01:28:06,950 --> 01:28:04,880
placed into one

2409
01:28:07,990 --> 01:28:06,960
room the size of this condo and it was

2410
01:28:09,669 --> 01:28:08,000
magnetized

2411
01:28:10,870 --> 01:28:09,679
do you remember that that all the cows

2412
01:28:11,750 --> 01:28:10,880
were placed in there i've heard that

2413
01:28:18,310 --> 01:28:11,760

yeah

2414
01:28:20,149 --> 01:28:18,320
bizarre stories

2415
01:28:21,830 --> 01:28:20,159
having to do with the cattle now what

2416
01:28:24,709 --> 01:28:21,840
the heck can explain

2417
01:28:27,350 --> 01:28:24,719
that i don't i don't know what can

2418
01:28:30,709 --> 01:28:27,360
explain half of what i've heard happen

2419
01:28:34,070 --> 01:28:30,719
locker ranch so that's how

2420
01:28:35,430 --> 01:28:34,080
that is okay let's talk about skinwalker

2421
01:28:36,629 --> 01:28:35,440
first that's a whole other kettle of

2422
01:28:40,629 --> 01:28:36,639
fish

2423
01:28:42,790 --> 01:28:40,639
skinwalker

2424
01:28:43,990 --> 01:28:42,800
there seems to be reports of ghosts

2425
01:28:45,990 --> 01:28:44,000
bigfoot and so

2426
01:28:48,229 --> 01:28:46,000
every phenomenon that's pretty much

2427
01:28:50,950 --> 01:28:48,239
everything you've ever heard of

2428
01:28:53,669 --> 01:28:50,960
it happens there which is very very

2429
01:28:57,110 --> 01:28:55,990
what's the relationship what could be

2430
01:28:58,870 --> 01:28:57,120
how about that what could be the

2431
01:28:59,189 --> 01:28:58,880
relationship between ufos and the rest

2432
01:29:02,470 --> 01:28:59,199
of

2433
01:29:04,709 --> 01:29:02,480
other paranormal activity like

2434
01:29:07,030 --> 01:29:04,719
why so here's one here's one simple

2435
01:29:09,990 --> 01:29:07,040
answer that when the aliens are nearby

2436
01:29:11,510 --> 01:29:10,000
in the same way that they induce a a

2437
01:29:14,070 --> 01:29:11,520
different conscious state

2438
01:29:15,430 --> 01:29:14,080

then in the same way that low frequency

2439
01:29:16,790 --> 01:29:15,440
sounds i'm sure you've heard that heard

2440
01:29:19,110 --> 01:29:16,800
of this low frequency sounds can

2441
01:29:20,870 --> 01:29:19,120
produce reports of ghost sightings maybe

2442
01:29:23,750 --> 01:29:20,880
there's something similar happening

2443
01:29:25,110 --> 01:29:23,760
but then that wouldn't explain any

2444
01:29:28,229 --> 01:29:25,120
actual footage

2445
01:29:30,470 --> 01:29:28,239
like or inter-subjective agreement

2446
01:29:31,590 --> 01:29:30,480
as to oh i saw an animal that looked

2447
01:29:32,790 --> 01:29:31,600
like this over there

2448
01:29:34,790 --> 01:29:32,800
i would imagine that it would just

2449
01:29:36,310 --> 01:29:34,800
produce strange phenomena and each

2450
01:29:38,390 --> 01:29:36,320
person would have a difference yeah

2451
01:29:40,310 --> 01:29:38,400
inter-subjective agreement is a good

2452
01:29:42,550 --> 01:29:40,320
term i've often heard

2453
01:29:44,070 --> 01:29:42,560
yeah i wouldn't explain that you know

2454
01:29:46,950 --> 01:29:44,080
i've heard

2455
01:29:48,310 --> 01:29:46,960
professionals claim oh it's a mass

2456
01:29:49,750 --> 01:29:48,320
hallucination

2457
01:29:51,990 --> 01:29:49,760
and then i have to remind them you know

2458
01:29:54,629 --> 01:29:52,000
that's not a thing either right

2459
01:29:55,910 --> 01:29:54,639
that's not a real phenomenon either so

2460
01:29:59,510 --> 01:29:55,920
yeah

2461
01:30:01,830 --> 01:29:59,520
explain this

2462
01:30:03,510 --> 01:30:01,840
let's get to some physics man i want to

2463
01:30:08,310 --> 01:30:03,520

stay on this topic so bad

2464
01:30:11,669 --> 01:30:09,830
we'll transition by talking about

2465
01:30:12,310 --> 01:30:11,679
consciousness usually i say that for the

2466
01:30:15,189 --> 01:30:12,320
end

2467
01:30:17,189 --> 01:30:15,199
but do you have any ideas as to how

2468
01:30:20,550 --> 01:30:17,199
consciousness arises is it emergent

2469
01:30:22,550 --> 01:30:20,560
and is there a connection between aliens

2470
01:30:24,070 --> 01:30:22,560
and consciousness

2471
01:30:25,910 --> 01:30:24,080
i would have no idea what that

2472
01:30:29,830 --> 01:30:25,920
connection is some people

2473
01:30:31,590 --> 01:30:29,840
seem to make a connection but i don't

2474
01:30:33,990 --> 01:30:31,600
have an idea i don't have any ideas of

2475
01:30:37,189 --> 01:30:34,000
where that connection is

2476
01:30:39,350 --> 01:30:37,199
i i have very boring thoughts

2477
01:30:40,229 --> 01:30:39,360
about consciousness compared to other

2478
01:30:43,350 --> 01:30:40,239
people i think

2479
01:30:44,709 --> 01:30:43,360
i don't i don't think of it as being as

2480
01:30:50,790 --> 01:30:44,719
dramatic

2481
01:30:57,510 --> 01:30:54,149
i mean and maybe we're

2482
01:31:00,229 --> 01:30:57,520
thinking about different things so

2483
01:31:01,990 --> 01:31:00,239
when i think of being conscious you know

2484
01:31:05,189 --> 01:31:02,000
i'm conscious of my surroundings

2485
01:31:08,229 --> 01:31:05,199
i'm conscious of my state um

2486
01:31:11,430 --> 01:31:08,239
and that

2487
01:31:14,229 --> 01:31:11,440
that to me doesn't seem to be

2488
01:31:15,990 --> 01:31:14,239

much of a miracle i'm not sure what

2489
01:31:19,990 --> 01:31:16,000
what's so difficult about that

2490
01:31:21,830 --> 01:31:20,000
um and so it very possible that

2491
01:31:23,990 --> 01:31:21,840
other people when they talk about

2492
01:31:25,189 --> 01:31:24,000
consciousness and are interested in it i

2493
01:31:27,189 --> 01:31:25,199
think they're

2494
01:31:30,390 --> 01:31:27,199
interested in some other aspect that i'm

2495
01:31:32,149 --> 01:31:30,400
not thinking about okay

2496
01:31:35,110 --> 01:31:32,159
i like this this was from this is a

2497
01:31:36,790 --> 01:31:35,120
quote from one of your papers

2498
01:31:38,709 --> 01:31:36,800
my belief is that the most foundational

2499
01:31:39,430 --> 01:31:38,719
research either assumes too much or is

2500
01:31:41,189 --> 01:31:39,440
too focused

2501
01:31:43,030 --> 01:31:41,199
on specific subfields of physics for

2502
01:31:44,629 --> 01:31:43,040
example i do not believe that one can

2503
01:31:47,110 --> 01:31:44,639
effectively study the foundations of

2504
01:31:48,149 --> 01:31:47,120
quantum mechanics and ignore probability

2505
01:31:49,590 --> 01:31:48,159
theory gravity

2506
01:31:52,709 --> 01:31:49,600
electromagnetism and other related

2507
01:31:54,390 --> 01:31:52,719
phenomenon the universe is a package

2508
01:31:55,990 --> 01:31:54,400
a package deal and to understand it

2509
01:31:56,629 --> 01:31:56,000
requires an understanding of that

2510
01:31:59,750 --> 01:31:56,639
package

2511
01:32:01,669 --> 01:31:59,760
as a whole certainly progress is made

2512
01:32:03,669 --> 01:32:01,679
in relatively small steps but if one is

2513
01:32:04,229 --> 01:32:03,679

to seriously think about solving this

2514
01:32:05,430 --> 01:32:04,239
puzzle

2515
01:32:07,270 --> 01:32:05,440
one has to keep in mind the whole

2516
01:32:09,270 --> 01:32:07,280
picture

2517
01:32:14,470 --> 01:32:09,280
while one is trying to place a

2518
01:32:17,830 --> 01:32:16,470
now i had a sub question to that prior

2519
01:32:18,870 --> 01:32:17,840
to that you talked about machine

2520
01:32:21,110 --> 01:32:18,880
learning

2521
01:32:22,550 --> 01:32:21,120
so first of all i share that view all

2522
01:32:23,669 --> 01:32:22,560
right that's how i like that that's one

2523
01:32:26,709 --> 01:32:23,679
of the reasons i took that

2524
01:32:28,149 --> 01:32:26,719
quote out i believe you just

2525
01:32:29,430 --> 01:32:28,159
mentioned machine learning and what i'm

2526
01:32:30,550 --> 01:32:29,440
wondering is like what the heck does

2527
01:32:31,750 --> 01:32:30,560
machine learning have to do with

2528
01:32:33,270 --> 01:32:31,760
fundamental physics

2529
01:32:35,030 --> 01:32:33,280
unless you're stephen wolfram and you

2530
01:32:35,990 --> 01:32:35,040
think computation is at the core of it

2531
01:32:38,629 --> 01:32:36,000
all

2532
01:32:41,110 --> 01:32:38,639
what the heck does machine learning have

2533
01:32:42,310 --> 01:32:41,120
to do it all except with some problem

2534
01:32:44,229 --> 01:32:42,320
solving techniques

2535
01:32:45,350 --> 01:32:44,239
but i know well so what does machine

2536
01:32:46,550 --> 01:32:45,360
learning have to do with fundamental

2537
01:32:47,990 --> 01:32:46,560
physics so what did i

2538
01:32:50,470 --> 01:32:48,000

well i'm not sure what i said about

2539
01:32:52,550 --> 01:32:50,480
machine learning before that um

2540
01:32:54,229 --> 01:32:52,560
i think you talked about maybe it was on

2541
01:32:56,149 --> 01:32:54,239
your website and i'm just conflating

2542
01:32:57,830 --> 01:32:56,159
quite a bit of information you talked

2543
01:32:59,510 --> 01:32:57,840
about that one of your advantages is

2544
01:33:00,790 --> 01:32:59,520
that you came from machine learning and

2545
01:33:03,750 --> 01:33:00,800
you can apply that to

2546
01:33:04,790 --> 01:33:03,760
physics now i imagine what you were

2547
01:33:06,470 --> 01:33:04,800
referring to was

2548
01:33:07,990 --> 01:33:06,480
fundamental physics at least in these

2549
01:33:10,070 --> 01:33:08,000
papers i'm not sure

2550
01:33:11,590 --> 01:33:10,080
if you were no were you is there an

2551
01:33:12,550 --> 01:33:11,600
application of machine learning oh no i

2552
01:33:16,310 --> 01:33:12,560
don't think i was

2553
01:33:17,750 --> 01:33:16,320
referring to the foundational physics i

2554
01:33:19,189 --> 01:33:17,760
think i was referring to

2555
01:33:22,550 --> 01:33:19,199
some of the other work i do with

2556
01:33:24,149 --> 01:33:22,560
exoplanet characterization

2557
01:33:31,510 --> 01:33:24,159
and some of the astrophysics work i've

2558
01:33:34,870 --> 01:33:33,030
yes okay you worked with someone by the

2559
01:33:38,310 --> 01:33:34,880
way from u of t

2560
01:33:39,590 --> 01:33:38,320
my hometown my bailiwick u of t for

2561
01:33:41,830 --> 01:33:39,600
spectral inference

2562
01:33:43,669 --> 01:33:41,840
from a multiplexing fourier transform

2563
01:33:47,350 --> 01:33:43,679

spectrometer oh

2564
01:33:49,270 --> 01:33:47,360
yes yep

2565
01:33:50,950 --> 01:33:49,280
okay why don't you explain each of those

2566
01:33:53,110 --> 01:33:50,960
terms spectral

2567
01:33:55,430 --> 01:33:53,120
inference from a multiplexing fourier

2568
01:33:57,030 --> 01:33:55,440
transform spectrometer so let's

2569
01:33:58,790 --> 01:33:57,040
spectral inference what is that

2570
01:33:59,350 --> 01:33:58,800
referring to what is that so the idea is

2571
01:34:02,790 --> 01:33:59,360
that we

2572
01:34:04,870 --> 01:34:02,800
are inferring the spectrum from

2573
01:34:05,910 --> 01:34:04,880
data recorded from the interferometer

2574
01:34:08,470 --> 01:34:05,920
basically the

2575
01:34:09,669 --> 01:34:08,480
the device works by taking in we were

2576
01:34:13,030 --> 01:34:09,679
looking at stars

2577
01:34:16,070 --> 01:34:13,040
and so we were taking taking light in um

2578
01:34:18,629 --> 01:34:16,080
beam splitter split it up and then you

2579
01:34:19,270 --> 01:34:18,639
have a delay line that you can vary the

2580
01:34:22,470 --> 01:34:19,280
length

2581
01:34:24,550 --> 01:34:22,480
and then you recombine them and

2582
01:34:25,910 --> 01:34:24,560
you get an interference pattern and so

2583
01:34:27,350 --> 01:34:25,920
so you either have constructive

2584
01:34:30,149 --> 01:34:27,360
interference or deconstructive

2585
01:34:32,709 --> 01:34:30,159
interference and depending on the

2586
01:34:34,470 --> 01:34:32,719
and it depends on how much you have it

2587
01:34:36,790 --> 01:34:34,480
depends on how much

2588
01:34:38,709 --> 01:34:36,800

of each frequency or wavelength you have

2589
01:34:41,910 --> 01:34:38,719
in the original light beam

2590
01:34:43,750 --> 01:34:41,920
so as you vary this delay length um

2591
01:34:45,510 --> 01:34:43,760
the side length of this interferometer

2592
01:34:49,669 --> 01:34:45,520
you'll you'll

2593
01:34:51,669 --> 01:34:49,679
get interference fringes so these um

2594
01:34:53,109 --> 01:34:51,679
so by doing that you can then look at

2595
01:34:56,629 --> 01:34:53,119
that interference pattern

2596
01:34:59,030 --> 01:34:56,639
and then infer what some spectrum

2597
01:35:01,270 --> 01:34:59,040
had to be present that to give you that

2598
01:35:03,830 --> 01:35:01,280
interference pattern

2599
01:35:05,910 --> 01:35:03,840
i see i see now interferometers is that

2600
01:35:06,550 --> 01:35:05,920
what ligo uses to detect gravitational

2601
01:35:10,790 --> 01:35:06,560
waves

2602
01:35:12,310 --> 01:35:10,800
yeah okay okay now multiplexing fourier

2603
01:35:12,870 --> 01:35:12,320
transform so fourier transform should be

2604
01:35:14,950 --> 01:35:12,880
familiar

2605
01:35:16,229 --> 01:35:14,960
but what's a multiplexing for you let me

2606
01:35:25,270 --> 01:35:16,239
try to remember what

2607
01:35:28,870 --> 01:35:27,590
you might have used that adjective just

2608
01:35:33,350 --> 01:35:28,880
to describe that we can

2609
01:35:36,790 --> 01:35:34,790
can you not do that with a traditional

2610
01:35:38,709 --> 01:35:36,800
usually usually with an interferometer

2611
01:35:40,709 --> 01:35:38,719
you're using like with ligo

2612
01:35:42,229 --> 01:35:40,719
you'll take a laser beam at a given

2613
01:35:44,709 --> 01:35:42,239

wavelength and then you

2614
01:35:46,229 --> 01:35:44,719
are look waiting for an interference

2615
01:35:47,109 --> 01:35:46,239
pattern and as a gravitational wave

2616
01:35:50,709 --> 01:35:47,119
comes by that

2617
01:35:53,109 --> 01:35:50,719
actually stretches your your delay lines

2618
01:35:54,629 --> 01:35:53,119
right and that's what you detect so in

2619
01:35:56,870 --> 01:35:54,639
this case you're not

2620
01:35:58,390 --> 01:35:56,880
yeah you're just taking light in so it's

2621
01:36:01,030 --> 01:35:58,400
multiple frequencies

2622
01:36:03,109 --> 01:36:01,040
spectrometer now what is that so

2623
01:36:03,910 --> 01:36:03,119
spectrometer is used to measure the

2624
01:36:06,790 --> 01:36:03,920
spectrum

2625
01:36:08,709 --> 01:36:06,800
of the light so you can determine what

2626
01:36:09,669 --> 01:36:08,719
wavelengths are present in that beam of

2627
01:36:11,270 --> 01:36:09,679
light

2628
01:36:12,550 --> 01:36:11,280
i'm mispronouncing these words but

2629
01:36:13,590 --> 01:36:12,560
hopefully you can understand what i'm

2630
01:36:14,709 --> 01:36:13,600
trying to say so what is this

2631
01:36:16,709 --> 01:36:14,719
what's the relationship between the

2632
01:36:19,590 --> 01:36:16,719
spectrometer and the inferometer

2633
01:36:21,189 --> 01:36:19,600
ah well there usually is no relationship

2634
01:36:23,910 --> 01:36:21,199
in this device we use

2635
01:36:25,430 --> 01:36:23,920
the interferometer to figure out what

2636
01:36:28,629 --> 01:36:25,440
the spectrum is so the whole

2637
01:36:30,629 --> 01:36:28,639
device is then called a spectrometer

2638
01:36:33,270 --> 01:36:30,639

so we're using an interferometer to

2639
01:36:36,629 --> 01:36:33,280
determine what wavelengths are present

2640
01:36:39,990 --> 01:36:36,639
nice and nice so the re the

2641
01:36:43,510 --> 01:36:40,000
end result is that we obtain a spectrum

2642
01:36:46,709 --> 01:36:46,149
earlier in your career you used to work

2643
01:36:49,510 --> 01:36:46,719
on

2644
01:36:51,270 --> 01:36:49,520
auditory neural auditory yeah i did work

2645
01:36:53,270 --> 01:36:51,280
in neuroscience that's right

2646
01:36:54,629 --> 01:36:53,280
right okay so you said in particular i

2647
01:36:56,070 --> 01:36:54,639
was interested in the transition that

2648
01:36:58,149 --> 01:36:56,080
happens when one listens to clicks and

2649
01:37:00,070 --> 01:36:58,159
then increases it to let's say 40 hertz

2650
01:37:01,669 --> 01:37:00,080
so that's 40 times a second and then

2651
01:37:04,709 --> 01:37:01,679
perceptually it goes from

2652
01:37:07,910 --> 01:37:06,629
and then you had expected there to be

2653
01:37:09,510 --> 01:37:07,920
doubling effects due to

2654
01:37:11,510 --> 01:37:09,520
neural refractory periods now what i'm

2655
01:37:13,109 --> 01:37:11,520
wondering is

2656
01:37:15,350 --> 01:37:13,119
why would you expect okay so what do you

2657
01:37:17,590 --> 01:37:15,360
expect to double the frequency

2658
01:37:19,270 --> 01:37:17,600
over the period of the period i expected

2659
01:37:20,070 --> 01:37:19,280
there to be period doubling so i was

2660
01:37:23,669 --> 01:37:20,080
looking for

2661
01:37:24,310 --> 01:37:23,679
nonlinear effects in the auditory system

2662
01:37:27,910 --> 01:37:24,320
and i

2663
01:37:30,550 --> 01:37:27,920

expected that you'd have something like

2664
01:37:32,950 --> 01:37:30,560
period doubling bifurcations going on

2665
01:37:34,629 --> 01:37:32,960
like you see in nonlinear dynamics so

2666
01:37:37,590 --> 01:37:34,639
basically the idea is that the

2667
01:37:38,070 --> 01:37:37,600
neurons have a particular firing rate

2668
01:37:40,950 --> 01:37:38,080
and

2669
01:37:42,470 --> 01:37:40,960
they have a refractory period during you

2670
01:37:44,310 --> 01:37:42,480
know after they fire

2671
01:37:45,990 --> 01:37:44,320
they have a refractory period over which

2672
01:37:48,470 --> 01:37:46,000
they can't fire again

2673
01:37:50,709 --> 01:37:48,480
because they've got a build up the

2674
01:37:54,070 --> 01:37:50,719
chemical levels again right

2675
01:37:56,229 --> 01:37:54,080
um and so now if you so now if you

2676
01:37:58,629 --> 01:37:56,239
stimulate a neuron it'll fire

2677
01:38:00,629 --> 01:37:58,639
but if you stimulate it too fast then

2678
01:38:02,790 --> 01:38:00,639
you're going to start missing beets

2679
01:38:04,709 --> 01:38:02,800
because it'll fire and then you'll have

2680
01:38:06,790 --> 01:38:04,719
it be in refractory mode when you

2681
01:38:08,870 --> 01:38:06,800
trigger it again so it won't fire on

2682
01:38:09,990 --> 01:38:08,880
that one but then the second one it'll

2683
01:38:11,590 --> 01:38:10,000
fire again

2684
01:38:13,350 --> 01:38:11,600
but the next one it won't because it's

2685
01:38:14,870 --> 01:38:13,360
still refractory so you get a period

2686
01:38:17,189 --> 01:38:14,880
doubling and that's what i expected to

2687
01:38:18,550 --> 01:38:17,199
see in the auditory system

2688
01:38:20,709 --> 01:38:18,560

and i thought that that might be

2689
01:38:24,470 --> 01:38:20,719
responsible for

2690
01:38:27,830 --> 01:38:24,480
the perception of tones instead of

2691
01:38:28,550 --> 01:38:27,840
individual clicks and what are the

2692
01:38:29,830 --> 01:38:28,560
results

2693
01:38:32,229 --> 01:38:29,840
that wasn't what was responsible was

2694
01:38:33,189 --> 01:38:32,239
negative no i did not see that happen at

2695
01:38:36,629 --> 01:38:33,199
all

2696
01:38:39,270 --> 01:38:36,639
so in that it was interesting

2697
01:38:40,709 --> 01:38:39,280
well as a phd student it's disappointing

2698
01:38:43,430 --> 01:38:40,719
because it's a negative result

2699
01:38:45,030 --> 01:38:43,440
right so so my thesis had to do with a

2700
01:38:48,470 --> 01:38:45,040
negative result

2701
01:38:50,470 --> 01:38:48,480
and um and i did other things like map

2702
01:38:51,750 --> 01:38:50,480
out locations of active areas in the

2703
01:38:55,350 --> 01:38:51,760
brain using from

2704
01:38:57,350 --> 01:38:55,360
using mri so um

2705
01:38:58,950 --> 01:38:57,360
along with the along with the

2706
01:39:00,470 --> 01:38:58,960
encephalography which is what i was

2707
01:39:03,350 --> 01:39:00,480
recording

2708
01:39:04,790 --> 01:39:03,360
the um now it was interesting because it

2709
01:39:07,390 --> 01:39:04,800
was a few years later

2710
01:39:09,030 --> 01:39:07,400
i was reading a paper about

2711
01:39:12,149 --> 01:39:09,040
schizophrenics

2712
01:39:13,430 --> 01:39:12,159
and it turned out the authors discovered

2713
01:39:16,629 --> 01:39:13,440

that phenomena

2714
01:39:18,390 --> 01:39:16,639
in schizophrenics now they didn't

2715
01:39:20,229 --> 01:39:18,400
know about nonlinear dynamics so they

2716
01:39:21,669 --> 01:39:20,239
didn't call it the same thing but from

2717
01:39:25,030 --> 01:39:21,679
the period

2718
01:39:26,709 --> 01:39:25,040
data it was clear that it was a period

2719
01:39:28,550 --> 01:39:26,719
doubling effect

2720
01:39:30,070 --> 01:39:28,560
so they found it in schizophrenics but i

2721
01:39:32,790 --> 01:39:30,080
didn't find it in normal people

2722
01:39:35,830 --> 01:39:32,800
so that was kind of interesting can that

2723
01:39:37,430 --> 01:39:35,840
be used to potentially diagnose

2724
01:39:39,189 --> 01:39:37,440
schizophrenia or oh i don't know

2725
01:39:40,709 --> 01:39:39,199
preconditions

2726
01:39:42,470 --> 01:39:40,719
yeah that's an interesting question i

2727
01:39:44,310 --> 01:39:42,480
didn't really pursue it so i didn't i

2728
01:39:46,390 --> 01:39:44,320
didn't i don't know

2729
01:39:47,750 --> 01:39:46,400
or i'm sure you heard about orchestrated

2730
01:39:52,310 --> 01:39:47,760
objective reduction from

2731
01:39:54,229 --> 01:39:52,320
penrose with regard to consciousness

2732
01:39:55,669 --> 01:39:54,239
no okay okay well anyway he has an

2733
01:39:57,430 --> 01:39:55,679
interesting theory as to why the wave

2734
01:39:59,590 --> 01:39:57,440
function collapses and it's because

2735
01:40:00,950 --> 01:39:59,600
right when it reaches a supers like the

2736
01:40:03,109 --> 01:40:00,960
question is

2737
01:40:04,629 --> 01:40:03,119
how does gravity come in because are you

2738
01:40:07,350 --> 01:40:04,639

in both space-time

2739
01:40:08,229 --> 01:40:07,360
in a superposition he would say yes

2740
01:40:10,709 --> 01:40:08,239
space time is

2741
01:40:11,510 --> 01:40:10,719
until it reaches a critical time

2742
01:40:14,229 --> 01:40:11,520
interval

2743
01:40:14,629 --> 01:40:14,239
or critical separation at which point it

2744
01:40:16,550 --> 01:40:14,639
then

2745
01:40:18,229 --> 01:40:16,560
chooses when it collapses and that's a

2746
01:40:22,229 --> 01:40:18,239
moment of proto-consciousness

2747
01:40:25,590 --> 01:40:22,239
it's actually a fascinatingly creative

2748
01:40:28,149 --> 01:40:25,600
theory i'm so surprised that someone

2749
01:40:29,189 --> 01:40:28,159
penrose a mainstr somewhat mainstream

2750
01:40:30,870 --> 01:40:29,199
physicist

2751
01:40:32,709 --> 01:40:30,880
would come up with this because it's so

2752
01:40:34,070 --> 01:40:32,719
bizarre anyway

2753
01:40:37,350 --> 01:40:34,080
when you were referring to the

2754
01:40:39,030 --> 01:40:37,360
perception of tones i was wondering hmm

2755
01:40:40,470 --> 01:40:39,040
do you have a theory as to why we

2756
01:40:42,709 --> 01:40:40,480
perceive it all of a sudden

2757
01:40:43,830 --> 01:40:42,719
to be uniform and continuous and i was

2758
01:40:44,550 --> 01:40:43,840
wondering if that was related to

2759
01:40:46,709 --> 01:40:44,560
orchestrated

2760
01:40:47,750 --> 01:40:46,719
objective reduction but anyway did you

2761
01:40:49,830 --> 01:40:47,760
manage to find out

2762
01:40:51,189 --> 01:40:49,840
why the tone became a tone and not a

2763
01:40:54,390 --> 01:40:51,199

series of clicks

2764
01:40:56,709 --> 01:40:54,400
no not really so i don't and i and i

2765
01:40:58,470 --> 01:40:56,719
haven't done that work since that time

2766
01:41:02,709 --> 01:40:58,480
so i don't know much about that now

2767
01:41:06,070 --> 01:41:04,950
okay all right all right why don't you

2768
01:41:06,550 --> 01:41:06,080
tell the audience a little bit about

2769
01:41:09,910 --> 01:41:06,560
your

2770
01:41:13,830 --> 01:41:09,920
position at nasa ames research center

2771
01:41:16,790 --> 01:41:13,840
at nasa yes so i was a

2772
01:41:19,030 --> 01:41:16,800
i was a research scientist at nasa ames

2773
01:41:23,109 --> 01:41:19,040
in the intelligent systems division

2774
01:41:26,310 --> 01:41:23,119
and so there what i did is i worked on

2775
01:41:28,470 --> 01:41:26,320
mostly on astrophysics problems

2776
01:41:31,030 --> 01:41:28,480
and designed machine learning algorithms

2777
01:41:34,470 --> 01:41:31,040
to analyze data

2778
01:41:36,560 --> 01:41:34,480
so we worked on for instance one of the

2779
01:41:37,750 --> 01:41:36,570
main projects i worked on was to

2780
01:41:41,030 --> 01:41:37,760
[Music]

2781
01:41:43,990 --> 01:41:41,040
work to create three-dimensional models

2782
01:41:46,310 --> 01:41:44,000
of planetary nebulae so planetary

2783
01:41:49,350 --> 01:41:46,320
nebulae are clouds of gas that surround

2784
01:41:51,109 --> 01:41:49,360
old stars these are stars that have

2785
01:41:51,430 --> 01:41:51,119
collapsed and become a white dwarf so

2786
01:41:55,109 --> 01:41:51,440
they

2787
01:41:58,470 --> 01:41:55,119
kind of puff off their outer atmospheres

2788
01:42:01,030 --> 01:41:58,480

and form a nebula and we had

2789
01:42:02,390 --> 01:42:01,040
obtained with with our sen hajian so the

2790
01:42:04,470 --> 01:42:02,400
same person at

2791
01:42:06,709 --> 01:42:04,480
um u of t that you mentioned earlier

2792
01:42:08,470 --> 01:42:06,719
with the fourier transform spectrometer

2793
01:42:11,270 --> 01:42:08,480
so this was our sentence project

2794
01:42:13,030 --> 01:42:11,280
originally and he had um

2795
01:42:14,629 --> 01:42:13,040
he had collected data with the hubble

2796
01:42:18,229 --> 01:42:14,639
space telescope

2797
01:42:20,470 --> 01:42:18,239
of of planetary nebula and he had

2798
01:42:22,149 --> 01:42:20,480
some imagery that were about five years

2799
01:42:23,830 --> 01:42:22,159
apart so you could actually see the

2800
01:42:26,830 --> 01:42:23,840
change in size

2801
01:42:28,229 --> 01:42:26,840
uh the change in angular size of the

2802
01:42:31,030 --> 01:42:28,239
object

2803
01:42:32,229 --> 01:42:31,040
we also had um doppler shift information

2804
01:42:35,750 --> 01:42:32,239
by looking at the

2805
01:42:37,030 --> 01:42:35,760
the um the the frequencies of light

2806
01:42:38,550 --> 01:42:37,040
coming off the nebula

2807
01:42:40,550 --> 01:42:38,560
part of the nebula is coming towards you

2808
01:42:42,310 --> 01:42:40,560
parts going away so you get a splitting

2809
01:42:45,669 --> 01:42:42,320
in the doppler lines

2810
01:42:49,350 --> 01:42:45,679
so we knew what the radial velocity was

2811
01:42:50,629 --> 01:42:49,360
and we knew the tangential angular size

2812
01:42:54,470 --> 01:42:50,639
change

2813
01:42:56,229 --> 01:42:54,480

and so we wanted to create a 3d model so

2814
01:42:58,310 --> 01:42:56,239
that we could relate the two

2815
01:43:01,109 --> 01:42:58,320
and figure out what the velocity is in

2816
01:43:02,709 --> 01:43:01,119
the tangential direction

2817
01:43:04,310 --> 01:43:02,719
uh because once you know the angular

2818
01:43:05,990 --> 01:43:04,320
size change and the velocity in that

2819
01:43:07,510 --> 01:43:06,000
direction then you can get the distance

2820
01:43:10,550 --> 01:43:07,520
to the nebula

2821
01:43:13,430 --> 01:43:10,560
and there aren't very many good

2822
01:43:15,750 --> 01:43:13,440
distance markers in the within you know

2823
01:43:18,709 --> 01:43:15,760
the galactic range so

2824
01:43:20,709 --> 01:43:18,719
so you know if things are within you

2825
01:43:21,109 --> 01:43:20,719
know a thousand parsecs or so you can

2826
01:43:23,510 --> 01:43:21,119
get

2827
01:43:24,870 --> 01:43:23,520
some idea of how far away it is and of

2828
01:43:27,990 --> 01:43:24,880
course if you

2829
01:43:30,390 --> 01:43:28,000
look at other galaxies and you see the

2830
01:43:32,470 --> 01:43:30,400
redshift from hubble expansion that you

2831
01:43:34,070 --> 01:43:32,480
can get distances there but distances

2832
01:43:38,390 --> 01:43:34,080
within the galaxy are very

2833
01:43:41,510 --> 01:43:38,400
poorly constrained so we were trying to

2834
01:43:44,229 --> 01:43:41,520
obtain 3d models of planetary nebulae

2835
01:43:46,390 --> 01:43:44,239
for distance markers

2836
01:43:47,590 --> 01:43:46,400
why why is it that the distances within

2837
01:43:49,590 --> 01:43:47,600
the galaxies are

2838
01:43:51,430 --> 01:43:49,600

troublesome you can't figure them out or

2839
01:43:53,030 --> 01:43:51,440
not you but one cannot

2840
01:43:54,950 --> 01:43:53,040
yeah well it's difficult they're two

2841
01:43:56,229 --> 01:43:54,960
your two we're talking about distances

2842
01:43:57,910 --> 01:43:56,239
where you're too far away to use

2843
01:44:01,590 --> 01:43:57,920
parallax

2844
01:44:02,709 --> 01:44:01,600
the earth you know the earth is orbiting

2845
01:44:05,270 --> 01:44:02,719
the sun so you're

2846
01:44:06,550 --> 01:44:05,280
you get a parallax shift uh you're too

2847
01:44:09,990 --> 01:44:06,560
far away for that

2848
01:44:13,189 --> 01:44:10,000
and um you

2849
01:44:15,030 --> 01:44:13,199
don't accurately know you know to

2850
01:44:16,310 --> 01:44:15,040
get just there's a few ways to get

2851
01:44:17,910 --> 01:44:16,320
distances right so

2852
01:44:19,590 --> 01:44:17,920
cepheid variables are one you have

2853
01:44:23,189 --> 01:44:19,600
variable stars and you know

2854
01:44:24,790 --> 01:44:23,199
how they're varying in intensity and so

2855
01:44:26,310 --> 01:44:24,800
because you know the varying intensity

2856
01:44:27,669 --> 01:44:26,320
you can then figure out how far away

2857
01:44:29,109 --> 01:44:27,679
they are by looking at how much light

2858
01:44:31,350 --> 01:44:29,119
you receive

2859
01:44:32,709 --> 01:44:31,360
um so that so that's one way to get

2860
01:44:35,830 --> 01:44:32,719
distances but

2861
01:44:37,030 --> 01:44:35,840
other stars you can't exactly know what

2862
01:44:39,510 --> 01:44:37,040
their luminosity is

2863
01:44:41,350 --> 01:44:39,520

so you know you have some idea but you

2864
01:44:44,550 --> 01:44:41,360
have a lot of uncertainty there

2865
01:44:47,430 --> 01:44:44,560
and so you can't get a good you know

2866
01:44:48,709 --> 01:44:47,440
a reliable distance for for most objects

2867
01:44:50,070 --> 01:44:48,719
i see i see you see

2868
01:44:52,310 --> 01:44:50,080
you know a question that i asked avi

2869
01:44:54,390 --> 01:44:52,320
loeb that i don't think he gave me

2870
01:44:56,310 --> 01:44:54,400
a sufficient answer and you could help

2871
01:44:57,990 --> 01:44:56,320
me out it's that when i'm

2872
01:44:59,910 --> 01:44:58,000
when studying general relativity just

2873
01:45:01,510 --> 01:44:59,920
speaking about manifolds in general

2874
01:45:03,030 --> 01:45:01,520
and then the velocity at two different

2875
01:45:05,750 --> 01:45:03,040
points on a manifold

2876
01:45:06,870 --> 01:45:05,760
you can't actually compare velocity at

2877
01:45:08,070 --> 01:45:06,880
two different points

2878
01:45:11,030 --> 01:45:08,080
you can compare them when they're

2879
01:45:12,310 --> 01:45:11,040
together it's ill-defined to compare two

2880
01:45:14,470 --> 01:45:12,320
different points on a matter yeah you

2881
01:45:17,270 --> 01:45:14,480
have to you have to parallel transport

2882
01:45:18,149 --> 01:45:17,280
one vector to another and then compare

2883
01:45:22,550 --> 01:45:18,159
right

2884
01:45:25,669 --> 01:45:22,560
now that's given by

2885
01:45:28,470 --> 01:45:25,679
einstein's equations but but what i'm

2886
01:45:31,030 --> 01:45:29,669
when we're saying that a galaxy is

2887
01:45:33,750 --> 01:45:31,040
moving at a certain distance away from

2888
01:45:35,590 --> 01:45:33,760

us so we're utilizing that connection

2889
01:45:37,669 --> 01:45:35,600
to parallel transport it to be able to

2890
01:45:39,430 --> 01:45:37,679
say that it's moving at a certain speed

2891
01:45:41,109 --> 01:45:39,440
because otherwise the notion of velocity

2892
01:45:41,430 --> 01:45:41,119
i don't see how it's well defined if

2893
01:45:45,350 --> 01:45:41,440
they're

2894
01:45:45,669 --> 01:45:45,360
well understand what i'm saying that's

2895
01:45:47,590 --> 01:45:45,679
my

2896
01:45:52,470 --> 01:45:47,600
question explaining exactly no that's

2897
01:45:56,070 --> 01:45:53,750
oh well that's interesting that's

2898
01:45:57,910 --> 01:45:56,080
something i hadn't quite conceived

2899
01:45:59,750 --> 01:45:57,920
of and i thought i really thought about

2900
01:46:03,030 --> 01:45:59,760
so

2901
01:46:08,950 --> 01:46:03,040
i mean we're talking i think we're

2902
01:46:12,229 --> 01:46:11,189
well what avi lope said earlier in the

2903
01:46:13,990 --> 01:46:12,239
conversation was that

2904
01:46:15,669 --> 01:46:14,000
as far as we can tell the universe we

2905
01:46:16,629 --> 01:46:15,679
live in is somewhat flat so i thought

2906
01:46:18,550 --> 01:46:16,639
okay maybe that's

2907
01:46:20,550 --> 01:46:18,560
one way to get around that but let's

2908
01:46:21,109 --> 01:46:20,560
imagine that it's a sufficiently curvy

2909
01:46:23,189 --> 01:46:21,119
strange

2910
01:46:24,310 --> 01:46:23,199
manifold that we don't actually have an

2911
01:46:27,350 --> 01:46:24,320
idea as to what it is

2912
01:46:29,910 --> 01:46:27,360
how can one compare speeds

2913
01:46:31,270 --> 01:46:29,920

so is it just because it's flat or is it

2914
01:46:33,030 --> 01:46:31,280
for some other reason like we're making

2915
01:46:35,030 --> 01:46:33,040
assumptions about what exists and

2916
01:46:37,350 --> 01:46:35,040
so let's say you just assume that

2917
01:46:38,310 --> 01:46:37,360
there's a uniform density of particles

2918
01:46:40,229 --> 01:46:38,320
almost like dust

2919
01:46:41,430 --> 01:46:40,239
and in some cosmological models and then

2920
01:46:43,750 --> 01:46:41,440
you can extrapolate and get the big

2921
01:46:46,070 --> 01:46:43,760
whatever so you have some

2922
01:46:46,870 --> 01:46:46,080
model of how the galaxy is distributed

2923
01:46:47,910 --> 01:46:46,880
in mass

2924
01:46:49,109 --> 01:46:47,920
and then you use that then you're like

2925
01:46:50,470 --> 01:46:49,119
okay i can get the connection from that

2926
01:46:51,910 --> 01:46:50,480
so that i can

2927
01:46:53,669 --> 01:46:51,920
understand how these two points relate

2928
01:46:55,669 --> 01:46:53,679
to one another that's how i could

2929
01:46:56,870 --> 01:46:55,679
make sense of it but without that

2930
01:46:58,390 --> 01:46:56,880
calculate like what's going on in the

2931
01:46:59,270 --> 01:46:58,400
calculation that you can compare two

2932
01:47:01,270 --> 01:46:59,280
different velocities

2933
01:47:02,709 --> 01:47:01,280
as simple is it as simple as like a

2934
01:47:05,590 --> 01:47:02,719
we're just looking at it

2935
01:47:06,790 --> 01:47:05,600
like i would a baseball and compare i

2936
01:47:08,870 --> 01:47:06,800
guess i guess the

2937
01:47:10,470 --> 01:47:08,880
i guess there's an implicit assumption

2938
01:47:13,590 --> 01:47:10,480

that the

2939
01:47:15,590 --> 01:47:13,600
space time is basically flat between the

2940
01:47:18,550 --> 01:47:15,600
two of you

2941
01:47:19,990 --> 01:47:18,560
and that you then get a doppler you know

2942
01:47:22,470 --> 01:47:20,000
then the doppler shift is

2943
01:47:23,990 --> 01:47:22,480
solely due to the velocity of the object

2944
01:47:28,310 --> 01:47:24,000
if not due to

2945
01:47:32,229 --> 01:47:30,310
and i think that's the general i think

2946
01:47:32,629 --> 01:47:32,239
that's the basic assumption because you

2947
01:47:34,470 --> 01:47:32,639
know

2948
01:47:35,750 --> 01:47:34,480
you could be wrong i mean so imagine

2949
01:47:37,430 --> 01:47:35,760
that imagine that

2950
01:47:39,590 --> 01:47:37,440
our solar i mean we don't believe this

2951
01:47:41,109 --> 01:47:39,600
is the case but imagine that our solar

2952
01:47:43,750 --> 01:47:41,119
system is sitting in the middle of a

2953
01:47:46,229 --> 01:47:43,760
dark matter cloud right

2954
01:47:47,669 --> 01:47:46,239
and then now now you have now you have a

2955
01:47:51,590 --> 01:47:47,679
gravitational

2956
01:47:54,229 --> 01:47:51,600
know coming into play

2957
01:47:55,750 --> 01:47:54,239
that you don't know about so now you're

2958
01:47:57,590 --> 01:47:55,760
you know you would get the wrong answers

2959
01:47:58,790 --> 01:47:57,600
for the velocity because you don't have

2960
01:48:07,189 --> 01:47:58,800
the

2961
01:48:10,470 --> 01:48:07,199
that it's flat

2962
01:48:12,070 --> 01:48:10,480
and there's no dark matter right right

2963
01:48:13,510 --> 01:48:12,080

the more that is assumed in a theory the

2964
01:48:15,270 --> 01:48:13,520
more likely it is to be wrong that's a

2965
01:48:16,870 --> 01:48:15,280
quote from one of your papers

2966
01:48:18,390 --> 01:48:16,880
then so this is an argument about

2967
01:48:21,109 --> 01:48:18,400
parsimony then

2968
01:48:22,950 --> 01:48:21,119
to me what i'm wondering is the reason

2969
01:48:23,830 --> 01:48:22,960
why i dislike arguments about parsimony

2970
01:48:25,669 --> 01:48:23,840
is because

2971
01:48:27,270 --> 01:48:25,679
it would lead you to idealism that is

2972
01:48:28,950 --> 01:48:27,280
mind is all that exists

2973
01:48:30,550 --> 01:48:28,960
okay why would it lead you to that

2974
01:48:32,629 --> 01:48:30,560
because mind

2975
01:48:34,149 --> 01:48:32,639
exists in the sense that in a sense of

2976
01:48:36,149 --> 01:48:34,159
descartes so you believe that you're

2977
01:48:37,430 --> 01:48:36,159
conscious okay so then

2978
01:48:40,950 --> 01:48:37,440
what you see in front of you is like

2979
01:48:44,229 --> 01:48:42,709
and then to posit that there's an

2980
01:48:47,030 --> 01:48:44,239
external world

2981
01:48:47,669 --> 01:48:47,040
is a second ontological step which means

2982
01:48:49,590 --> 01:48:47,679
it's actually

2983
01:48:50,870 --> 01:48:49,600
easier to just assume that this is all

2984
01:48:52,310 --> 01:48:50,880
occurring in mind

2985
01:48:54,229 --> 01:48:52,320
and then you're like well if it's in

2986
01:48:55,350 --> 01:48:54,239
mind then why

2987
01:48:57,430 --> 01:48:55,360
are there regularities well you could

2988
01:48:59,910 --> 01:48:57,440

say there's regularities in mind this is

2989
01:49:01,990 --> 01:48:59,920
something that bernardo castro argues he

2990
01:49:05,590 --> 01:49:02,000
says that actually

2991
01:49:09,030 --> 01:49:05,600
idealism is the

2992
01:49:12,709 --> 01:49:09,040
the best philosophical thought if one is

2993
01:49:17,430 --> 01:49:14,470
i'm curious why don't you take the step

2994
01:49:18,870 --> 01:49:17,440
of just saying idealism is correct

2995
01:49:21,270 --> 01:49:18,880
unless you do maybe you do i don't know

2996
01:49:23,510 --> 01:49:21,280
what your philosophical framework is

2997
01:49:26,229 --> 01:49:23,520
why don't you take that step if you're

2998
01:49:29,589 --> 01:49:26,239
making an argument about parsimony

2999
01:49:35,350 --> 01:49:29,599
that less assumptions are better

3000
01:49:39,510 --> 01:49:38,149
so maybe to answer that it better for me

3001
01:49:44,229 --> 01:49:39,520
to

3002
01:49:50,709 --> 01:49:47,510
or why why one would invoke parsimony

3003
01:49:54,870 --> 01:49:50,719
in that particular argument

3004
01:49:57,910 --> 01:49:54,880
so in my theoretical

3005
01:50:04,629 --> 01:49:57,920
my more recent theoretical work

3006
01:50:09,430 --> 01:50:08,470
i've taken the a very a very different

3007
01:50:13,350 --> 01:50:09,440
perspective

3008
01:50:15,189 --> 01:50:13,360
so you know typically we have a um

3009
01:50:16,709 --> 01:50:15,199
you know we have these ideas of physical

3010
01:50:20,629 --> 01:50:16,719
law there's a physical law

3011
01:50:22,629 --> 01:50:20,639
and um and i think you were um talking

3012
01:50:24,550 --> 01:50:22,639
to eric weinstein about this you know

3013
01:50:27,589 --> 01:50:24,560

what makes the electron fall what makes

3014
01:50:30,709 --> 01:50:27,599
it obey the physical law right

3015
01:50:35,030 --> 01:50:32,390
and so we have this idea that there are

3016
01:50:35,669 --> 01:50:35,040
these there exists these laws that we

3017
01:50:39,270 --> 01:50:35,679
discover

3018
01:50:41,430 --> 01:50:39,280
right and um you know so

3019
01:50:43,030 --> 01:50:41,440
where do the laws come from you know you

3020
01:50:43,990 --> 01:50:43,040
worry about that and we worry about

3021
01:50:45,270 --> 01:50:44,000
whether different

3022
01:50:46,550 --> 01:50:45,280
you know if there's a multiverse

3023
01:50:47,510 --> 01:50:46,560
different universes could they have

3024
01:50:49,990 --> 01:50:47,520
different laws

3025
01:50:51,750 --> 01:50:50,000
you know you have that question come up

3026
01:50:53,430 --> 01:50:51,760
um which is a natural question when you

3027
01:50:54,390 --> 01:50:53,440
have no idea where the laws come from

3028
01:50:59,350 --> 01:50:54,400
right

3029
01:51:02,790 --> 01:51:01,270
so you either believe that you know

3030
01:51:05,430 --> 01:51:02,800
mother nature has

3031
01:51:07,350 --> 01:51:05,440
you know dictated a set of laws and then

3032
01:51:08,870 --> 01:51:07,360
somehow make sure that the electron

3033
01:51:12,390 --> 01:51:08,880
follows them right

3034
01:51:15,830 --> 01:51:12,400
and so you have that going on or

3035
01:51:20,790 --> 01:51:15,840
um or is it something else

3036
01:51:22,790 --> 01:51:20,800
and so the

3037
01:51:24,149 --> 01:51:22,800
i guess i've i've come to think of it

3038
01:51:27,430 --> 01:51:24,159

more in terms

3039
01:51:29,109 --> 01:51:27,440
of you know the law when we talk about

3040
01:51:31,830 --> 01:51:29,119
laws we're usually talking about

3041
01:51:33,589 --> 01:51:31,840
our mathematical form formulation of

3042
01:51:34,950 --> 01:51:33,599
physics right because this is what we

3043
01:51:38,070 --> 01:51:34,960
use to make

3044
01:51:39,990 --> 01:51:38,080
quantitative predictions and when i when

3045
01:51:41,990 --> 01:51:40,000
we say quantitative what do we mean well

3046
01:51:44,790 --> 01:51:42,000
we're assigning numbers to things

3047
01:51:45,430 --> 01:51:44,800
right so so how does one assign numbers

3048
01:51:48,070 --> 01:51:45,440
to things

3049
01:51:49,510 --> 01:51:48,080
and that's so that's a question and that

3050
01:51:51,430 --> 01:51:49,520
one could ask

3051
01:51:53,189 --> 01:51:51,440
and i and i had worried about this in

3052
01:51:56,790 --> 01:51:53,199
graduate school i got

3053
01:52:00,149 --> 01:51:56,800
it was frustrating i i had asked

3054
01:52:01,750 --> 01:52:00,159
a very simple question and i was trying

3055
01:52:03,510 --> 01:52:01,760
to understand

3056
01:52:05,589 --> 01:52:03,520
you know i said why is it when i take

3057
01:52:08,629 --> 01:52:05,599
two pens and i combine them

3058
01:52:11,750 --> 01:52:08,639
with another pin i always get third

3059
01:52:12,229 --> 01:52:11,760
three pens why why does that happen and

3060
01:52:16,790 --> 01:52:12,239
i

3061
01:52:19,990 --> 01:52:16,800
three

3062
01:52:24,229 --> 01:52:20,000
i'm very familiar with this um

3063
01:52:26,790 --> 01:52:24,239

but what i was wondering is is this a

3064
01:52:28,470 --> 01:52:26,800
is this an experimental result where you

3065
01:52:29,270 --> 01:52:28,480
had to do an experiment to find out that

3066
01:52:31,830 --> 01:52:29,280
it was three

3067
01:52:33,910 --> 01:52:31,840
and or is it a theoretical result where

3068
01:52:36,070 --> 01:52:33,920
this is how you define three

3069
01:52:37,109 --> 01:52:36,080
or is it a definition do we define three

3070
01:52:40,070 --> 01:52:37,119
this way

3071
01:52:42,149 --> 01:52:40,080
um where what do we mean when we you

3072
01:52:44,550 --> 01:52:42,159
know when we think about that

3073
01:52:45,589 --> 01:52:44,560
and so i had had asked that question in

3074
01:52:48,070 --> 01:52:45,599
graduate school

3075
01:52:49,430 --> 01:52:48,080
and that that really didn't go well

3076
01:52:51,990 --> 01:52:49,440
because they

3077
01:52:53,109 --> 01:52:52,000
um i ended up having several professors

3078
01:52:57,750 --> 01:52:53,119
make

3079
01:52:59,589 --> 01:52:57,760
oh i think we're having internet

3080
01:53:01,189 --> 01:52:59,599
connections here

3081
01:53:03,030 --> 01:53:01,199
huh it might be on my side because

3082
01:53:06,790 --> 01:53:03,040
you're completely fine as far as

3083
01:53:08,470 --> 01:53:06,800
okay yeah so so the um

3084
01:53:09,910 --> 01:53:08,480
it was at the moment that i read that in

3085
01:53:13,030 --> 01:53:09,920
your

3086
01:53:14,390 --> 01:53:13,040
paper once that i realized man this guy

3087
01:53:15,990 --> 01:53:14,400
is far more interesting than i

3088
01:53:17,430 --> 01:53:16,000

initially thought i mean i already

3089
01:53:19,589 --> 01:53:17,440
thought you were interesting and i was

3090
01:53:21,030 --> 01:53:19,599
excited to thank you just about uap and

3091
01:53:22,550 --> 01:53:21,040
then i saw that and then i was like okay

3092
01:53:24,149 --> 01:53:22,560
so this person is actually thinking

3093
01:53:25,750 --> 01:53:24,159
about physics

3094
01:53:27,350 --> 01:53:25,760
not in the same way not to say that you

3095
01:53:29,030 --> 01:53:27,360
think about it

3096
01:53:30,629 --> 01:53:29,040
not to compliment myself by saying i

3097
01:53:33,750 --> 01:53:30,639
think about it anyway like you

3098
01:53:36,229 --> 01:53:33,760
but i'm saying there's similarities

3099
01:53:37,189 --> 01:53:36,239
you you definitely are thinking

3100
01:53:40,310 --> 01:53:37,199
foundationally

3101
01:53:42,070 --> 01:53:40,320
and i'm so super excited okay great

3102
01:53:43,589 --> 01:53:42,080
so essentially the effectiveness of

3103
01:53:45,350 --> 01:53:43,599
mathematics yeah so

3104
01:53:47,270 --> 01:53:45,360
so why does why does math work why does

3105
01:53:50,950 --> 01:53:47,280
that why does that work and i

3106
01:53:52,470 --> 01:53:50,960
and yeah so i had um several professors

3107
01:53:53,510 --> 01:53:52,480
would make fun if i asked a question in

3108
01:53:55,910 --> 01:53:53,520
class oh here

3109
01:53:57,910 --> 01:53:55,920
kevin who doesn't know why we add things

3110
01:54:00,149 --> 01:53:57,920
when we combine them as a question

3111
01:54:01,589 --> 01:54:00,159
and that was that was a little

3112
01:54:03,189 --> 01:54:01,599
frustrating and some of the graduate

3113
01:54:06,709 --> 01:54:03,199

students made fun as well

3114
01:54:09,510 --> 01:54:06,719
that's fine um what it did

3115
01:54:11,270 --> 01:54:09,520
for me though is it solidified in my

3116
01:54:13,189 --> 01:54:11,280
mind that

3117
01:54:14,390 --> 01:54:13,199
they don't actually know the answer to

3118
01:54:17,030 --> 01:54:14,400
the question either

3119
01:54:17,669 --> 01:54:17,040
no no it was it was clear very obvious

3120
01:54:20,229 --> 01:54:17,679
to me

3121
01:54:23,030 --> 01:54:20,239
no one had the answer to that and so it

3122
01:54:26,310 --> 01:54:23,040
remained kind of a mystery in my mind

3123
01:54:28,390 --> 01:54:26,320
and um in some way

3124
01:54:29,510 --> 01:54:28,400
clearly became a driving force you know

3125
01:54:31,669 --> 01:54:29,520
at some level

3126
01:54:32,870 --> 01:54:31,679
uh was it wasn't one that i was aware of

3127
01:54:35,270 --> 01:54:32,880
initially

3128
01:54:36,310 --> 01:54:35,280
um meaning that it was at the back of

3129
01:54:38,470 --> 01:54:36,320
your mind

3130
01:54:39,510 --> 01:54:38,480
probably at the back of my mind and when

3131
01:54:42,550 --> 01:54:39,520
the time came

3132
01:54:45,910 --> 01:54:42,560
for it to be you know relevant it it

3133
01:54:48,149 --> 01:54:45,920
was right there and ready so mm-hmm

3134
01:54:49,510 --> 01:54:48,159
and it became relevant years later

3135
01:54:51,910 --> 01:54:49,520
because you were

3136
01:54:52,870 --> 01:54:51,920
it was years later yeah it was years

3137
01:54:55,830 --> 01:54:52,880
later and i was

3138
01:54:56,390 --> 01:54:55,840

um pretty much when i was working at

3139
01:54:59,830 --> 01:54:56,400
nasa

3140
01:55:03,350 --> 01:54:59,840
i was trying to

3141
01:55:06,229 --> 01:55:03,360
develop machines that autonomously

3142
01:55:09,510 --> 01:55:06,239
performed experiments

3143
01:55:12,149 --> 01:55:09,520
so i didn't want to do i wanted to do

3144
01:55:15,510 --> 01:55:12,159
calculations with questions

3145
01:55:17,589 --> 01:55:15,520
so the idea is that you can you have an

3146
01:55:19,750 --> 01:55:17,599
issue you want to resolve but you can't

3147
01:55:21,510 --> 01:55:19,760
ask that question directly but you can

3148
01:55:24,229 --> 01:55:21,520
ask questions that

3149
01:55:24,870 --> 01:55:24,239
have answers that imply um the answers

3150
01:55:27,589 --> 01:55:24,880
to that

3151
01:55:29,350 --> 01:55:27,599
question you do want to ask i don't

3152
01:55:30,310 --> 01:55:29,360
understand give me an example yeah so

3153
01:55:33,270 --> 01:55:30,320
you might want to

3154
01:55:34,550 --> 01:55:33,280
know you know is there you know you've

3155
01:55:36,229 --> 01:55:34,560
got a martian rover

3156
01:55:38,229 --> 01:55:36,239
it's looking at a rock and there's green

3157
01:55:39,430 --> 01:55:38,239
stuff on it and you want to say oh is

3158
01:55:41,030 --> 01:55:39,440
that stuff alive

3159
01:55:42,950 --> 01:55:41,040
right that's the question the issue when

3160
01:55:45,510 --> 01:55:42,960
you want to resolve is that alive

3161
01:55:46,470 --> 01:55:45,520
well you can't the rover can't just ask

3162
01:55:48,550 --> 01:55:46,480
are you alive

3163
01:55:49,910 --> 01:55:48,560

right that doesn't work that way so it

3164
01:55:53,350 --> 01:55:49,920
has to perform an experiment

3165
01:55:55,030 --> 01:55:53,360
so you know you could do raman

3166
01:55:58,709 --> 01:55:55,040
spectroscopy

3167
01:55:59,990 --> 01:55:58,719
and collect a spectrum you know a raman

3168
01:56:03,030 --> 01:56:00,000
spectrum from that and get some

3169
01:56:05,030 --> 01:56:03,040
idea of what molecules are present

3170
01:56:06,550 --> 01:56:05,040
and that's a question and gives you an

3171
01:56:07,750 --> 01:56:06,560
answer and the answer would be what

3172
01:56:09,669 --> 01:56:07,760
molecules are present

3173
01:56:11,030 --> 01:56:09,679
and then the question is does that then

3174
01:56:14,870 --> 01:56:11,040
you have to worry about whether

3175
01:56:18,310 --> 01:56:14,880
that result that that um

3176
01:56:21,589 --> 01:56:18,320
that assertion that you get from

3177
01:56:24,709 --> 01:56:21,599
from analyzing your data then how that

3178
01:56:25,510 --> 01:56:24,719
um is relevant to the issue what you

3179
01:56:27,910 --> 01:56:25,520
want to resolve

3180
01:56:29,990 --> 01:56:27,920
you know how how relevant is this to

3181
01:56:32,229 --> 01:56:30,000
whether it's alive or not

3182
01:56:34,310 --> 01:56:32,239
yeah so is it better to step on it and

3183
01:56:35,270 --> 01:56:34,320
see if it dies or is it better to take a

3184
01:56:37,270 --> 01:56:35,280
ramen's

3185
01:56:39,589 --> 01:56:37,280
spectrum and look at that what's a ramen

3186
01:56:40,070 --> 01:56:39,599
spectrum like ramen as in ramen noodles

3187
01:56:43,990 --> 01:56:40,080
or

3188
01:56:46,790 --> 01:56:44,000

uh r-a-m-a so it's it's basically

3189
01:56:47,350 --> 01:56:46,800
you um shine a laser beam at this and

3190
01:56:54,950 --> 01:56:47,360
the

3191
01:56:56,709 --> 01:56:54,960
right

3192
01:56:58,629 --> 01:56:56,719
okay cool it doesn't destroy the

3193
01:56:59,990 --> 01:56:58,639
specimen right so

3194
01:57:02,070 --> 01:57:00,000
so that was the original idea so i

3195
01:57:04,310 --> 01:57:02,080
wanted to do computations with questions

3196
01:57:05,350 --> 01:57:04,320
and i had had some experience in

3197
01:57:08,390 --> 01:57:05,360
deriving

3198
01:57:10,790 --> 01:57:08,400
uh probability theory and so

3199
01:57:12,390 --> 01:57:10,800
i was using that as kind of a framework

3200
01:57:17,750 --> 01:57:12,400
for getting started

3201
01:57:23,350 --> 01:57:20,390
basically what you what when you work

3202
01:57:25,270 --> 01:57:23,360
with that what you realize is that

3203
01:57:27,109 --> 01:57:25,280
if i want to assign a number to a

3204
01:57:29,430 --> 01:57:27,119
question actually i'm assigning numbers

3205
01:57:32,629 --> 01:57:29,440
to pairs of questions and i

3206
01:57:38,149 --> 01:57:32,639
want to quantify how relevant question a

3207
01:57:40,790 --> 01:57:38,159
is to my the issue i want to resolve

3208
01:57:42,149 --> 01:57:40,800
so this idea of relevance so i want to

3209
01:57:43,910 --> 01:57:42,159
assign a number to

3210
01:57:45,510 --> 01:57:43,920
this relevance which is a function of

3211
01:57:49,109 --> 01:57:45,520
two questions

3212
01:57:49,910 --> 01:57:49,119
and um so how do you consistently assign

3213
01:57:53,109 --> 01:57:49,920

numbers

3214
01:57:54,870 --> 01:57:53,119
um to this quantity

3215
01:57:58,550 --> 01:57:54,880
and that's the question that's that's

3216
01:58:09,750 --> 01:58:06,950
and you find that if you you can combine

3217
01:58:13,189 --> 01:58:09,760
questions in different ways you can ask

3218
01:58:16,550 --> 01:58:13,199
you know is it um this or that right

3219
01:58:19,830 --> 01:58:16,560
so you can use or as a conjunction and

3220
01:58:22,550 --> 01:58:19,840
um you can join two questions with an or

3221
01:58:23,910 --> 01:58:22,560
and you know are you drinking pepsi or

3222
01:58:26,709 --> 01:58:23,920
mountain dew

3223
01:58:27,270 --> 01:58:26,719
it could be your question and when you

3224
01:58:29,990 --> 01:58:27,280
do that

3225
01:58:32,070 --> 01:58:30,000
you find that you know the or the

3226
01:58:32,709 --> 01:58:32,080
logical order there when combining two

3227
01:58:35,270 --> 01:58:32,719
questions

3228
01:58:36,470 --> 01:58:35,280
is commutative and and it's also

3229
01:58:39,510 --> 01:58:36,480
associative if you

3230
01:58:41,990 --> 01:58:39,520
included more questions and that puts

3231
01:58:43,270 --> 01:58:42,000
some serious constraints on the numbers

3232
01:58:46,550 --> 01:58:43,280
that you would assign

3233
01:58:47,430 --> 01:58:46,560
to that joint question based on as a

3234
01:58:51,030 --> 01:58:47,440
function of the

3235
01:58:53,430 --> 01:58:51,040
the questions that you're joining and

3236
01:58:54,149 --> 01:58:53,440
you can show that it has to be additive

3237
01:58:57,270 --> 01:58:54,159
um or

3238
01:58:57,669 --> 01:58:57,280

or in isomorphic it has to be isomorphic

3239
01:59:02,229 --> 01:58:57,679
to

3240
01:59:05,430 --> 01:59:02,239
additive and

3241
01:59:07,350 --> 01:59:05,440
keep it simple um and

3242
01:59:08,709 --> 01:59:07,360
that's basically how that work started

3243
01:59:13,589 --> 01:59:08,719
so

3244
01:59:15,830 --> 01:59:13,599
point

3245
01:59:17,910 --> 01:59:15,840
you were a graduate in nasa or yeah i

3246
01:59:19,910 --> 01:59:17,920
was a i was a research scientist at nasa

3247
01:59:21,669 --> 01:59:19,920
at that point

3248
01:59:22,950 --> 01:59:21,679
because the work that i see you're doing

3249
01:59:24,310 --> 01:59:22,960
with saying that so-and-so is

3250
01:59:25,350 --> 01:59:24,320
commutative so-and-so is associated with

3251
01:59:26,950 --> 01:59:25,360
so it's distributed

3252
01:59:29,030 --> 01:59:26,960
and therefore has this implication to

3253
01:59:29,669 --> 01:59:29,040
physics that work i see it as being

3254
01:59:32,390 --> 01:59:29,679
recent

3255
01:59:34,070 --> 01:59:32,400
so you took that thinking from your

3256
01:59:35,589 --> 01:59:34,080
research days and then applied it or did

3257
01:59:39,189 --> 01:59:35,599
you apply back then

3258
01:59:42,470 --> 01:59:39,199
no i i didn't i didn't i didn't apply it

3259
01:59:45,350 --> 01:59:42,480
for oops my computer as an

3260
01:59:46,870 --> 01:59:45,360
error report this is fine i'll ask i'll

3261
01:59:47,750 --> 01:59:46,880
re-ask the question what i'm wondering

3262
01:59:51,750 --> 01:59:47,760
is

3263
01:59:55,350 --> 01:59:51,760

don't know how old you were let's say 30

3264
01:59:56,629 --> 01:59:55,360
28 35 yeah it was 2 000 so it had been

3265
01:59:58,709 --> 01:59:56,639
about 35 yep

3266
02:00:02,229 --> 01:59:58,719
okay so you're 35 great oh i got one of

3267
02:00:03,669 --> 02:00:02,239
those numbers okay so you were 35.

3268
02:00:04,950 --> 02:00:03,679
you weren't thinking right then about

3269
02:00:06,229 --> 02:00:04,960
the foundations of physics you were just

3270
02:00:07,990 --> 02:00:06,239
trying to

3271
02:00:09,910 --> 02:00:08,000
solve this problem of how can we ask it

3272
02:00:11,830 --> 02:00:09,920
a question and get some feedback how can

3273
02:00:13,510 --> 02:00:11,840
we quantify questions that was basically

3274
02:00:15,510 --> 02:00:13,520
what i was doing yeah

3275
02:00:17,430 --> 02:00:15,520
then maybe 10 years later you realize oh

3276
02:00:18,950 --> 02:00:17,440
okay okay wait that's interesting

3277
02:00:20,550 --> 02:00:18,960
i can take that and let's see how far i

3278
02:00:22,310 --> 02:00:20,560
can run with it and apply to

3279
02:00:24,149 --> 02:00:22,320
the foundation yeah well around that

3280
02:00:24,790 --> 02:00:24,159
time that i was trying to quantify

3281
02:00:27,990 --> 02:00:24,800
questions

3282
02:00:30,070 --> 02:00:28,000
i had seen a talk by ariel katicha

3283
02:00:31,350 --> 02:00:30,080
who is a colleague of mine now here at

3284
02:00:33,030 --> 02:00:31,360
suny albany

3285
02:00:34,390 --> 02:00:33,040
um and he's he's one of the reasons i'm

3286
02:00:38,149 --> 02:00:34,400
here at suny albany

3287
02:00:41,510 --> 02:00:38,159
we became friends and and um

3288
02:00:43,510 --> 02:00:41,520

so he had given a talk on uh

3289
02:00:45,750 --> 02:00:43,520
foundations of quantum mechanics and he

3290
02:00:47,510 --> 02:00:45,760
used some of the similar arguments

3291
02:00:49,589 --> 02:00:47,520
you know of associativity and

3292
02:00:52,629 --> 02:00:49,599
distributivity to

3293
02:00:56,149 --> 02:00:52,639
um to

3294
02:00:57,589 --> 02:00:56,159
derive the the um the feynman path

3295
02:01:00,310 --> 02:00:57,599
integral formulation of quantum

3296
02:01:04,310 --> 02:01:02,070
so he had done something very similar to

3297
02:01:05,109 --> 02:01:04,320
this with experimental setup so the idea

3298
02:01:07,510 --> 02:01:05,119
was that your

3299
02:01:09,189 --> 02:01:07,520
he was quantifying an experimental setup

3300
02:01:10,550 --> 02:01:09,199
and then if you combine

3301
02:01:11,910 --> 02:01:10,560
so you've got an experimental setup

3302
02:01:13,109 --> 02:01:11,920
where you've got a light going through a

3303
02:01:14,550 --> 02:01:13,119
single slit

3304
02:01:15,910 --> 02:01:14,560
and then you've got another experimental

3305
02:01:17,589 --> 02:01:15,920
setup with light going through a single

3306
02:01:19,510 --> 02:01:17,599
set and now you combine these two and

3307
02:01:23,030 --> 02:01:19,520
now you have two slits

3308
02:01:26,390 --> 02:01:23,040
um so how do you perform computations

3309
02:01:28,470 --> 02:01:26,400
with these and forgive my ignorance

3310
02:01:29,990 --> 02:01:28,480
it's been a little while but is

3311
02:01:31,990 --> 02:01:30,000
feynman's path into girl is that how is

3312
02:01:34,310 --> 02:01:32,000
that related to feynman's

3313
02:01:39,109 --> 02:01:34,320

he has a checkerboard as well i believe

3314
02:01:41,910 --> 02:01:40,550
i thought that one was the continuous

3315
02:01:42,709 --> 02:01:41,920
limit of the other so they're not

3316
02:01:45,990 --> 02:01:42,719
related

3317
02:01:48,790 --> 02:01:46,000
oh oh one yeah well you could certainly

3318
02:01:50,870 --> 02:01:48,800
the path integral would be a continuous

3319
02:01:51,830 --> 02:01:50,880
version of the checkerboard yeah okay

3320
02:01:53,030 --> 02:01:51,840
because

3321
02:01:54,629 --> 02:01:53,040
actually i hadn't heard about the

3322
02:01:56,149 --> 02:01:54,639
checkerboard until when i was reading

3323
02:01:56,709 --> 02:01:56,159
about how you took causal sets and then

3324
02:01:58,390 --> 02:01:56,719
said

3325
02:02:00,870 --> 02:01:58,400
well you can recreate some of the

3326
02:02:03,510 --> 02:02:00,880
characteristics of feynman

3327
02:02:04,950 --> 02:02:03,520
checkerboard then checkerboard say right

3328
02:02:05,750 --> 02:02:04,960
there cause the checkerboard whatever

3329
02:02:07,109 --> 02:02:05,760
you got the idea

3330
02:02:08,790 --> 02:02:07,119
okay continue please sorry that i'm

3331
02:02:10,229 --> 02:02:08,800
interrupting i'm just making sure i'm

3332
02:02:10,709 --> 02:02:10,239
understanding it correctly right so i

3333
02:02:13,830 --> 02:02:10,719
had seen

3334
02:02:16,790 --> 02:02:13,840
so i'd seen it talk by ariel katicha

3335
02:02:19,189 --> 02:02:16,800
about experimental setups and how to

3336
02:02:22,229 --> 02:02:19,199
quantify experimental setups and so

3337
02:02:26,229 --> 02:02:22,239
that had stuck in my mind and

3338
02:02:29,589 --> 02:02:26,239

um so it wasn't until years later that

3339
02:02:32,870 --> 02:02:29,599
i was you know when um

3340
02:02:35,589 --> 02:02:32,880
i was working with philip goyal who was

3341
02:02:37,109 --> 02:02:35,599
he was at the perimeter institute at the

3342
02:02:40,629 --> 02:02:37,119
time

3343
02:02:42,950 --> 02:02:40,639
near where you are and um we were

3344
02:02:44,390 --> 02:02:42,960
talking about quantum mechanics and how

3345
02:02:46,550 --> 02:02:44,400
similar

3346
02:02:48,390 --> 02:02:46,560
um the feynman rules uh which are

3347
02:02:51,750 --> 02:02:48,400
basically when you are

3348
02:02:54,149 --> 02:02:51,760
you know combining two things in two cis

3349
02:02:56,390 --> 02:02:54,159
um experiments in parallel you basically

3350
02:02:57,669 --> 02:02:56,400
sum the complex numbers

3351
02:02:59,910 --> 02:02:57,679
and when you put them in series you

3352
02:03:00,310 --> 02:02:59,920
multiply complex numbers and those are

3353
02:03:03,589 --> 02:03:00,320
your

3354
02:03:05,350 --> 02:03:03,599
ample quantum amplitudes and

3355
02:03:07,350 --> 02:03:05,360
we were talking about how similar those

3356
02:03:09,430 --> 02:03:07,360
rules look look to

3357
02:03:11,270 --> 02:03:09,440
the sum and product rules of probability

3358
02:03:14,229 --> 02:03:11,280
theory

3359
02:03:14,870 --> 02:03:14,239
and and i mentioned in passing i said

3360
02:03:16,229 --> 02:03:14,880
well

3361
02:03:18,470 --> 02:03:16,239
you know you can drive the summon

3362
02:03:20,629 --> 02:03:18,480
product rules with you know these basic

3363
02:03:22,149 --> 02:03:20,639

algebraic symmetries so

3364
02:03:24,310 --> 02:03:22,159
probably you should be able to do that

3365
02:03:26,310 --> 02:03:24,320
with quantum mechanics as well

3366
02:03:27,430 --> 02:03:26,320
and we started working on it that

3367
02:03:30,790 --> 02:03:27,440
evening and

3368
02:03:34,229 --> 02:03:30,800
um made a good bit of progress

3369
02:03:36,470 --> 02:03:34,239
and um then um

3370
02:03:37,350 --> 02:03:36,480
got our friend john skilling involved

3371
02:03:39,669 --> 02:03:37,360
and

3372
02:03:42,310 --> 02:03:39,679
basically wrote their first paper our

3373
02:03:43,910 --> 02:03:42,320
first pass at that work there that was

3374
02:03:44,310 --> 02:03:43,920
based on that so that's basically how

3375
02:03:48,709 --> 02:03:44,320
that

3376
02:03:52,229 --> 02:03:50,870
and so so more recently i'm working with

3377
02:03:53,910 --> 02:03:52,239
john skilling and i think that's the

3378
02:03:56,069 --> 02:03:53,920
paper you're looking at

3379
02:03:58,069 --> 02:03:56,079
yeah for the audience there are about

3380
02:03:59,990 --> 02:03:58,079
six papers of yours that i find to be

3381
02:04:02,470 --> 02:04:00,000
extremely interesting and i'm gonna

3382
02:04:04,069 --> 02:04:02,480
state them in any one and i'll list them

3383
02:04:05,990 --> 02:04:04,079
in the description so people can view

3384
02:04:07,270 --> 02:04:06,000
them so the ones that i find interesting

3385
02:04:09,109 --> 02:04:07,280
are the origins

3386
02:04:10,790 --> 02:04:09,119
of complex quantum amplitudes and

3387
02:04:12,550 --> 02:04:10,800
finding rules pretty much

3388
02:04:13,750 --> 02:04:12,560

quantum theory and probability theory

3389
02:04:15,030 --> 02:04:13,760
their relationship in origin and

3390
02:04:17,589 --> 02:04:15,040
symmetry

3391
02:04:18,470 --> 02:04:17,599
a potential foundation for emergent

3392
02:04:20,069 --> 02:04:18,480
space time

3393
02:04:21,830 --> 02:04:20,079
now that one i wasn't able to go through

3394
02:04:23,270 --> 02:04:21,840
in detail the understanding of the

3395
02:04:27,109 --> 02:04:23,280
electron

3396
02:04:28,950 --> 02:04:27,119
hmm now that one that one's absolutely

3397
02:04:31,589 --> 02:04:28,960
that one's more philosophical and that

3398
02:04:34,149 --> 02:04:31,599
one you're a soul author

3399
02:04:35,510 --> 02:04:34,159
okay the arithmetic of uncertainty that

3400
02:04:36,470 --> 02:04:35,520
unifies quantum formalism and

3401
02:04:38,629 --> 02:04:36,480
relativistic space

3402
02:04:39,990 --> 02:04:38,639
that one i made notes on which i'm gonna

3403
02:04:43,109 --> 02:04:40,000
ask all right great

3404
02:04:44,550 --> 02:04:43,119
and then the last one an essay

3405
02:04:46,069 --> 02:04:44,560
sorry there's two ones there's one

3406
02:04:47,750 --> 02:04:46,079
that's an introduction to influence

3407
02:04:49,350 --> 02:04:47,760
theory

3408
02:04:52,550 --> 02:04:49,360
see a couple of these are extremely

3409
02:04:54,470 --> 02:04:52,560
similar so the foundation

3410
02:04:56,470 --> 02:04:54,480
of emergent space time what do you call

3411
02:04:56,870 --> 02:04:56,480
influence theory is that that's the uh

3412
02:04:59,189 --> 02:04:56,880
yeah

3413
02:05:00,390 --> 02:04:59,199

influence theory basically came out of

3414
02:05:05,189 --> 02:05:00,400
yeah it came out of

3415
02:05:08,229 --> 02:05:05,199
the um emergent space-time work

3416
02:05:10,069 --> 02:05:08,239
okay and is that where you have a chain

3417
02:05:11,430 --> 02:05:10,079
and then one influences one

3418
02:05:13,669 --> 02:05:11,440
other that you're calling influence

3419
02:05:14,550 --> 02:05:13,679
theory yeah okay because when i first

3420
02:05:15,910 --> 02:05:14,560
read that i thought

3421
02:05:17,350 --> 02:05:15,920
it's like influence theory hadn't heard

3422
02:05:18,550 --> 02:05:17,360
about that is that some way of speaking

3423
02:05:20,790 --> 02:05:18,560
about causation

3424
02:05:21,589 --> 02:05:20,800
is that some is that something new that

3425
02:05:22,870 --> 02:05:21,599
i shouldn't so

3426
02:05:25,270 --> 02:05:22,880
it's something you've coined is that

3427
02:05:27,910 --> 02:05:25,280
correct yeah like we created that yeah

3428
02:05:28,310 --> 02:05:27,920
yeah so the idea is that the you know

3429
02:05:33,430 --> 02:05:28,320
what

3430
02:05:33,830 --> 02:05:33,440
quantifying in quantum mechanics is

3431
02:05:38,709 --> 02:05:33,840
you're

3432
02:05:40,550 --> 02:05:38,719
interested in what happens when

3433
02:05:41,830 --> 02:05:40,560
something interacts with something else

3434
02:05:45,030 --> 02:05:41,840
so

3435
02:05:45,990 --> 02:05:45,040
we work to strip that down to the bare

3436
02:05:49,910 --> 02:05:46,000
essentials

3437
02:05:52,310 --> 02:05:49,920
and um and ended up with these

3438
02:05:54,629 --> 02:05:52,320

uh partially ordered sets of of

3439
02:05:57,270 --> 02:05:54,639
interaction events

3440
02:05:59,109 --> 02:05:57,280
yeah it's definitely the bare essentials

3441
02:06:01,030 --> 02:05:59,119
yeah and then we work to quantify it

3442
02:06:02,870 --> 02:06:01,040
and you know how can you quantify it

3443
02:06:05,990 --> 02:06:02,880
while there's basic symmetries

3444
02:06:08,390 --> 02:06:06,000
that are that are imposed by the by the

3445
02:06:09,669 --> 02:06:08,400
basic structure that you've assumed and

3446
02:06:10,950 --> 02:06:09,679
those symmetries tell you how to

3447
02:06:14,790 --> 02:06:10,960
quantify it and then

3448
02:06:17,830 --> 02:06:14,800
the laws emerge as constraint equations

3449
02:06:19,430 --> 02:06:17,840
that enforce those symmetries i was

3450
02:06:19,830 --> 02:06:19,440
talking to someone now i'm not sure how

3451
02:06:23,109 --> 02:06:19,840
far

3452
02:06:25,109 --> 02:06:23,119
in the ama my ema you got but i was

3453
02:06:26,550 --> 02:06:25,119
someone was saying well there are

3454
02:06:28,149 --> 02:06:26,560
different kinds of podcasts and there's

3455
02:06:30,069 --> 02:06:28,159
like the joe rogan podcast and so

3456
02:06:31,510 --> 02:06:30,079
then i said mine is more of office hours

3457
02:06:32,629 --> 02:06:31,520
i feel like i have a professor

3458
02:06:33,830 --> 02:06:32,639
and i want to make sure that i

3459
02:06:35,189 --> 02:06:33,840
understand what the professor's saying

3460
02:06:37,109 --> 02:06:35,199
it's office hours it's not

3461
02:06:38,069 --> 02:06:37,119
don't think of it like it's an interview

3462
02:06:39,430 --> 02:06:38,079
don't think of it like it's a

3463
02:06:41,510 --> 02:06:39,440

documentary or joe rogan

3464
02:06:43,030 --> 02:06:41,520
i'm not here to just have a beer and

3465
02:06:43,430 --> 02:06:43,040
have a conversation with all we can do

3466
02:06:45,830 --> 02:06:43,440
that

3467
02:06:47,189 --> 02:06:45,840
i'm like i have questions anyone know

3468
02:06:47,750 --> 02:06:47,199
yeah it does feel like office hours

3469
02:06:49,589 --> 02:06:47,760
that's what i

3470
02:06:52,790 --> 02:06:49,599
yeah that's one thing i enjoy about

3471
02:06:54,310 --> 02:06:52,800
watching you know watching your podcasts

3472
02:06:56,470 --> 02:06:54,320
great great great okay it's great fun

3473
02:06:58,229 --> 02:06:56,480
and it's it's informative for that

3474
02:07:00,310 --> 02:06:58,239
reason you go into some depth and

3475
02:07:02,470 --> 02:07:00,320
makes it really interesting yeah thank

3476
02:07:04,229 --> 02:07:02,480
you thank you so much

3477
02:07:05,430 --> 02:07:04,239
okay so so have some notes here and i

3478
02:07:07,430 --> 02:07:05,440
want to make sure that i'm understanding

3479
02:07:09,350 --> 02:07:07,440
the paper of arithmetic of uncertainty

3480
02:07:10,870 --> 02:07:09,360
so it's also okay showing that the

3481
02:07:16,149 --> 02:07:10,880
mathematical structures of quantum

3482
02:07:21,910 --> 02:07:18,950
so he said well that's more of a

3483
02:07:26,149 --> 02:07:24,229
start so this is what i understand what

3484
02:07:28,069 --> 02:07:26,159
you've done and so please correct me

3485
02:07:29,910 --> 02:07:28,079
you start from assuming or suggesting

3486
02:07:32,069 --> 02:07:29,920
that commutativity distribution

3487
02:07:33,510 --> 02:07:32,079
associativity are so fundamental that

3488
02:07:35,030 --> 02:07:33,520

they're taken as axioms

3489
02:07:36,870 --> 02:07:35,040
then you define a scalar you're like

3490
02:07:39,109 --> 02:07:36,880
okay then we're like now that we've got

3491
02:07:40,870 --> 02:07:39,119
a scalar let's make a two vector

3492
02:07:42,390 --> 02:07:40,880
and then let's put some extra structure

3493
02:07:43,430 --> 02:07:42,400
on that two vector for multiplication

3494
02:07:45,109 --> 02:07:43,440
almost like an algebra

3495
02:07:47,430 --> 02:07:45,119
that we don't put the structure on you

3496
02:07:49,109 --> 02:07:47,440
the structure is imposed by the symmetry

3497
02:07:51,109 --> 02:07:49,119
then you get something that resembles

3498
02:07:52,229 --> 02:07:51,119
the poly matrices then you say well let

3499
02:07:53,109 --> 02:07:52,239
determine it equal one

3500
02:07:55,430 --> 02:07:53,119
and then you get something that

3501
02:07:56,709 --> 02:07:55,440
resembles poly matrices even more this

3502
02:07:58,310 --> 02:07:56,719
time you give them

3503
02:08:00,470 --> 02:07:58,320
generator status and you call them

3504
02:08:02,149 --> 02:08:00,480
matrices a b and c

3505
02:08:04,149 --> 02:08:02,159
then you say there's an unknown phase

3506
02:08:07,990 --> 02:08:04,159
associated with each

3507
02:08:10,470 --> 02:08:08,000
unit determinant two vector and

3508
02:08:11,350 --> 02:08:10,480
hey i i had a question there let's

3509
02:08:14,550 --> 02:08:11,360
forget about that

3510
02:08:15,910 --> 02:08:14,560
then you have an unknown phase and then

3511
02:08:23,750 --> 02:08:15,920
you say well this unknown phase let's

3512
02:08:27,669 --> 02:08:23,760
give it uniform probability

3513
02:08:31,350 --> 02:08:29,669

yes then you say that this phase has to

3514
02:08:33,830 --> 02:08:31,360
be continuous necessarily

3515
02:08:35,990 --> 02:08:33,840
necessarily and thus you've found a way

3516
02:08:39,189 --> 02:08:36,000
to derive continuity instead of assuming

3517
02:08:41,189 --> 02:08:39,199
continuity okay then you get

3518
02:08:42,950 --> 02:08:41,199
bourne's rule by saying the ignorance of

3519
02:08:44,709 --> 02:08:42,960
the phase means you can only measure

3520
02:08:46,470 --> 02:08:44,719
averages and here's one way here's the

3521
02:08:47,830 --> 02:08:46,480
way you measure averages

3522
02:08:49,750 --> 02:08:47,840
now please correct me if what i'm saying

3523
02:08:51,109 --> 02:08:49,760
is foolish or it's incorrect yeah no

3524
02:08:54,790 --> 02:08:51,119
you've got you've got

3525
02:09:00,470 --> 02:08:54,800
much much of the basic idea the the um

3526
02:09:04,709 --> 02:09:02,870
referring back to our earlier work with

3527
02:09:05,910 --> 02:09:04,719
quantifying things with a scalar so if

3528
02:09:07,109 --> 02:09:05,920
you're going to use one number to

3529
02:09:10,629 --> 02:09:07,119
quantify

3530
02:09:13,990 --> 02:09:10,639
something then um if

3531
02:09:15,750 --> 02:09:14,000
the so yeah so i quantify one object

3532
02:09:17,510 --> 02:09:15,760
with a number and i quantify this object

3533
02:09:18,550 --> 02:09:17,520
with another and now if i combine them

3534
02:09:21,350 --> 02:09:18,560
in some way

3535
02:09:22,950 --> 02:09:21,360
and this combination rule is commutative

3536
02:09:24,870 --> 02:09:22,960
and associative

3537
02:09:25,990 --> 02:09:24,880
then the number that i assigned to the

3538
02:09:27,910 --> 02:09:26,000

combination

3539
02:09:29,430 --> 02:09:27,920
i want that to be some function of the

3540
02:09:32,229 --> 02:09:29,440
two numbers that i've assigned to the

3541
02:09:33,750 --> 02:09:32,239
original objects um

3542
02:09:35,589 --> 02:09:33,760
if they if i don't then they're not

3543
02:09:36,790 --> 02:09:35,599
related to each other yeah yeah yeah

3544
02:09:38,229 --> 02:09:36,800
there's no point i think they have that

3545
02:09:38,629 --> 02:09:38,239
i'm doing this i believe those are the

3546
02:09:41,990 --> 02:09:38,639
gamma

3547
02:09:43,350 --> 02:09:42,000
numbers right so now yeah so here we'll

3548
02:09:44,709 --> 02:09:43,360
give this a number and we give this a

3549
02:09:45,350 --> 02:09:44,719
number and then combine them and we'll

3550
02:09:48,470 --> 02:09:45,360
give this

3551
02:09:50,870 --> 02:09:48,480
a different number now what number

3552
02:09:52,550 --> 02:09:50,880
you know i might have some choice as to

3553
02:09:53,189 --> 02:09:52,560
what numbers i assigned to these two but

3554
02:09:55,430 --> 02:09:53,199
then

3555
02:09:57,270 --> 02:09:55,440
what number should i assign to these two

3556
02:09:59,270 --> 02:09:57,280
that's gonna should be of some function

3557
02:10:00,629 --> 02:09:59,280
of the number i assigned to this one

3558
02:10:03,430 --> 02:10:00,639
and a function of the number i assigned

3559
02:10:05,109 --> 02:10:03,440
to this one but it shouldn't matter

3560
02:10:07,109 --> 02:10:05,119
you know whether i joined them this way

3561
02:10:07,830 --> 02:10:07,119
or join them that way right communicator

3562
02:10:09,750 --> 02:10:07,840
communicative

3563
02:10:12,310 --> 02:10:09,760

they're associative so if i'm joining

3564
02:10:14,950 --> 02:10:12,320
three i can combine them together like

3565
02:10:18,229 --> 02:10:14,960
this or i can combine it like that

3566
02:10:21,350 --> 02:10:18,239
so that constrains severely constrains

3567
02:10:25,109 --> 02:10:21,360
the number that you assign to the three

3568
02:10:28,550 --> 02:10:25,119
objects or the j the joint object

3569
02:10:31,830 --> 02:10:28,560
and it turns out you can prove that that

3570
02:10:34,870 --> 02:10:31,840
has to be isomorphic to addition

3571
02:10:37,189 --> 02:10:34,880
so it's basically addition or

3572
02:10:38,870 --> 02:10:37,199
something that is a an invertible

3573
02:10:40,550 --> 02:10:38,880
transform of addition

3574
02:10:42,790 --> 02:10:40,560
so multiplication is an invertible

3575
02:10:45,270 --> 02:10:42,800
transform of addition as well

3576
02:10:46,470 --> 02:10:45,280
yeah so that's so that's basically why i

3577
02:10:49,669 --> 02:10:46,480
could take

3578
02:10:50,870 --> 02:10:49,679
i can take this stuff and give it a

3579
02:10:53,189 --> 02:10:50,880
number two

3580
02:10:55,270 --> 02:10:53,199
and take this one and give it a number

3581
02:10:57,030 --> 02:10:55,280
one and when i put them together

3582
02:10:59,669 --> 02:10:57,040
what number do i sign this group well

3583
02:11:02,870 --> 02:10:59,679
it's one plus two three

3584
02:11:05,189 --> 02:11:02,880
and that's actually why you sum things

3585
02:11:07,750 --> 02:11:05,199
when you combine them that answers my

3586
02:11:08,870 --> 02:11:07,760
original question in graduate school but

3587
02:11:11,109 --> 02:11:08,880
it has to do with

3588
02:11:12,790 --> 02:11:11,119

associativity and cognitivity of the

3589
02:11:14,950 --> 02:11:12,800
joining operation

3590
02:11:17,750 --> 02:11:14,960
what struck me was how elementary it was

3591
02:11:19,589 --> 02:11:17,760
and i wonder not to demean it but

3592
02:11:21,189 --> 02:11:19,599
how the heck is it that other people

3593
02:11:23,510 --> 02:11:21,199
haven't come up with this it's so

3594
02:11:24,709 --> 02:11:23,520
elementary it's so simple it's the

3595
02:11:27,510 --> 02:11:24,719
opposite of demeaning sorry i'm

3596
02:11:31,430 --> 02:11:27,520
complimenting no i'm wondering i agree

3597
02:11:34,069 --> 02:11:31,440
i actually feel asinine that

3598
02:11:34,790 --> 02:11:34,079
i didn't come up with this it almost

3599
02:11:37,510 --> 02:11:34,800
looks so

3600
02:11:38,310 --> 02:11:37,520
obvious that it doesn't require saying

3601
02:11:43,350 --> 02:11:38,320
right

3602
02:11:47,990 --> 02:11:45,910
we've revised that paper now or we're

3603
02:11:52,709 --> 02:11:48,000
working on revising this paper

3604
02:11:55,430 --> 02:11:52,719
we work with a pair of numbers um

3605
02:11:56,550 --> 02:11:55,440
because we have a quantity and an

3606
02:11:58,550 --> 02:11:56,560
uncertainty

3607
02:12:00,709 --> 02:11:58,560
we acknowledge that you're always going

3608
02:12:02,550 --> 02:12:00,719
to be uncertain at a fundamental level

3609
02:12:03,990 --> 02:12:02,560
you're going to have some uncertainty

3610
02:12:06,149 --> 02:12:04,000
so the question is how do you account

3611
02:12:08,229 --> 02:12:06,159
for this uncertainty um

3612
02:12:10,390 --> 02:12:08,239
you could you know your first response

3613
02:12:10,870 --> 02:12:10,400

would be to say oh it's quantity plus or

3614
02:12:12,629 --> 02:12:10,880
minus

3615
02:12:14,229 --> 02:12:12,639
some sigma right that would be your

3616
02:12:18,629 --> 02:12:14,239
first go to

3617
02:12:20,870 --> 02:12:18,639
but but you we basically

3618
02:12:22,069 --> 02:12:20,880
account for the fact that there might be

3619
02:12:24,229 --> 02:12:22,079
a more

3620
02:12:25,109 --> 02:12:24,239
subtle or more intimate relationship

3621
02:12:27,109 --> 02:12:25,119
there

3622
02:12:28,550 --> 02:12:27,119
and so we say let's just start with two

3623
02:12:31,510 --> 02:12:28,560
numbers and then see

3624
02:12:32,229 --> 02:12:31,520
how those numbers have to evolve you

3625
02:12:34,870 --> 02:12:32,239
know as we

3626
02:12:35,990 --> 02:12:34,880
do these perform these um acts of

3627
02:12:37,910 --> 02:12:36,000
combination

3628
02:12:39,430 --> 02:12:37,920
so was it that at first you tried

3629
02:12:41,030 --> 02:12:39,440
naively the plus or minus

3630
02:12:42,390 --> 02:12:41,040
and then it didn't lead anywhere

3631
02:12:44,069 --> 02:12:42,400
fruitful so then you're like how about i

3632
02:12:49,750 --> 02:12:44,079
be more general and say i don't know how

3633
02:12:53,270 --> 02:12:49,760
to combine these two

3634
02:12:56,709 --> 02:12:53,280
no i guess i was talking about um

3635
02:12:57,990 --> 02:12:56,719
quantity plus uncertainty yes yes

3636
02:12:59,589 --> 02:12:58,000
oh and then i was wondering why did you

3637
02:13:00,870 --> 02:12:59,599
make that generalization like what

3638
02:13:03,510 --> 02:13:00,880

spurred you to do so

3639
02:13:04,069 --> 02:13:03,520
right so the idea was to treat them as

3640
02:13:10,629 --> 02:13:04,079
two

3641
02:13:12,149 --> 02:13:10,639
do the symmetries the algebraic

3642
02:13:15,430 --> 02:13:12,159
symmetries dictate

3643
02:13:18,310 --> 02:13:15,440
we deal with these numbers so with

3644
02:13:19,350 --> 02:13:18,320
addition it's it's quite simple when you

3645
02:13:22,310 --> 02:13:19,360
um

3646
02:13:25,109 --> 02:13:22,320
are so when you have just combination

3647
02:13:28,149 --> 02:13:25,119
with associativity and commutativity

3648
02:13:29,910 --> 02:13:28,159
then it's just a transform

3649
02:13:31,669 --> 02:13:29,920
an invertible transform of component

3650
02:13:34,550 --> 02:13:31,679
wise addition so

3651
02:13:36,550 --> 02:13:34,560
so you can just use addition for that so

3652
02:13:39,430 --> 02:13:36,560
um that's pretty straightforward

3653
02:13:40,310 --> 02:13:39,440
multiplication is more interesting so so

3654
02:13:44,790 --> 02:13:40,320
now if you

3655
02:13:48,390 --> 02:13:44,800
um combine objects in series

3656
02:13:49,910 --> 02:13:48,400
and now you have um

3657
02:13:52,790 --> 02:13:49,920
associativity commutativity

3658
02:13:55,910 --> 02:13:52,800
associativity and distributivity

3659
02:13:58,310 --> 02:13:55,920
and that imposes some extra constraints

3660
02:14:02,950 --> 02:13:58,320
so with a scalar you

3661
02:14:04,950 --> 02:14:02,960
then get also get addition but it can't

3662
02:14:05,589 --> 02:14:04,960
be addition because you've already used

3663
02:14:09,350 --> 02:14:05,599

that for

3664
02:14:11,430 --> 02:14:09,360
the for the um parallel combination

3665
02:14:12,390 --> 02:14:11,440
so it has to be a transform of addition

3666
02:14:13,830 --> 02:14:12,400
you can prove that

3667
02:14:15,270 --> 02:14:13,840
multiplication works and that's what

3668
02:14:17,109 --> 02:14:15,280
gives you the sum and product rules and

3669
02:14:20,709 --> 02:14:17,119
probability theory

3670
02:14:22,470 --> 02:14:20,719
but when you have two numbers you um

3671
02:14:24,790 --> 02:14:22,480
you don't have simple multiplication

3672
02:14:26,950 --> 02:14:24,800
anymore you're basically dealing with

3673
02:14:29,750 --> 02:14:26,960
two by two matrices

3674
02:14:31,270 --> 02:14:29,760
and it turns out that there are three

3675
02:14:34,790 --> 02:14:31,280
different ways to do it

3676
02:14:35,669 --> 02:14:34,800
so so we get so we get matrix a we get

3677
02:14:37,669 --> 02:14:35,679
matrix b

3678
02:14:39,270 --> 02:14:37,679
non-degenerate yeah that's right three

3679
02:14:42,629 --> 02:14:39,280
that are non-degenerate

3680
02:14:45,750 --> 02:14:42,639
so matrix a b and c and so

3681
02:14:49,910 --> 02:14:45,760
we then um back up and say look

3682
02:14:52,830 --> 02:14:49,920
we are originally we're dealing with

3683
02:14:54,229 --> 02:14:52,840
you know the original motivation was to

3684
02:14:57,430 --> 02:14:54,239
quantify

3685
02:14:58,870 --> 02:14:57,440
objects while taking into account

3686
02:15:01,750 --> 02:14:58,880
uncertainties

3687
02:15:03,830 --> 02:15:01,760
so what happens if we now actually treat

3688
02:15:07,189 --> 02:15:03,840

these as uncertainties using

3689
02:15:07,990 --> 02:15:07,199
probability theory and if you do that

3690
02:15:11,030 --> 02:15:08,000
you find that

3691
02:15:11,589 --> 02:15:11,040
only matrix a works in that case and it

3692
02:15:14,149 --> 02:15:11,599
gives you

3693
02:15:15,669 --> 02:15:14,159
complex addition and complex

3694
02:15:18,709 --> 02:15:15,679
multiplication

3695
02:15:20,870 --> 02:15:18,719
so you then are you then learn

3696
02:15:22,629 --> 02:15:20,880
that what you what you're constrained to

3697
02:15:26,390 --> 02:15:22,639
do in that situation is

3698
02:15:29,669 --> 02:15:26,400
to use complex numbers and

3699
02:15:32,950 --> 02:15:29,679
if you then want to assign a scalar

3700
02:15:34,709 --> 02:15:32,960
to that same system then you can derive

3701
02:15:38,310 --> 02:15:34,719
the born rule that way

3702
02:15:41,030 --> 02:15:38,320
and so that that gives you the complex

3703
02:15:41,669 --> 02:15:41,040
formalism of quantum mechanics one of my

3704
02:15:43,750 --> 02:15:41,679
questions

3705
02:15:46,310 --> 02:15:43,760
was basically what instigated this was

3706
02:15:47,589 --> 02:15:46,320
why is it it's so fun it's so elementary

3707
02:15:51,589 --> 02:15:47,599
that i'm wondering how the heck did

3708
02:15:53,430 --> 02:15:51,599
people not see this before

3709
02:15:55,430 --> 02:15:53,440
that's a good question i don't know i

3710
02:15:57,510 --> 02:15:55,440
think that

3711
02:15:58,790 --> 02:15:57,520
part of it is perspective i don't hear

3712
02:16:00,950 --> 02:15:58,800
your name on

3713
02:16:01,990 --> 02:16:00,960

a list of toes theories of everything

3714
02:16:03,990 --> 02:16:02,000
with

3715
02:16:05,350 --> 02:16:04,000
string and loop and so on i'm not saying

3716
02:16:06,790 --> 02:16:05,360
that you claim to have a theory of

3717
02:16:08,629 --> 02:16:06,800
everything but you definitely derive

3718
02:16:09,750 --> 02:16:08,639
are more fundamental which to me is puts

3719
02:16:10,390 --> 02:16:09,760
you in the class of a theory of

3720
02:16:13,270 --> 02:16:10,400
everything

3721
02:16:13,669 --> 02:16:13,280
why haven't i heard it yeah well i i

3722
02:16:17,270 --> 02:16:13,679
don't know

3723
02:16:19,270 --> 02:16:17,280
question it seems to take several years

3724
02:16:20,149 --> 02:16:19,280
for some of this work to filter into the

3725
02:16:23,350 --> 02:16:20,159
community

3726
02:16:24,870 --> 02:16:23,360
um there's a there's a delay people are

3727
02:16:26,310 --> 02:16:24,880
working on their own ideas right and

3728
02:16:28,310 --> 02:16:26,320
it's hard to

3729
02:16:29,750 --> 02:16:28,320
take the time to look at somebody else's

3730
02:16:31,910 --> 02:16:29,760
ideas and to do that

3731
02:16:33,349 --> 02:16:31,920
well you have to it's a deep dive right

3732
02:16:39,429 --> 02:16:33,359
so

3733
02:16:41,270 --> 02:16:39,439
why hasn't it been done before i think

3734
02:16:44,230 --> 02:16:41,280
it's a matter of perspective

3735
02:16:45,190 --> 02:16:44,240
if you're thinking of the laws of

3736
02:16:47,509 --> 02:16:45,200
physics as

3737
02:16:48,950 --> 02:16:47,519
laws you know that are dictated by

3738
02:16:52,150 --> 02:16:48,960

mother nature

3739
02:16:53,030 --> 02:16:52,160
then you go about handling them

3740
02:16:54,709 --> 02:16:53,040
differently

3741
02:16:56,389 --> 02:16:54,719
so how should they be conceptualized

3742
02:16:58,230 --> 02:16:56,399
that are not law

3743
02:17:00,469 --> 02:16:58,240
i mean here in this case we're thinking

3744
02:17:02,150 --> 02:17:00,479
about it in terms of quantifying things

3745
02:17:05,110 --> 02:17:02,160
you know if i want to assign numbers to

3746
02:17:09,030 --> 02:17:05,120
things how do i how can i do it and so

3747
02:17:11,750 --> 02:17:09,040
so it's a rather unique perspective that

3748
02:17:13,349 --> 02:17:11,760
and it it bore fruit it was it was

3749
02:17:15,190 --> 02:17:13,359
useful

3750
02:17:16,309 --> 02:17:15,200
was one term in your paper that i kept

3751
02:17:17,750 --> 02:17:16,319
getting confused by it was

3752
02:17:21,030 --> 02:17:17,760
quantification

3753
02:17:22,870 --> 02:17:21,040
it's not a term that i've heard well

3754
02:17:23,830 --> 02:17:22,880
it suggests something but i wasn't sure

3755
02:17:25,349 --> 02:17:23,840
like what's the definition of

3756
02:17:28,230 --> 02:17:25,359
quantification and how are you using it

3757
02:17:29,990 --> 02:17:28,240
well i mean i use that just to

3758
02:17:32,150 --> 02:17:30,000
describe the act of quantifying

3759
02:17:34,230 --> 02:17:32,160
something so i assign numbers

3760
02:17:36,309 --> 02:17:34,240
how do you go about assigning numbers to

3761
02:17:40,469 --> 02:17:36,319
things

3762
02:17:42,309 --> 02:17:40,479
and um and then you know and

3763
02:17:43,669 --> 02:17:42,319

and of course then the real question is

3764
02:17:44,950 --> 02:17:43,679
what happens to

3765
02:17:46,549 --> 02:17:44,960
how do you assign a number to

3766
02:17:48,549 --> 02:17:46,559
combinations of things and that's what

3767
02:17:51,110 --> 02:17:48,559
we're really after

3768
02:17:52,230 --> 02:17:51,120
okay well let's just finish up so what's

3769
02:17:53,429 --> 02:17:52,240
your opinion on

3770
02:17:54,549 --> 02:17:53,439
i'll just read through the questions so

3771
02:17:56,150 --> 02:17:54,559
that you get an idea and then you can

3772
02:17:57,750 --> 02:17:56,160
answer them sure okay back to the

3773
02:17:58,629 --> 02:17:57,760
beginning so opinion on string theory

3774
02:18:01,669 --> 02:17:58,639
opinion on loop

3775
02:18:04,629 --> 02:18:01,679
opinion on geometric unity opinion on

3776
02:18:05,830 --> 02:18:04,639
stephen wolframs

3777
02:18:07,110 --> 02:18:05,840
i'll answer it don't answer any of these

3778
02:18:08,469 --> 02:18:07,120
yeah i'm going to okay i just want you

3779
02:18:11,429 --> 02:18:08,479
to get the lay of the land

3780
02:18:11,669 --> 02:18:11,439
picture all right okay where did these

3781
02:18:19,509 --> 02:18:11,679
la

3782
02:18:21,750 --> 02:18:19,519
and then two audience questions one was

3783
02:18:23,429 --> 02:18:21,760
from stephen paul king he says ask him

3784
02:18:24,389 --> 02:18:23,439
about space his space-time ideas you've

3785
02:18:26,549 --> 02:18:24,399
already talked about that

3786
02:18:27,990 --> 02:18:26,559
and robot scientist concept i have no

3787
02:18:30,070 --> 02:18:28,000
clue what that is

3788
02:18:31,830 --> 02:18:30,080

maybe you do and then steve scully wants

3789
02:18:33,750 --> 02:18:31,840
to know about

3790
02:18:35,349 --> 02:18:33,760
nothingness and infinity being the same

3791
02:18:37,030 --> 02:18:35,359
let's get to this opinion on string

3792
02:18:38,790 --> 02:18:37,040
theory we can go through this quick

3793
02:18:40,389 --> 02:18:38,800
what's your opinion on string theory

3794
02:18:43,030 --> 02:18:40,399
string theory it's tough

3795
02:18:43,429 --> 02:18:43,040
it's it's i think it's too high level

3796
02:18:47,110 --> 02:18:43,439
the

3797
02:18:51,990 --> 02:18:49,190
i'm work i guess i'm working at a level

3798
02:18:54,389 --> 02:18:52,000
where i'm driving

3799
02:18:55,349 --> 02:18:54,399
mean we just talked about how i do how

3800
02:18:57,349 --> 02:18:55,359
we're deriving

3801
02:18:59,509 --> 02:18:57,359
the fact that you need to use complex

3802
02:19:00,389 --> 02:18:59,519
numbers in quantum mechanics right and

3803
02:19:01,830 --> 02:19:00,399
the fact that

3804
02:19:04,070 --> 02:19:01,840
you know how do you manipulate these

3805
02:19:05,270 --> 02:19:04,080
complex numbers this the sum and product

3806
02:19:07,669 --> 02:19:05,280
rules

3807
02:19:08,709 --> 02:19:07,679
um that's what i'm working to derive in

3808
02:19:10,469 --> 02:19:08,719
string theory

3809
02:19:12,309 --> 02:19:10,479
there's a different approach the idea is

3810
02:19:12,790 --> 02:19:12,319
instead of point particles we're going

3811
02:19:14,549 --> 02:19:12,800
to have

3812
02:19:17,750 --> 02:19:14,559
loops of string and then we're going to

3813
02:19:20,230 --> 02:19:17,760

just apply quantum mechanics to it

3814
02:19:23,589 --> 02:19:20,240
so it's too high level i mean you're

3815
02:19:24,950 --> 02:19:23,599
applying quantum mechanics well

3816
02:19:26,389 --> 02:19:24,960
where does quantum mechanics come from

3817
02:19:27,270 --> 02:19:26,399
why do you use quantum mechanics and

3818
02:19:28,709 --> 02:19:27,280
that's something else

3819
02:19:30,629 --> 02:19:28,719
right and that's that's a question i

3820
02:19:32,070 --> 02:19:30,639
would ask

3821
02:19:33,750 --> 02:19:32,080
i have a question about that why is it

3822
02:19:34,070 --> 02:19:33,760
that you derive quantum mechanics and

3823
02:19:36,790 --> 02:19:34,080
not

3824
02:19:38,309 --> 02:19:36,800
qft well we well we we haven't we

3825
02:19:42,150 --> 02:19:38,319
haven't applied it to

3826
02:19:43,910 --> 02:19:42,160
yet so it's

3827
02:19:45,589 --> 02:19:43,920
you know we're just you're working at

3828
02:19:47,910 --> 02:19:45,599
the basics what happened how do you

3829
02:19:49,910 --> 02:19:47,920
quantify a quantum system well you're

3830
02:19:52,309 --> 02:19:49,920
going to need these complex numbers

3831
02:19:53,110 --> 02:19:52,319
that's what we we've derived that how do

3832
02:19:54,950 --> 02:19:53,120
you

3833
02:19:56,469 --> 02:19:54,960
calculate the probabilities from those

3834
02:19:57,670 --> 02:19:56,479
complex numbers well you derive the

3835
02:19:59,830 --> 02:19:57,680
bourne rule

3836
02:20:02,070 --> 02:19:59,840
um so it's it's building up from the

3837
02:20:05,590 --> 02:20:02,080
bottom so what are your thoughts on loop

3838
02:20:09,030 --> 02:20:05,600

similar and geometric unity um

3839
02:20:10,389 --> 02:20:09,040
i i think it's a similar you know my my

3840
02:20:13,270 --> 02:20:10,399
opinion similar at the

3841
02:20:15,110 --> 02:20:13,280
the levels you know you're you're

3842
02:20:17,190 --> 02:20:15,120
constructing your fundamental theory too

3843
02:20:18,950 --> 02:20:17,200
high up

3844
02:20:21,110 --> 02:20:18,960
how about wolframs i see wolfram's is

3845
02:20:23,349 --> 02:20:21,120
being amenable to yours or yours

3846
02:20:25,110 --> 02:20:23,359
amenable now his is very yeah no his is

3847
02:20:28,870 --> 02:20:25,120
a very low level theory and that

3848
02:20:29,349 --> 02:20:28,880
that i think i'm more you know agreeable

3849
02:20:32,950 --> 02:20:29,359
toward

3850
02:20:33,830 --> 02:20:32,960
um i don't tend to see the universe as a

3851
02:20:37,270 --> 02:20:33,840
computer so

3852
02:20:38,790 --> 02:20:37,280
i differ in that aspect does your theory

3853
02:20:40,230 --> 02:20:38,800
have anything to say about black holes

3854
02:20:42,389 --> 02:20:40,240
or the information paradox or the

3855
02:20:47,190 --> 02:20:42,399
beginning of the universe or is it too

3856
02:20:48,950 --> 02:20:47,200
early right now it's too early yeah okay

3857
02:20:51,429 --> 02:20:48,960
now just two audience questions and

3858
02:20:51,910 --> 02:20:51,439
that's it man so stephen paul king wants

3859
02:20:53,910 --> 02:20:51,920
to know

3860
02:20:55,830 --> 02:20:53,920
ask him about space-time ideas or his

3861
02:20:58,870 --> 02:20:55,840
space-time ideas we've done that

3862
02:21:01,349 --> 02:20:58,880
and his robot scientist concept he is

3863
02:21:05,030 --> 02:21:01,359

amazing in my opinion

3864
02:21:07,590 --> 02:21:05,040
thank you very much steve wow um

3865
02:21:09,990 --> 02:21:07,600
oh the space time business first um i

3866
02:21:12,950 --> 02:21:10,000
should i should

3867
02:21:14,870 --> 02:21:12,960
be a little clear about the work that

3868
02:21:17,990 --> 02:21:14,880
we've done with influence theory

3869
02:21:21,590 --> 02:21:18,000
one of we've run into some difficulty

3870
02:21:23,510 --> 02:21:21,600
in that we can describe

3871
02:21:25,590 --> 02:21:23,520
one dimension one plus one dimensional

3872
02:21:29,510 --> 02:21:25,600
space time very nicely

3873
02:21:31,349 --> 02:21:29,520
three plus one is very weird and very

3874
02:21:32,150 --> 02:21:31,359
difficult so it's not clear that we can

3875
02:21:35,510 --> 02:21:32,160
handle

3876
02:21:38,070 --> 02:21:35,520
the theory seems to be too linear um

3877
02:21:38,630 --> 02:21:38,080
so three plus one space times difficult

3878
02:21:41,510 --> 02:21:38,640
however

3879
02:21:44,550 --> 02:21:41,520
that being said i can use their work in

3880
02:21:48,389 --> 02:21:44,560
influence theory to derive

3881
02:21:50,710 --> 02:21:48,399
the dimensionality that

3882
02:21:51,750 --> 02:21:50,720
you know space is in this theory space

3883
02:21:54,309 --> 02:21:51,760
is a description

3884
02:21:56,550 --> 02:21:54,319
right space isn't a physical thing it's

3885
02:22:00,230 --> 02:21:56,560
a description of events

3886
02:22:01,190 --> 02:22:00,240
so i can derive how many numbers you

3887
02:22:04,550 --> 02:22:01,200
should need

3888
02:22:06,230 --> 02:22:04,560

to describe events generally and i

3889
02:22:09,349 --> 02:22:06,240
actually have such a definition

3890
02:22:11,270 --> 02:22:09,359
and the result is three plus one three

3891
02:22:13,429 --> 02:22:11,280
dimensions of space one plus time

3892
02:22:14,550 --> 02:22:13,439
only thing that works and based on

3893
02:22:17,590 --> 02:22:14,560
symmetries

3894
02:22:20,070 --> 02:22:17,600
in that theory but but strangely

3895
02:22:20,790 --> 02:22:20,080
the theory cannot actually i haven't

3896
02:22:23,190 --> 02:22:20,800
been able to

3897
02:22:24,630 --> 02:22:23,200
use the theory to describe three plus

3898
02:22:26,870 --> 02:22:24,640
one dimensional space time

3899
02:22:29,349 --> 02:22:26,880
i can't use it to just use use four

3900
02:22:31,349 --> 02:22:29,359
numbers to describe events

3901
02:22:32,710 --> 02:22:31,359
and so we're kind of stuck there which

3902
02:22:36,309 --> 02:22:32,720
is why i

3903
02:22:39,349 --> 02:22:36,319
kind of i for a year basically took off

3904
02:22:41,510 --> 02:22:39,359
uh from working on that work and then

3905
02:22:43,190 --> 02:22:41,520
teamed up with john skilling to work the

3906
02:22:46,790 --> 02:22:43,200
on the paper that you're reading now

3907
02:22:48,710 --> 02:22:46,800
with you know arithmetic of uncertainty

3908
02:22:50,950 --> 02:22:48,720
as for the robot scientist concept is

3909
02:22:53,270 --> 02:22:50,960
that the same as the mars rover

3910
02:22:56,469 --> 02:22:53,280
yeah that's similar to the quantifying

3911
02:22:58,070 --> 02:22:56,479
relevance so the idea oh i used to joke

3912
02:22:59,590 --> 02:22:58,080
you know when i when i would give a talk

3913
02:23:01,670 --> 02:22:59,600

on this i would give a joke

3914
02:23:05,110 --> 02:23:01,680
you know joke around how you know i'm

3915
02:23:06,070 --> 02:23:05,120
trying to um make experimentalists

3916
02:23:09,190 --> 02:23:06,080
obsolete by

3917
02:23:12,550 --> 02:23:09,200
automating an experimental design

3918
02:23:16,150 --> 02:23:12,560
um of course that's not going to happen

3919
02:23:17,030 --> 02:23:16,160
but um but that that's the basic idea is

3920
02:23:19,830 --> 02:23:17,040
to

3921
02:23:20,710 --> 02:23:19,840
perform if you can perform computations

3922
02:23:22,950 --> 02:23:20,720
with questions

3923
02:23:24,870 --> 02:23:22,960
which turns out to be very closely

3924
02:23:26,790 --> 02:23:24,880
related to information theory it's it's

3925
02:23:29,429 --> 02:23:26,800
information theory plus a little bit

3926
02:23:33,830 --> 02:23:29,439
more which is nice

3927
02:23:35,990 --> 02:23:33,840
and you can then use that to

3928
02:23:37,429 --> 02:23:36,000
for machines to figure out what

3929
02:23:40,790 --> 02:23:37,439
experiments to do

3930
02:23:42,469 --> 02:23:40,800
to accomplish certain you know

3931
02:23:44,469 --> 02:23:42,479
resolve certain issues to basically

3932
02:23:46,790 --> 02:23:44,479
accomplish certain goals

3933
02:23:47,750 --> 02:23:46,800
so if you want to learn something about

3934
02:23:49,349 --> 02:23:47,760
that rock

3935
02:23:51,510 --> 02:23:49,359
you know you can actually perform

3936
02:23:53,670 --> 02:23:51,520
computations to figure out

3937
02:23:55,270 --> 02:23:53,680
which experiments to perform and based

3938
02:23:57,190 --> 02:23:55,280

on the data that you get you can figure

3939
02:23:58,469 --> 02:23:57,200
out which experiment to perform next and

3940
02:24:01,670 --> 02:23:58,479
so on until

3941
02:24:03,270 --> 02:24:01,680
you reach the requisite precision that's

3942
02:24:06,070 --> 02:24:03,280
the basic idea with that

3943
02:24:07,590 --> 02:24:06,080
behind that work great last question is

3944
02:24:09,030 --> 02:24:07,600
from steve scully who has a youtube

3945
02:24:11,349 --> 02:24:09,040
channel that i'll link in the

3946
02:24:12,830 --> 02:24:11,359
description he steve scully has a theory

3947
02:24:16,150 --> 02:24:12,840
of everything

3948
02:24:18,230 --> 02:24:16,160
and he wants to know

3949
02:24:19,670 --> 02:24:18,240
just for the audience steve scully has

3950
02:24:20,469 --> 02:24:19,680
an idea that nothing is the same as

3951
02:24:22,150 --> 02:24:20,479
infinity

3952
02:24:24,070 --> 02:24:22,160
i don't know if you've heard about this

3953
02:24:26,710 --> 02:24:24,080
maybe you get emails from people

3954
02:24:27,990 --> 02:24:26,720
suggesting theories of everything to you

3955
02:24:29,590 --> 02:24:28,000
and saying you should read this or you

3956
02:24:31,750 --> 02:24:29,600
should read my paper and so on

3957
02:24:33,510 --> 02:24:31,760
well have you come across this idea that

3958
02:24:34,550 --> 02:24:33,520
zero is the same as infinity or infinity

3959
02:24:36,230 --> 02:24:34,560
is the same as zero

3960
02:24:37,670 --> 02:24:36,240
asked exactly how i don't know because i

3961
02:24:39,830 --> 02:24:37,680
don't understand steve scully's

3962
02:24:40,950 --> 02:24:39,840
theory yeah i haven't gone through it

3963
02:24:42,950 --> 02:24:40,960

but

3964
02:24:45,429 --> 02:24:42,960
what do you make of that that's

3965
02:24:47,349 --> 02:24:45,439
interesting and no i don't i don't get

3966
02:24:48,790 --> 02:24:47,359
emails about that i usually get emails

3967
02:24:51,030 --> 02:24:48,800
with pictures of

3968
02:24:51,830 --> 02:24:51,040
lights and people are asking me what

3969
02:24:55,030 --> 02:24:51,840
they are

3970
02:24:57,429 --> 02:24:55,040
and i usually respond by saying there

3971
02:24:59,110 --> 02:24:57,439
they appear to be lights i what they're

3972
02:25:00,790 --> 02:24:59,120
attached to i can't possibly tell you

3973
02:25:04,150 --> 02:25:00,800
because

3974
02:25:04,790 --> 02:25:04,160
they're lights um so that's what i

3975
02:25:09,349 --> 02:25:04,800
usually get

3976
02:25:10,630 --> 02:25:09,359
from in my emails the let's see

3977
02:25:12,870 --> 02:25:10,640
i thought you were going somewhere else

3978
02:25:16,389 --> 02:25:12,880
is zero pictures

3979
02:25:17,030 --> 02:25:16,399
is zero equal to infinity well that's

3980
02:25:19,030 --> 02:25:17,040
difficult

3981
02:25:21,030 --> 02:25:19,040
infinity isn't really a number right

3982
02:25:24,230 --> 02:25:21,040
infinity is a concept

3983
02:25:27,670 --> 02:25:24,240
so so it's hard to

3984
02:25:30,950 --> 02:25:27,680
imagine any kind of equivalence between

3985
02:25:33,990 --> 02:25:30,960
a a number and a concept and now

3986
02:25:36,309 --> 02:25:34,000
no zero a number that's a little messy

3987
02:25:37,990 --> 02:25:36,319
too zero is also a concept right

3988
02:25:39,590 --> 02:25:38,000

but they're different concepts so i

3989
02:25:41,270 --> 02:25:39,600
don't i don't see how they're the same

3990
02:25:43,590 --> 02:25:41,280
but i'm not familiar with his work

3991
02:25:45,429 --> 02:25:43,600
so okay so his actual question that was

3992
02:25:46,309 --> 02:25:45,439
mine is is it possible that the universe

3993
02:25:48,790 --> 02:25:46,319
is infinite

3994
02:25:50,070 --> 02:25:48,800
that is that there's no end to how large

3995
02:25:52,230 --> 02:25:50,080
or how small

3996
02:25:53,750 --> 02:25:52,240
objects in the universe can be relative

3997
02:25:55,670 --> 02:25:53,760
to one another

3998
02:25:57,110 --> 02:25:55,680
and that if the overall system is to be

3999
02:25:59,270 --> 02:25:57,120
comprehensible

4000
02:26:01,030 --> 02:25:59,280
it is only by us recognizing how all

4001
02:26:01,830 --> 02:26:01,040
these apparently separate and distinct

4002
02:26:06,469 --> 02:26:01,840
systems

4003
02:26:17,670 --> 02:26:06,479
actually share some underlying mechanism

4004
02:26:24,309 --> 02:26:22,150
so i i it sounds like his ideas that

4005
02:26:25,590 --> 02:26:24,319
things can be arbitrarily small and

4006
02:26:42,230 --> 02:26:25,600
arbitrarily large

4007
02:26:45,910 --> 02:26:44,150
yeah i don't know what to make of that

4008
02:26:48,070 --> 02:26:45,920
um

4009
02:26:50,230 --> 02:26:48,080
it's hard because i'm not sure how you

4010
02:26:52,309 --> 02:26:50,240
could tell

4011
02:27:00,830 --> 02:26:52,319
how would you ever know that they can be

4012
02:27:06,150 --> 02:27:02,550
so

4013
02:27:09,990 --> 02:27:06,160

usually my thinking is that if

4014
02:27:15,190 --> 02:27:10,000
if it if the arbitrarily

4015
02:27:19,349 --> 02:27:17,830
isn't detectable then it doesn't matter

4016
02:27:21,270 --> 02:27:19,359
and you wouldn't

4017
02:27:22,710 --> 02:27:21,280
you don't no you won't you won't know

4018
02:27:23,349 --> 02:27:22,720
about it and you don't need to know

4019
02:27:31,110 --> 02:27:23,359
about it

4020
02:27:34,469 --> 02:27:31,120
um so

4021
02:27:35,990 --> 02:27:34,479
so i'm not sure that it you know i i if

4022
02:27:37,510 --> 02:27:36,000
i'm not sure you would notice and i'm

4023
02:27:38,150 --> 02:27:37,520
not sure it would matter if that were

4024
02:27:41,750 --> 02:27:38,160
the case

4025
02:27:46,630 --> 02:27:45,349
professor it was great thank you so much

4026
02:27:48,230 --> 02:27:46,640
for speaking with me

4027
02:27:49,910 --> 02:27:48,240
for three or four hours i don't know how

4028
02:27:52,870 --> 02:27:49,920
long that was yeah

4029
02:27:54,150 --> 02:27:52,880
about i guess we're in three plus texts

4030
02:27:54,870 --> 02:27:54,160
where can the audience find out more

4031
02:27:57,429 --> 02:27:54,880
about you

4032
02:27:58,309 --> 02:27:57,439
and do you have anything to promote oh i

4033
02:28:01,990 --> 02:27:58,319
i have

4034
02:28:05,349 --> 02:28:02,000
um let's see knuth lab.org is my

4035
02:28:06,550 --> 02:28:05,359
is my um website so you can check that

4036
02:28:09,349 --> 02:28:06,560
out

4037
02:28:10,950 --> 02:28:09,359
um anything i want to promote actually i

4038
02:28:13,110 --> 02:28:10,960

i do have something i want to promote i

4039
02:28:15,830 --> 02:28:13,120
don't have a good

4040
02:28:19,030 --> 02:28:15,840
i'll send you the link to it um i'm

4041
02:28:21,830 --> 02:28:19,040
working on designing a card game

4042
02:28:23,670 --> 02:28:21,840
so this is totally out of left field i

4043
02:28:24,870 --> 02:28:23,680
it basically came from the fact i read

4044
02:28:27,670 --> 02:28:24,880
an article

4045
02:28:29,110 --> 02:28:27,680
oh about two and a half years ago now

4046
02:28:32,550 --> 02:28:29,120
where

4047
02:28:35,510 --> 02:28:32,560
um why i don't know what the

4048
02:28:37,750 --> 02:28:35,520
percentage was but some tiny percent or

4049
02:28:41,030 --> 02:28:37,760
something like 80 percent of americans

4050
02:28:42,710 --> 02:28:41,040
couldn't name a living scientist

4051
02:28:44,150 --> 02:28:42,720
and i was really struck by that i

4052
02:28:48,150 --> 02:28:44,160
thought that's crazy

4053
02:28:50,150 --> 02:28:48,160
um and and my son came home from

4054
02:28:51,429 --> 02:28:50,160
school that day he was in third grade at

4055
02:28:54,469 --> 02:28:51,439
the time

4056
02:28:56,630 --> 02:28:54,479
and he had made some good trades with

4057
02:28:58,469 --> 02:28:56,640
his pokemon cards and he was telling me

4058
02:29:00,070 --> 02:28:58,479
all about this pokemon card and this

4059
02:29:01,349 --> 02:29:00,080
character and he traded for this one and

4060
02:29:02,870 --> 02:29:01,359
this is better because he has this

4061
02:29:05,830 --> 02:29:02,880
ability in this ability

4062
02:29:07,830 --> 02:29:05,840
and i thought 80 percent of americans

4063
02:29:09,110 --> 02:29:07,840

can't name a living scientist yet my

4064
02:29:11,830 --> 02:29:09,120
third grade son

4065
02:29:13,830 --> 02:29:11,840
knows all about these fictional japanese

4066
02:29:14,309 --> 02:29:13,840
characters and their superpowers and i

4067
02:29:17,030 --> 02:29:14,319
thought

4068
02:29:18,870 --> 02:29:17,040
what's what's wrong with this picture

4069
02:29:22,309 --> 02:29:18,880
and so i've

4070
02:29:24,389 --> 02:29:22,319
designed a card game with scientists and

4071
02:29:25,670 --> 02:29:24,399
um and i'm looking for scientists to

4072
02:29:28,950 --> 02:29:25,680
actually sign up

4073
02:29:30,630 --> 02:29:28,960
for the card game so um so i'm still

4074
02:29:31,190 --> 02:29:30,640
trying to find scientists i especially

4075
02:29:34,389 --> 02:29:31,200
want

4076
02:29:35,910 --> 02:29:34,399
especially what women and minorities

4077
02:29:37,510 --> 02:29:35,920
because i really want to have the game

4078
02:29:39,990 --> 02:29:37,520
very well balanced

4079
02:29:41,910 --> 02:29:40,000
and so that everyone's well represented

4080
02:29:44,070 --> 02:29:41,920
and um

4081
02:29:45,510 --> 02:29:44,080
and that's the goal is to get that game

4082
02:29:47,510 --> 02:29:45,520
going so if

4083
02:29:49,429 --> 02:29:47,520
any of you viewers are happen to be

4084
02:29:53,349 --> 02:29:49,439
scientists or

4085
02:29:57,030 --> 02:29:53,359
or basically um stem professionals

4086
02:29:59,510 --> 02:29:57,040
though they work too um please consider

4087
02:30:01,270 --> 02:29:59,520
you know you can email me or um or you

4088
02:30:05,030 --> 02:30:01,280

can go to the link and you can um

4089
02:30:06,550 --> 02:30:05,040
join by creating a card for yourself

4090
02:30:07,990 --> 02:30:06,560
right what about people who are

4091
02:30:09,670 --> 02:30:08,000
illustrators if they want to volunteer

4092
02:30:12,790 --> 02:30:09,680
their time to make

4093
02:30:13,910 --> 02:30:12,800
the pictures for the cards oh that's a

4094
02:30:17,510 --> 02:30:13,920
nice idea

4095
02:30:20,550 --> 02:30:17,520
yeah if somebody is interested i was

4096
02:30:21,910 --> 02:30:20,560
i had planned on using mostly stock

4097
02:30:23,670 --> 02:30:21,920
images but i

4098
02:30:25,349 --> 02:30:23,680
you know if somebody is interested in

4099
02:30:26,870 --> 02:30:25,359
illustrating and wants to volunteer for

4100
02:30:28,309 --> 02:30:26,880
that that might be nice too

4101
02:30:30,790 --> 02:30:28,319
yeah it would look more pleasant if

4102
02:30:33,110 --> 02:30:30,800
there was a uniform graphic design

4103
02:30:34,469 --> 02:30:33,120
yeah as for yep that's that's

4104
02:30:35,030 --> 02:30:34,479
interesting i know all the pokemon as

4105
02:30:38,309 --> 02:30:35,040
well so

4106
02:30:39,110 --> 02:30:38,319
i joined your signs right charizard

4107
02:30:40,469 --> 02:30:39,120
i don't know if you've heard of

4108
02:30:42,469 --> 02:30:40,479
charizard that's the most valuable