



1
00:00:04,230 --> 00:00:02,869

[Music]

2
00:00:06,470 --> 00:00:04,240

welcome to sales from the rabbit hole

3
00:00:08,549 --> 00:00:06,480

i'm your host mick west my guest today

4
00:00:10,950 --> 00:00:08,559

is professor rb loeb

5
00:00:12,870 --> 00:00:10,960

uh avi thank you very much for being

6
00:00:14,310 --> 00:00:12,880

here uh it's uh

7
00:00:15,110 --> 00:00:14,320

great for you to make the time to do

8
00:00:17,830 --> 00:00:15,120

this

9
00:00:21,830 --> 00:00:17,840

thanks for hosting me it's my pleasure

10
00:00:23,750 --> 00:00:21,840

so you are a professor of science and i

11
00:00:25,349 --> 00:00:23,760

found that very interesting because uh

12
00:00:27,269 --> 00:00:25,359

science you know as you know is very

13
00:00:28,870 --> 00:00:27,279

compartmentalized even at school you

14

00:00:30,150 --> 00:00:28,880

start out you know we we start out

15

00:00:32,229 --> 00:00:30,160

learning science and then it very

16

00:00:33,750 --> 00:00:32,239

quickly divides into physics chemistry

17

00:00:35,590 --> 00:00:33,760

and biology

18

00:00:36,790 --> 00:00:35,600

so uh and when i looked up professor of

19

00:00:38,150 --> 00:00:36,800

science it doesn't seem to be a very

20

00:00:40,069 --> 00:00:38,160

common title you see things like

21

00:00:41,990 --> 00:00:40,079

professor of science communications or

22

00:00:43,830 --> 00:00:42,000

professor of science and technology and

23

00:00:45,670 --> 00:00:43,840

things like that how do you get to be a

24

00:00:48,549 --> 00:00:45,680

professor of science

25

00:00:50,869 --> 00:00:48,559

well it's a name the chair so

26

00:00:53,270 --> 00:00:50,879

it's called the frank b bird the junior

27

00:00:55,750 --> 00:00:53,280

professor of science at harvard and i

28

00:00:57,510 --> 00:00:55,760

originally was a professor of astronomy

29

00:00:59,270 --> 00:00:57,520

because i belong to the astronomy

30

00:01:03,029 --> 00:00:59,280

department but then

31

00:01:05,350 --> 00:01:03,039

they gave me a chair position so

32

00:01:07,750 --> 00:01:05,360

that's where the science came in and of

33

00:01:09,990 --> 00:01:07,760

course the way i view myself is as a

34

00:01:12,550 --> 00:01:10,000

broad

35

00:01:14,950 --> 00:01:12,560

ranging scientists in the sense that i

36

00:01:17,590 --> 00:01:14,960

worked on many different aspects of

37

00:01:19,830 --> 00:01:17,600

science you know i worked on uh

38

00:01:20,870 --> 00:01:19,840

the first stars in the universe early on

39

00:01:22,710 --> 00:01:20,880

and

40

00:01:24,789 --> 00:01:22,720

you might call it the scientific version

41

00:01:25,670 --> 00:01:24,799

of the story of genesis let there be

42

00:01:27,749 --> 00:01:25,680

light

43

00:01:29,030 --> 00:01:27,759

and i worked on black holes for many

44

00:01:30,230 --> 00:01:29,040

years and

45

00:01:31,910 --> 00:01:30,240

also

46

00:01:34,230 --> 00:01:31,920

served as the founding director of the

47

00:01:37,590 --> 00:01:34,240

black hole initiative at harvard

48

00:01:42,469 --> 00:01:40,630

most recently the search for life

49

00:01:44,230 --> 00:01:42,479

in the universe and so it's a very

50

00:01:46,950 --> 00:01:44,240

diverse range of

51
00:01:48,870 --> 00:01:46,960
research topics and uh you know when i

52
00:01:50,950 --> 00:01:48,880
started astrophysics i was given an

53
00:01:54,149 --> 00:01:50,960
advice by my mentor at the time john

54
00:01:55,830 --> 00:01:54,159
baker he said you should focus on a very

55
00:01:58,310 --> 00:01:55,840
specific topic

56
00:02:01,749 --> 00:01:58,320
so that you can become the world expert

57
00:02:03,510 --> 00:02:01,759
and i never listened to his advice

58
00:02:05,429 --> 00:02:03,520
yeah that's good uh

59
00:02:07,350 --> 00:02:05,439
i i like the idea of being a scientific

60
00:02:09,350 --> 00:02:07,360
generalist myself and obviously i'm not

61
00:02:11,190 --> 00:02:09,360
really a scientist as such but uh you

62
00:02:12,949 --> 00:02:11,200
know i like learning lots of different

63
00:02:15,910 --> 00:02:12,959

new things and you know i appreciate

64

00:02:17,750 --> 00:02:15,920

that uh and you when we before we

65

00:02:19,910 --> 00:02:17,760

started this this interview when we were

66

00:02:21,830 --> 00:02:19,920

getting it in touch you advised me to

67

00:02:23,830 --> 00:02:21,840

have a look at the the series of

68

00:02:26,070 --> 00:02:23,840

articles that you write at scientific

69

00:02:27,510 --> 00:02:26,080

america and you know they're great

70

00:02:29,270 --> 00:02:27,520

they're really interesting and i think

71

00:02:32,229 --> 00:02:29,280

it gives you a very people a very good

72

00:02:34,390 --> 00:02:32,239

idea of who you are and uh the broad

73

00:02:37,110 --> 00:02:34,400

range of things that you are interested

74

00:02:39,270 --> 00:02:37,120

in you know in a way these these essays

75

00:02:42,070 --> 00:02:39,280

and also my book exoperation are an

76
00:02:44,070 --> 00:02:42,080
admission that uh of my true love which

77
00:02:45,750 --> 00:02:44,080
was philosophy at a young age when i

78
00:02:47,350 --> 00:02:45,760
grew up on a farm and

79
00:02:49,430 --> 00:02:47,360
i was mostly interested in the big

80
00:02:51,270 --> 00:02:49,440
questions unfortunately we don't have

81
00:02:53,030 --> 00:02:51,280
answers to those big questions like

82
00:02:55,270 --> 00:02:53,040
what's the meaning of life you know we

83
00:02:57,750 --> 00:02:55,280
are born into this world like actors put

84
00:02:59,830 --> 00:02:57,760
on a stage without knowing what the play

85
00:03:01,270 --> 00:02:59,840
is about and most people think the play

86
00:03:03,270 --> 00:03:01,280
is about us

87
00:03:05,509 --> 00:03:03,280
and you know it started with the ancient

88
00:03:06,710 --> 00:03:05,519

greek philosopher aristotle that argued

89

00:03:08,869 --> 00:03:06,720

that we are at the center of the

90

00:03:10,710 --> 00:03:08,879

universe and people believed him for a

91

00:03:12,309 --> 00:03:10,720

thousand years it was very flattering to

92

00:03:15,030 --> 00:03:12,319

our ego

93

00:03:17,190 --> 00:03:15,040

and what we now know is the universe is

94

00:03:19,509 --> 00:03:17,200

10 to the power 26 times bigger the

95

00:03:22,070 --> 00:03:19,519

observable volume of the universe is

96

00:03:23,910 --> 00:03:22,080

10 to the power 26 times bigger than the

97

00:03:26,710 --> 00:03:23,920

size of our body so we're clearly not at

98

00:03:29,430 --> 00:03:26,720

the center of the stage and moreover the

99

00:03:32,789 --> 00:03:29,440

play has been going on for 13.8 billion

100

00:03:35,190 --> 00:03:32,799

years so it's clearly not about us

101
00:03:36,949 --> 00:03:35,200
that's you know i understand where this

102
00:03:38,390 --> 00:03:36,959
is coming from because my daughters when

103
00:03:39,990 --> 00:03:38,400
they were young they thought everything

104
00:03:41,830 --> 00:03:40,000
is centered on them

105
00:03:42,869 --> 00:03:41,840
and then they got

106
00:03:44,390 --> 00:03:42,879
into the world they went to the

107
00:03:46,229 --> 00:03:44,400
kindergarten and realized there are

108
00:03:47,589 --> 00:03:46,239
other kids and some of them are smarter

109
00:03:49,270 --> 00:03:47,599
than they are and

110
00:03:51,589 --> 00:03:49,280
you know we still have to mature in that

111
00:03:53,750 --> 00:03:51,599
sense many of my colleagues still argue

112
00:03:56,070 --> 00:03:53,760
that we are alone and

113
00:03:57,509 --> 00:03:56,080

until given extraordinary evidence they

114

00:04:00,710 --> 00:03:57,519

will continue to think that we are the

115

00:04:02,470 --> 00:04:00,720

smartest on our cosmic blog

116

00:04:04,789 --> 00:04:02,480

yeah we uh i have that kind of

117

00:04:06,949 --> 00:04:04,799

experience myself of thinking i was the

118

00:04:09,270 --> 00:04:06,959

smartest kid around when i was very very

119

00:04:10,710 --> 00:04:09,280

young and i you know i was in my school

120

00:04:12,630 --> 00:04:10,720

my little school but then of course you

121

00:04:15,830 --> 00:04:12,640

go out into the broader world and to the

122

00:04:18,710 --> 00:04:15,840

university and yes

123

00:04:20,150 --> 00:04:18,720

yeah well i i think it's uh true for

124

00:04:21,990 --> 00:04:20,160

someone like einstein you know he

125

00:04:24,310 --> 00:04:22,000

thought that he's the smartest early on

126
00:04:25,189 --> 00:04:24,320
and it was true later on as well

127
00:04:26,550 --> 00:04:25,199
right but

128
00:04:30,230 --> 00:04:26,560
most people

129
00:04:33,110 --> 00:04:32,230
uh so you talked about philosophy and

130
00:04:35,830 --> 00:04:33,120
let's talk a little bit about the

131
00:04:38,070 --> 00:04:35,840
philosophy of science uh and one of the

132
00:04:40,629 --> 00:04:38,080
big issues in the philosophy of science

133
00:04:42,550 --> 00:04:40,639
is the the demarcation issue

134
00:04:44,550 --> 00:04:42,560
how do you decide what is science and

135
00:04:47,830 --> 00:04:44,560
what is pseudoscience and we're going to

136
00:04:50,070 --> 00:04:47,840
talk here about about ufos and obviously

137
00:04:54,070 --> 00:04:50,080
a lot of people would consider

138
00:04:56,710 --> 00:04:54,080

uh the study of ufos to be pseudoscience

139

00:04:59,110 --> 00:04:56,720

and yeah i think they disagree yeah the

140

00:05:02,070 --> 00:04:59,120

distinction is rather simple um science

141

00:05:04,469 --> 00:05:02,080

is if i had to define it actually

142

00:05:06,950 --> 00:05:04,479

i was asked to define an intelligent

143

00:05:08,710 --> 00:05:06,960

civilization and the way i define an

144

00:05:11,029 --> 00:05:08,720

intelligent civilization is a

145

00:05:13,510 --> 00:05:11,039

civilization guided by

146

00:05:15,590 --> 00:05:13,520

the principles of science which are a

147

00:05:17,909 --> 00:05:15,600

cooperation and sharing of

148

00:05:20,070 --> 00:05:17,919

evidence-based knowledge so there are

149

00:05:21,990 --> 00:05:20,080

two elements to that one is cooperation

150

00:05:24,469 --> 00:05:22,000

and sharing and if you look at human

151
00:05:27,029 --> 00:05:24,479
history it's full of instances where

152
00:05:29,590 --> 00:05:27,039
humans tried to feel superior relative

153
00:05:32,150 --> 00:05:29,600
to each other and did not really share i

154
00:05:35,110 --> 00:05:32,160
mean even recently um you know the

155
00:05:36,710 --> 00:05:35,120
information about kovid 19 was not

156
00:05:39,430 --> 00:05:36,720
shared with the rest of the world when

157
00:05:40,870 --> 00:05:39,440
it started in wuhan china and that is

158
00:05:42,629 --> 00:05:40,880
not a good

159
00:05:44,629 --> 00:05:42,639
sign because

160
00:05:48,070 --> 00:05:44,639
intelligence is you know trying to

161
00:05:52,070 --> 00:05:48,080
promote a better future for than all of

162
00:05:54,310 --> 00:05:52,080
all humans and in that sense you know

163
00:05:56,550 --> 00:05:54,320

political boundaries and and boundaries

164

00:05:58,390 --> 00:05:56,560

between countries do not make much much

165

00:06:01,029 --> 00:05:58,400

sense you want to help everyone and

166

00:06:02,870 --> 00:06:01,039

nowadays we live in a global world so

167

00:06:04,870 --> 00:06:02,880

that's one of the elements and then the

168

00:06:06,790 --> 00:06:04,880

second one most important that makes the

169

00:06:08,070 --> 00:06:06,800

distinction between cellular science and

170

00:06:11,749 --> 00:06:08,080

real science

171

00:06:13,590 --> 00:06:11,759

is evidence based knowledge and you know

172

00:06:15,749 --> 00:06:13,600

we see a lot

173

00:06:18,550 --> 00:06:15,759

of of discussion in politics that is not

174

00:06:21,029 --> 00:06:18,560

evidence based and in other realms of of

175

00:06:23,350 --> 00:06:21,039

our life and uh i think

176

00:06:25,590 --> 00:06:23,360

we will be much better off if we were to

177

00:06:27,350 --> 00:06:25,600

be guided by evidence and and by the way

178

00:06:29,670 --> 00:06:27,360

we will talk about the galileo project

179

00:06:32,469 --> 00:06:29,680

but the entire motivation for me

180

00:06:34,469 --> 00:06:32,479

uh to lead this project is to bring a

181

00:06:36,469 --> 00:06:34,479

subject that you might call

182

00:06:38,629 --> 00:06:36,479

pseudoscience because perhaps the

183

00:06:40,070 --> 00:06:38,639

evidence that was released to the public

184

00:06:42,070 --> 00:06:40,080

was not

185

00:06:43,670 --> 00:06:42,080

convincing and there might be other

186

00:06:46,230 --> 00:06:43,680

evidence you know it might be like an

187

00:06:48,710 --> 00:06:46,240

iceberg where we see only the tip but i

188

00:06:50,790 --> 00:06:48,720

don't you know i don't really care

189

00:06:53,350 --> 00:06:50,800

uh if there is classified evidence and

190

00:06:56,150 --> 00:06:53,360

what the past evidence is i just want to

191

00:06:58,070 --> 00:06:56,160

collect enough evidence to examine it

192

00:07:00,550 --> 00:06:58,080

scientifically because science is guided

193

00:07:03,430 --> 00:07:00,560

by evidence and nothing more nothing

194

00:07:05,270 --> 00:07:03,440

less and and we should regard science

195

00:07:07,110 --> 00:07:05,280

it's a learning experience for me

196

00:07:09,670 --> 00:07:07,120

science is a privilege

197

00:07:12,150 --> 00:07:09,680

of maintaining your childhood curiosity

198

00:07:14,150 --> 00:07:12,160

and you know as a child as a kid when

199

00:07:16,309 --> 00:07:14,160

adults tell you something you don't

200

00:07:18,790 --> 00:07:16,319

believe them you just go out and and

201

00:07:20,790 --> 00:07:18,800

check it for yourself something bad

202

00:07:23,510 --> 00:07:20,800

happens to these kids when they become

203

00:07:25,110 --> 00:07:23,520

adults they stop checking and they start

204

00:07:28,390 --> 00:07:25,120

to believe uh

205

00:07:30,469 --> 00:07:28,400

ideas that are not um you know um that

206

00:07:32,070 --> 00:07:30,479

are not supported by evidence yeah and

207

00:07:33,589 --> 00:07:32,080

that's something i'm very much against

208

00:07:35,270 --> 00:07:33,599

obviously because i'm kind of a skeptic

209

00:07:37,029 --> 00:07:35,280

slash debunker

210

00:07:39,270 --> 00:07:37,039

that's perfectly fine to be skeptic and

211

00:07:41,510 --> 00:07:39,280

i think it's important to to be skeptic

212

00:07:43,670 --> 00:07:41,520

because yeah but if if that motivates

213

00:07:46,070 --> 00:07:43,680

you to collect better evidence

214

00:07:48,230 --> 00:07:46,080

you are following signs

215

00:07:50,950 --> 00:07:48,240

yeah so let's say uh just imagine for a

216

00:07:53,270 --> 00:07:50,960

second i was i got a check for a million

217

00:07:55,909 --> 00:07:53,280

dollars here and i want to invest this

218

00:07:57,670 --> 00:07:55,919

million dollars in the

219

00:07:59,589 --> 00:07:57,680

search for ufos like because i i'm

220

00:08:01,350 --> 00:07:59,599

personally convinced to say that ufos

221

00:08:03,830 --> 00:08:01,360

might be alien visitors and i want to

222

00:08:05,589 --> 00:08:03,840

kind of get that out to the world

223

00:08:09,350 --> 00:08:05,599

why should i give my million dollars to

224

00:08:12,550 --> 00:08:09,360

you and project galileo okay so

225

00:08:16,629 --> 00:08:12,560

the galileo project is basically the

226

00:08:19,430 --> 00:08:16,639

the scope of it is trying to establish

227

00:08:20,950 --> 00:08:19,440

the study of of unidentified objects

228

00:08:22,790 --> 00:08:20,960

whose nature is not known in our

229

00:08:24,869 --> 00:08:22,800

atmosphere

230

00:08:27,430 --> 00:08:24,879

to study it scientifically meaning to

231

00:08:29,830 --> 00:08:27,440

collect evidence uh using instruments

232

00:08:32,469 --> 00:08:29,840

that we have full control over so for

233

00:08:34,870 --> 00:08:32,479

example past testimonies

234

00:08:36,389 --> 00:08:34,880

uh you know do not stand up to the

235

00:08:38,149 --> 00:08:36,399

scrutiny of science you can't write a

236

00:08:41,029 --> 00:08:38,159

scientific paper based on what people

237

00:08:42,949 --> 00:08:41,039

tell you can't say this person said that

238

00:08:45,269 --> 00:08:42,959

and and submit the paper for publication

239

00:08:47,190 --> 00:08:45,279

that's not acceptable uh what you need

240

00:08:50,310 --> 00:08:47,200

is to rely on instruments that collect

241

00:08:52,470 --> 00:08:50,320

the quantitative evidence um and so

242

00:08:53,910 --> 00:08:52,480

that's point number one the second is

243

00:08:56,150 --> 00:08:53,920

the instruments that were used in the

244

00:08:59,590 --> 00:08:56,160

past on reports

245

00:09:01,750 --> 00:08:59,600

uh on unidentified objects uh were not

246

00:09:04,310 --> 00:09:01,760

optimized for that purpose they were for

247

00:09:06,870 --> 00:09:04,320

example a jittery camera in the cockpit

248

00:09:08,710 --> 00:09:06,880

of a fighter jet i mean that's not a

249

00:09:11,110 --> 00:09:08,720

scientific experiment because you don't

250

00:09:13,509 --> 00:09:11,120

know exactly how the fighter jet

251
00:09:15,509 --> 00:09:13,519
maneuvered and uh you don't know what

252
00:09:18,310 --> 00:09:15,519
kind of jitters were introduced to the

253
00:09:20,550 --> 00:09:18,320
camera during that flight and um what

254
00:09:22,710 --> 00:09:20,560
you want is to have full control and

255
00:09:24,870 --> 00:09:22,720
full knowledge of your experimental

256
00:09:26,790 --> 00:09:24,880
setup and that's what the galileo

257
00:09:29,030 --> 00:09:26,800
project wants to do we want to we don't

258
00:09:30,790 --> 00:09:29,040
want to look back at past evidence in

259
00:09:31,910 --> 00:09:30,800
fact we say that explicitly on our

260
00:09:34,070 --> 00:09:31,920
website

261
00:09:36,310 --> 00:09:34,080
also the other thing that i should say

262
00:09:38,150 --> 00:09:36,320
we don't want to entertain explanations

263
00:09:40,949 --> 00:09:38,160

that deviate from the known laws of

264

00:09:42,630 --> 00:09:40,959

physics so if someone says oh actually

265

00:09:44,870 --> 00:09:42,640

you know there is something really

266

00:09:47,590 --> 00:09:44,880

strange going on that violates the

267

00:09:51,190 --> 00:09:47,600

standard model of physics we will not

268

00:09:52,949 --> 00:09:51,200

entertain that we will use our knowledge

269

00:09:55,190 --> 00:09:52,959

just like in a regular scientific

270

00:09:57,990 --> 00:09:55,200

experiment of course if we are pushed

271

00:10:00,150 --> 00:09:58,000

to the point where the evidence is so

272

00:10:02,230 --> 00:10:00,160

uh unusual that

273

00:10:05,030 --> 00:10:02,240

you can say for sure that

274

00:10:08,150 --> 00:10:05,040

our understanding of physics is violated

275

00:10:10,470 --> 00:10:08,160

you know that would be uh worth

276

00:10:12,870 --> 00:10:10,480

a nobel prize of course and and i find

277

00:10:14,470 --> 00:10:12,880

it unlikely because there are so many

278

00:10:16,310 --> 00:10:14,480

experiments that we've

279

00:10:18,389 --> 00:10:16,320

tested the current understanding of the

280

00:10:20,870 --> 00:10:18,399

laws of physics that i would really find

281

00:10:22,710 --> 00:10:20,880

it surprising if these objects violated

282

00:10:24,949 --> 00:10:22,720

so at first we will

283

00:10:26,389 --> 00:10:24,959

use the what we know about physics the

284

00:10:29,030 --> 00:10:26,399

laws of nature

285

00:10:32,470 --> 00:10:29,040

and then not deviate from that and then

286

00:10:33,750 --> 00:10:32,480

collect as much data as possible using a

287

00:10:35,030 --> 00:10:33,760

telescopes

288

00:10:37,190 --> 00:10:35,040

connected to

289

00:10:39,590 --> 00:10:37,200

uh cameras that fit the data into

290

00:10:41,269 --> 00:10:39,600

computer systems that filter it for

291

00:10:43,110 --> 00:10:41,279

objects of interest and i should say i

292

00:10:45,509 --> 00:10:43,120

mean people would ask okay what's new

293

00:10:47,750 --> 00:10:45,519

about it you know we have telescopes

294

00:10:50,069 --> 00:10:47,760

operated by astronomers

295

00:10:52,230 --> 00:10:50,079

looking at the sky all the time well the

296

00:10:54,150 --> 00:10:52,240

answer is if a bird flies above a

297

00:10:56,310 --> 00:10:54,160

telescope that astronomers are using

298

00:10:58,949 --> 00:10:56,320

they just ignore it we will look at it

299

00:11:00,630 --> 00:10:58,959

and see that it's a bird and identified

300

00:11:02,870 --> 00:11:00,640

we will try to get a high resolution

301
00:11:04,710 --> 00:11:02,880
image just to give you a sense an object

302
00:11:06,710 --> 00:11:04,720
the size of a person

303
00:11:08,870 --> 00:11:06,720
at a distance of a mile

304
00:11:11,030 --> 00:11:08,880
uh can be resolved

305
00:11:13,590 --> 00:11:11,040
with a megapixel image so that you can

306
00:11:16,310 --> 00:11:13,600
see the size of the head of a pin on it

307
00:11:19,590 --> 00:11:16,320
using a one meter telescope

308
00:11:22,150 --> 00:11:19,600
and just standard optics and then you

309
00:11:24,069 --> 00:11:22,160
know in a few weeks ago i looked online

310
00:11:26,550 --> 00:11:24,079
and you can actually

311
00:11:28,710 --> 00:11:26,560
purchase such a telescope you just add

312
00:11:30,949 --> 00:11:28,720
it to your bag there is a button add to

313
00:11:32,870 --> 00:11:30,959

the bag it costs half a million dollars

314

00:11:34,470 --> 00:11:32,880

that's a lot of money but apparently

315

00:11:35,829 --> 00:11:34,480

there are people willing to spend that

316

00:11:39,269 --> 00:11:35,839

so the point is with a big enough

317

00:11:41,750 --> 00:11:39,279

telescope you can tell whether an object

318

00:11:44,550 --> 00:11:41,760

the size of a person has a label saying

319

00:11:47,430 --> 00:11:44,560

made in china made in russia or made on

320

00:11:49,190 --> 00:11:47,440

exoplanet x you know and

321

00:11:51,990 --> 00:11:49,200

that's what we will now i should tell

322

00:11:53,910 --> 00:11:52,000

you that i'm not interested at all in

323

00:11:57,190 --> 00:11:53,920

anything that is human made you know if

324

00:11:59,030 --> 00:11:57,200

it says made in china or made in russia

325

00:12:01,030 --> 00:11:59,040

you know that's very boring as far as

326

00:12:02,870 --> 00:12:01,040

i'm concerned i will transfer all the

327

00:12:03,910 --> 00:12:02,880

information to washington dc whoever

328

00:12:06,389 --> 00:12:03,920

wants it

329

00:12:08,870 --> 00:12:06,399

uh i don't you know the project is not

330

00:12:10,629 --> 00:12:08,880

about that we don't care about that

331

00:12:12,069 --> 00:12:10,639

kind of objects

332

00:12:13,670 --> 00:12:12,079

the two the two types that are of

333

00:12:15,750 --> 00:12:13,680

interest are of course atmospheric

334

00:12:19,030 --> 00:12:15,760

phenomena you know things that happen in

335

00:12:20,790 --> 00:12:19,040

nature were unexpected and produce

336

00:12:22,710 --> 00:12:20,800

interesting events that were previously

337

00:12:26,069 --> 00:12:22,720

unappreciated you know that's why their

338

00:12:28,069 --> 00:12:26,079

nature is not known in the uap report to

339

00:12:29,509 --> 00:12:28,079

to congress so that's one possibility

340

00:12:31,910 --> 00:12:29,519

and of course there is a possibility

341

00:12:34,629 --> 00:12:31,920

that something out of this earth came

342

00:12:37,829 --> 00:12:34,639

uh nearby so i mean we are completely

343

00:12:39,750 --> 00:12:37,839

agnostic uh without any agenda just

344

00:12:42,310 --> 00:12:39,760

trying to collect the data and and the

345

00:12:45,190 --> 00:12:42,320

good thing is you know that we are

346

00:12:47,430 --> 00:12:45,200

funded by donations so i did not

347

00:12:49,670 --> 00:12:47,440

fundraise i just got not one million but

348

00:12:51,829 --> 00:12:49,680

two nearly two million dollars over the

349

00:12:54,949 --> 00:12:51,839

past few weeks from donors that i've

350

00:12:57,430 --> 00:12:54,959

never met before until the last

351
00:12:59,509 --> 00:12:57,440
few weeks and and they just decided to

352
00:13:01,590 --> 00:12:59,519
support that research and

353
00:13:03,829 --> 00:13:01,600
i said at that point i said okay well i

354
00:13:05,829 --> 00:13:03,839
can assemble

355
00:13:08,790 --> 00:13:05,839
exceptional scientists mostly

356
00:13:10,629 --> 00:13:08,800
astronomers that know how to construct

357
00:13:12,550 --> 00:13:10,639
telescopes that will serve the purpose

358
00:13:14,790 --> 00:13:12,560
that we need them for

359
00:13:16,710 --> 00:13:14,800
uh and you might ask why not use

360
00:13:18,389 --> 00:13:16,720
satellite data you know there was some

361
00:13:20,470 --> 00:13:18,399
satellite data looking down well

362
00:13:22,230 --> 00:13:20,480
satellites move around the earth

363
00:13:24,389 --> 00:13:22,240

very quickly they can't really monitor

364

00:13:26,470 --> 00:13:24,399

the motion of a given object in the way

365

00:13:28,230 --> 00:13:26,480

that we want it and

366

00:13:30,550 --> 00:13:28,240

so i was asked by many people why not

367

00:13:33,269 --> 00:13:30,560

use existing data the point is existing

368

00:13:35,190 --> 00:13:33,279

data was never designed for the purpose

369

00:13:37,750 --> 00:13:35,200

that we are talking about this is really

370

00:13:39,350 --> 00:13:37,760

a new endeavor and no and and the reason

371

00:13:40,470 --> 00:13:39,360

it was not done in the past is very

372

00:13:42,310 --> 00:13:40,480

simple

373

00:13:44,629 --> 00:13:42,320

the science community scientists

374

00:13:46,870 --> 00:13:44,639

ridiculed this subject and didn't take

375

00:13:48,389 --> 00:13:46,880

it seriously at the same time there were

376

00:13:50,310 --> 00:13:48,399

people out there

377

00:13:52,389 --> 00:13:50,320

uh making statements that do not make

378

00:13:54,629 --> 00:13:52,399

much sense including statements about

379

00:13:55,509 --> 00:13:54,639

violating the laws of physics you know

380

00:13:59,189 --> 00:13:55,519

and

381

00:14:00,710 --> 00:13:59,199

you see that there is no point in us

382

00:14:03,269 --> 00:14:00,720

getting engaged because it makes no

383

00:14:06,069 --> 00:14:03,279

sense so the two communities basically

384

00:14:09,189 --> 00:14:06,079

created the status quo where not much

385

00:14:11,030 --> 00:14:09,199

was done and then when the report came

386

00:14:13,590 --> 00:14:11,040

to congress at that point it looked to

387

00:14:15,350 --> 00:14:13,600

me as if it's you know it's very

388

00:14:18,310 --> 00:14:15,360

intriguing for us to look into it

389

00:14:20,150 --> 00:14:18,320

because former cia directors brennan and

390

00:14:22,310 --> 00:14:20,160

woolsey would say this is a serious

391

00:14:23,829 --> 00:14:22,320

matter former president barack obama

392

00:14:26,069 --> 00:14:23,839

said this is a serious matter this is a

393

00:14:28,150 --> 00:14:26,079

real object so if the politicians in

394

00:14:29,509 --> 00:14:28,160

washington dc you know and military

395

00:14:31,030 --> 00:14:29,519

personnel say

396

00:14:32,870 --> 00:14:31,040

they don't understand the nature of some

397

00:14:34,870 --> 00:14:32,880

objects that appear to be real at that

398

00:14:36,949 --> 00:14:34,880

point in time i say let's move this

399

00:14:39,030 --> 00:14:36,959

subject away from the talking points of

400

00:14:41,189 --> 00:14:39,040

politicians military personnel to the

401
00:14:44,150 --> 00:14:41,199
realm of science so that we can clear up

402
00:14:46,150 --> 00:14:44,160
the fog and resolve it once and for all

403
00:14:50,310 --> 00:14:46,160
you know this is a subject we are not in

404
00:14:51,990 --> 00:14:50,320
the dark ages right so we there there is

405
00:14:54,790 --> 00:14:52,000
we shouldn't uh

406
00:14:56,550 --> 00:14:54,800
speculate we we can clear it up with the

407
00:14:58,230 --> 00:14:56,560
investment of a few tens of millions of

408
00:15:00,310 --> 00:14:58,240
dollars and we can talk about why i need

409
00:15:03,030 --> 00:15:00,320
more money in order to do it properly

410
00:15:05,269 --> 00:15:03,040
but the point is we can clear up this

411
00:15:07,110 --> 00:15:05,279
this fog and and find the answer and

412
00:15:09,110 --> 00:15:07,120
then move on you know if it ends up

413
00:15:10,710 --> 00:15:09,120

being a natural phenomenon so be it i

414

00:15:12,310 --> 00:15:10,720

have no agenda

415

00:15:14,389 --> 00:15:12,320

that's a very interesting idea the idea

416

00:15:15,829 --> 00:15:14,399

that you can clear it up in just uh i

417

00:15:17,670 --> 00:15:15,839

guess a few years with a few tens of

418

00:15:19,189 --> 00:15:17,680

millions of dollars and that would be

419

00:15:20,470 --> 00:15:19,199

great obviously if that actually

420

00:15:22,629 --> 00:15:20,480

happened but let's kind of like look at

421

00:15:24,629 --> 00:15:22,639

the nitty-gritty there yeah

422

00:15:27,269 --> 00:15:24,639

you're proposing essentially a network

423

00:15:29,749 --> 00:15:27,279

of telescopes that are going to uh get

424

00:15:32,150 --> 00:15:29,759

high resolution images of objects in the

425

00:15:35,110 --> 00:15:32,160

sky and you talked about one telescope

426

00:15:35,990 --> 00:15:35,120

it's a half billion dollar telescope

427

00:15:37,910 --> 00:15:36,000

today

428

00:15:40,389 --> 00:15:37,920

i gave an example of one telescope a

429

00:15:42,150 --> 00:15:40,399

meter size but it's we we

430

00:15:43,829 --> 00:15:42,160

are likely to use small uh slightly

431

00:15:45,590 --> 00:15:43,839

smaller telescope because the cost is

432

00:15:47,030 --> 00:15:45,600

still an issue if yes you know if

433

00:15:48,310 --> 00:15:47,040

currently we have it right now very

434

00:15:50,150 --> 00:15:48,320

quickly yeah

435

00:15:52,470 --> 00:15:50,160

so you know the obvious issue with uh

436

00:15:54,470 --> 00:15:52,480

ufos is that the sky is very very large

437

00:15:56,150 --> 00:15:54,480

you know the the the amount of area that

438

00:15:58,710 --> 00:15:56,160

you have to cover is very very large and

439

00:16:00,389 --> 00:15:58,720

we we see ufos because we have lots of

440

00:16:02,389 --> 00:16:00,399

people and so

441

00:16:05,350 --> 00:16:02,399

people looking up in the sky see things

442

00:16:07,430 --> 00:16:05,360

and we have a very very broad net right

443

00:16:08,389 --> 00:16:07,440

how are you going to get sufficient

444

00:16:10,470 --> 00:16:08,399

coverage

445

00:16:13,189 --> 00:16:10,480

to get sufficient frequency of

446

00:16:15,110 --> 00:16:13,199

observations yeah well that's that's an

447

00:16:17,509 --> 00:16:15,120

excellent question and we made some

448

00:16:19,990 --> 00:16:17,519

preliminary estimates for how many

449

00:16:22,870 --> 00:16:20,000

telescope systems we might need given

450

00:16:25,030 --> 00:16:22,880

you know the the uh

451
00:16:27,670 --> 00:16:25,040
area that is covered by each telescope

452
00:16:31,430 --> 00:16:27,680
system okay and and the answer is you

453
00:16:34,150 --> 00:16:31,440
know for given the reports by

454
00:16:36,150 --> 00:16:34,160
military personnel you would need the of

455
00:16:40,150 --> 00:16:36,160
order at least a hundred stations a

456
00:16:42,550 --> 00:16:40,160
hundred telescope systems um and then

457
00:16:44,310 --> 00:16:42,560
today with the entire united states

458
00:16:45,990 --> 00:16:44,320
well it could be the us it could be

459
00:16:48,150 --> 00:16:46,000
elsewhere you know

460
00:16:50,230 --> 00:16:48,160
of course the best sites in terms of

461
00:16:51,990 --> 00:16:50,240
visibility are mountain tops that's why

462
00:16:54,310 --> 00:16:52,000
astronomers put telescopes on mountain

463
00:16:57,269 --> 00:16:54,320

tops and because the atmosphere is more

464

00:16:59,030 --> 00:16:57,279

dilute as you go up and there is less

465

00:17:00,949 --> 00:16:59,040

blurring by atmospheric turbulence so

466

00:17:02,550 --> 00:17:00,959

you can see better to greater distances

467

00:17:05,029 --> 00:17:02,560

without

468

00:17:06,549 --> 00:17:05,039

deterioration of the image quality and

469

00:17:08,309 --> 00:17:06,559

uh but

470

00:17:10,710 --> 00:17:08,319

it may well be i mean some people claim

471

00:17:12,789 --> 00:17:10,720

that uap concentrate around the

472

00:17:15,669 --> 00:17:12,799

particular locations like

473

00:17:18,230 --> 00:17:15,679

military facilities or or nuclear

474

00:17:20,390 --> 00:17:18,240

reactors and uh the point is these are

475

00:17:22,390 --> 00:17:20,400

the facilities that are most monitored

476
00:17:24,230 --> 00:17:22,400
so it's not clear to me that it's not

477
00:17:27,429 --> 00:17:24,240
just a selection highest

478
00:17:29,350 --> 00:17:27,439
but um at any event um and obviously you

479
00:17:31,270 --> 00:17:29,360
know most of the sky is not classified

480
00:17:34,470 --> 00:17:31,280
that's why astronomers use telescopes

481
00:17:35,669 --> 00:17:34,480
without any problem uh and so

482
00:17:38,789 --> 00:17:35,679
we may not

483
00:17:40,710 --> 00:17:38,799
approach military facilities because

484
00:17:42,710 --> 00:17:40,720
some you know these areas are restricted

485
00:17:44,950 --> 00:17:42,720
but but we will try to spread the

486
00:17:46,310 --> 00:17:44,960
telescopes over a wide range of

487
00:17:48,630 --> 00:17:46,320
of um

488
00:17:51,669 --> 00:17:48,640

environments and uh the question of the

489

00:17:54,390 --> 00:17:51,679

location is um yet to be decided where

490

00:17:55,190 --> 00:17:54,400

would we put them but what i'm saying is

491

00:17:56,789 --> 00:17:55,200

uh

492

00:17:58,630 --> 00:17:56,799

currently with the current funding we

493

00:18:01,350 --> 00:17:58,640

can at most fund

494

00:18:04,789 --> 00:18:01,360

up to 10 systems

495

00:18:06,710 --> 00:18:04,799

uh and then the thing is we need 100

496

00:18:08,789 --> 00:18:06,720

or or more so we need 10 times more

497

00:18:11,750 --> 00:18:08,799

funding uh current so we need tens of

498

00:18:13,750 --> 00:18:11,760

millions but but if we have that we we

499

00:18:15,510 --> 00:18:13,760

will have that which i'm optimistic

500

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

about because once we demonstrate that

501
00:18:20,630 --> 00:18:18,160
we can accom we can achieve the data

502
00:18:23,909 --> 00:18:20,640
quality that we need uh at that point we

503
00:18:25,590 --> 00:18:23,919
might get more donors to to to support

504
00:18:28,230 --> 00:18:25,600
the project and you know i must

505
00:18:29,110 --> 00:18:28,240
emphasize we are not taking away money

506
00:18:31,029 --> 00:18:29,120
from

507
00:18:34,070 --> 00:18:31,039
searches you know the this the

508
00:18:36,549 --> 00:18:34,080
mainstream science done by the national

509
00:18:38,230 --> 00:18:36,559
science foundation or or nasa in the

510
00:18:39,669 --> 00:18:38,240
sense you know people are still

511
00:18:41,750 --> 00:18:39,679
searching for the dark matter for

512
00:18:46,150 --> 00:18:41,760
example right but right that's supported

513
00:18:47,669 --> 00:18:46,160

by doe or supported by uh nsf and um

514

00:18:49,350 --> 00:18:47,679

we haven't found the dark matter for

515

00:18:50,630 --> 00:18:49,360

four decades we've been searching

516

00:18:53,029 --> 00:18:50,640

investing hundreds of millions of

517

00:18:55,430 --> 00:18:53,039

dollars in the dark so to speak

518

00:18:58,230 --> 00:18:55,440

and that is mainstream in science that's

519

00:18:59,990 --> 00:18:58,240

mainstream in uh astronomy and it's

520

00:19:01,669 --> 00:19:00,000

completely legitimate not to find

521

00:19:03,830 --> 00:19:01,679

something you're looking for you know

522

00:19:06,150 --> 00:19:03,840

and uh like people were searching for

523

00:19:08,470 --> 00:19:06,160

weekly interacting massive particles i

524

00:19:10,470 --> 00:19:08,480

don't regard it as a failure that for 40

525

00:19:12,630 --> 00:19:10,480

years nothing was found and just upper

526

00:19:14,150 --> 00:19:12,640

limits were set and i asked an

527

00:19:16,870 --> 00:19:14,160

experimentalist how long will you

528

00:19:19,350 --> 00:19:16,880

continue to search and he said as long

529

00:19:20,710 --> 00:19:19,360

as i'm getting funded so that is

530

00:19:21,830 --> 00:19:20,720

completely but

531

00:19:24,150 --> 00:19:21,840

having

532

00:19:26,390 --> 00:19:24,160

zero or a thousand times less funding

533

00:19:28,870 --> 00:19:26,400

for the trying to figure out the nature

534

00:19:30,150 --> 00:19:28,880

of this uap doesn't make much sense to

535

00:19:32,630 --> 00:19:30,160

me so i think

536

00:19:35,029 --> 00:19:32,640

uh at this day and age you know science

537

00:19:36,789 --> 00:19:35,039

should engage in a topic that is of such

538

00:19:39,510 --> 00:19:36,799

interest to the public

539

00:19:41,029 --> 00:19:39,520

and clear it up you know we are not

540

00:19:44,390 --> 00:19:41,039

you know a thousand years ago there were

541

00:19:46,230 --> 00:19:44,400

people saying the human body has a soul

542

00:19:48,630 --> 00:19:46,240

and therefore anatomy should be

543

00:19:51,029 --> 00:19:48,640

forbidden imagine if scientists would

544

00:19:53,430 --> 00:19:51,039

say oh some people are saying nonsense

545

00:19:55,590 --> 00:19:53,440

about the human body we don't want to

546

00:19:57,430 --> 00:19:55,600

engage with the human body we don't want

547

00:20:00,390 --> 00:19:57,440

to have operations because there is all

548

00:20:01,990 --> 00:20:00,400

this nonsense said about it uh you know

549

00:20:04,149 --> 00:20:02,000

it's a controversial subject the human

550

00:20:06,630 --> 00:20:04,159

body think where where would modern

551
00:20:08,950 --> 00:20:06,640
medicine be the point is if science has

552
00:20:10,950 --> 00:20:08,960
the ability to address a question that

553
00:20:13,669 --> 00:20:10,960
has a lot of nonsense being said about

554
00:20:15,669 --> 00:20:13,679
it it should do it so that agrees it's

555
00:20:17,750 --> 00:20:15,679
basically being said about it so that we

556
00:20:19,350 --> 00:20:17,760
can clear it up and move on

557
00:20:21,430 --> 00:20:19,360
yeah i would i very much like that i

558
00:20:22,710 --> 00:20:21,440
would like to have more data i i you

559
00:20:25,510 --> 00:20:22,720
know i'm a big fan of science and

560
00:20:27,270 --> 00:20:25,520
science fiction and uh the idea of alien

561
00:20:29,590 --> 00:20:27,280
contact would be would be great or even

562
00:20:31,750 --> 00:20:29,600
just evidence of of a past alien

563
00:20:33,430 --> 00:20:31,760

civilization even would be very good so

564

00:20:35,830 --> 00:20:33,440

i'm in favor of this but what i'm

565

00:20:37,430 --> 00:20:35,840

interested in is is it's kind of is it

566

00:20:38,870 --> 00:20:37,440

the right thing to do

567

00:20:41,029 --> 00:20:38,880

uh and

568

00:20:42,310 --> 00:20:41,039

you talk about these these telescopes

569

00:20:43,750 --> 00:20:42,320

and you know the smaller ones you're

570

00:20:45,990 --> 00:20:43,760

going to have these say you know 10 to

571

00:20:48,390 --> 00:20:46,000

100 uh stations and they're going to be

572

00:20:51,190 --> 00:20:48,400

taking photographs of things but you

573

00:20:53,029 --> 00:20:51,200

know is is photography really going to

574

00:20:55,190 --> 00:20:53,039

be showing you that much because a lot

575

00:20:57,510 --> 00:20:55,200

of the time what you see is is images

576
00:20:59,190 --> 00:20:57,520
that are ambiguous you see that now and

577
00:21:01,990 --> 00:20:59,200
what you're trying to do obviously is to

578
00:21:05,029 --> 00:21:02,000
get an image that is less ambiguous but

579
00:21:07,110 --> 00:21:05,039
is that is that really the best use of

580
00:21:09,110 --> 00:21:07,120
money yeah to get

581
00:21:11,190 --> 00:21:09,120
a better resolution image all you need

582
00:21:13,270 --> 00:21:11,200
is a bigger aperture so when people use

583
00:21:15,190 --> 00:21:13,280
for example cell phones the images are

584
00:21:17,510 --> 00:21:15,200
always blurry for an object at the

585
00:21:19,190 --> 00:21:17,520
distance of a mile because the aperture

586
00:21:22,070 --> 00:21:19,200
of the camera is so small but if you

587
00:21:24,230 --> 00:21:22,080
make a camera that is 100 times bigger

588
00:21:26,630 --> 00:21:24,240

then you can get 100 times better

589

00:21:29,510 --> 00:21:26,640

angular resolution so it's just about

590

00:21:31,750 --> 00:21:29,520

that optics but moreover in a given

591

00:21:33,990 --> 00:21:31,760

station in a given system it will not be

592

00:21:36,390 --> 00:21:34,000

just one telescope it will be multiple

593

00:21:38,149 --> 00:21:36,400

like for example two or three so that

594

00:21:40,070 --> 00:21:38,159

you can get a parallax you can see how

595

00:21:42,710 --> 00:21:40,080

the object moves in three dimensions on

596

00:21:45,029 --> 00:21:42,720

the sky you can get a trajectory you

597

00:21:46,390 --> 00:21:45,039

will get a better image of it because

598

00:21:50,149 --> 00:21:46,400

the telescopes are bigger than

599

00:21:52,310 --> 00:21:50,159

previously used and moreover we use uh

600

00:21:55,430 --> 00:21:52,320

detectors not just in optical light

601
00:21:58,710 --> 00:21:55,440
reflected sunlight but also in infrared

602
00:22:01,110 --> 00:21:58,720
light and the radar systems in the radio

603
00:22:03,510 --> 00:22:01,120
so um and we will have full control over

604
00:22:05,830 --> 00:22:03,520
the instruments that we are using so we

605
00:22:08,470 --> 00:22:05,840
we will know exactly what is happening

606
00:22:10,870 --> 00:22:08,480
and i should emphasize one of the most

607
00:22:13,590 --> 00:22:10,880
important aspects of our our work would

608
00:22:15,270 --> 00:22:13,600
be that it it's open data anyone will be

609
00:22:18,950 --> 00:22:15,280
able to access it there will be no

610
00:22:20,710 --> 00:22:18,960
mystery about uh hidden data or whether

611
00:22:22,230 --> 00:22:20,720
high resolution data exists but not

612
00:22:23,990 --> 00:22:22,240
released because it will not be

613
00:22:25,990 --> 00:22:24,000

classified the only reason the data by

614

00:22:29,270 --> 00:22:26,000

the government is classified because it

615

00:22:32,070 --> 00:22:29,280

it was taken by classified sensors and

616

00:22:34,230 --> 00:22:32,080

um the government doesn't uh release the

617

00:22:36,549 --> 00:22:34,240

data simply because it doesn't want to

618

00:22:38,870 --> 00:22:36,559

reveal the quality of the sensors being

619

00:22:42,630 --> 00:22:38,880

used to monitor our sky so that

620

00:22:44,549 --> 00:22:42,640

adversaries will know what we use and uh

621

00:22:45,590 --> 00:22:44,559

we don't have that problem and by the

622

00:22:47,990 --> 00:22:45,600

way i

623

00:22:50,710 --> 00:22:48,000

personally do not want to look at any

624

00:22:52,470 --> 00:22:50,720

classified data because that would limit

625

00:22:56,149 --> 00:22:52,480

my freedom as a scientist i don't want

626

00:22:57,669 --> 00:22:56,159

to be obligated uh not to think uh

627

00:22:59,270 --> 00:22:57,679

because it will always be in the back of

628

00:23:02,470 --> 00:22:59,280

my head if i had

629

00:23:04,310 --> 00:23:02,480

witnessed the classified data and uh if

630

00:23:06,470 --> 00:23:04,320

if i don't see it then we can just

631

00:23:09,750 --> 00:23:06,480

collect our own new data

632

00:23:11,669 --> 00:23:09,760

and examine it with a fresh perspective

633

00:23:13,990 --> 00:23:11,679

i have nothing against other scientists

634

00:23:16,070 --> 00:23:14,000

looking at classified data that we find

635

00:23:17,029 --> 00:23:16,080

but i want to be free to look at new

636

00:23:19,190 --> 00:23:17,039

data

637

00:23:20,870 --> 00:23:19,200

and you know the sky is not classified

638

00:23:22,870 --> 00:23:20,880

most of it is not classified so we can

639

00:23:23,909 --> 00:23:22,880

just look up the astronomers are using

640

00:23:25,669 --> 00:23:23,919

it

641

00:23:27,190 --> 00:23:25,679

are looking at the sky all the time the

642

00:23:29,590 --> 00:23:27,200

difference is that we will focus on

643

00:23:31,590 --> 00:23:29,600

nearby objects i should say the galileo

644

00:23:34,070 --> 00:23:31,600

project has two components that there is

645

00:23:35,909 --> 00:23:34,080

a second component that has to do with

646

00:23:38,230 --> 00:23:35,919

interstellar objects objects that came

647

00:23:40,230 --> 00:23:38,240

from outside the solar system and enter

648

00:23:42,950 --> 00:23:40,240

the solar system like omua moao for

649

00:23:45,510 --> 00:23:42,960

example that look weird objects that do

650

00:23:48,549 --> 00:23:45,520

not match what we are used to in terms

651
00:23:50,390 --> 00:23:48,559
of looking at comets or asteroids and we

652
00:23:52,630 --> 00:23:50,400
just want to figure out their nature you

653
00:23:54,549 --> 00:23:52,640
know just like you walk on the on the

654
00:23:56,070 --> 00:23:54,559
beach and you see most of the time rocks

655
00:23:58,470 --> 00:23:56,080
and every now and then you see a plastic

656
00:24:00,950 --> 00:23:58,480
bottle so we want to look if there is

657
00:24:03,430 --> 00:24:00,960
any plastic bottle out there that enters

658
00:24:05,990 --> 00:24:03,440
the solar system just to make sure that

659
00:24:08,390 --> 00:24:06,000
you know that we understand the what is

660
00:24:09,990 --> 00:24:08,400
coming in and i should say even if we

661
00:24:12,549 --> 00:24:10,000
find something

662
00:24:15,190 --> 00:24:12,559
uh like a hydrogen iceberg like some

663
00:24:16,710 --> 00:24:15,200

people suggested for mua to explain its

664

00:24:17,990 --> 00:24:16,720

weird properties

665

00:24:19,990 --> 00:24:18,000

you know that's something we've never

666

00:24:21,990 --> 00:24:20,000

seen before something that was not

667

00:24:23,830 --> 00:24:22,000

produced in the solar system we know

668

00:24:25,669 --> 00:24:23,840

that and

669

00:24:26,549 --> 00:24:25,679

you know it's it should be very abundant

670

00:24:28,149 --> 00:24:26,559

because

671

00:24:30,630 --> 00:24:28,159

was the first interstellar object that

672

00:24:32,870 --> 00:24:30,640

we discovered so if we understand

673

00:24:35,669 --> 00:24:32,880

objects like omumu to be hydrogen

674

00:24:37,510 --> 00:24:35,679

icebergs based on future evidence

675

00:24:39,350 --> 00:24:37,520

that will be important for science

676

00:24:41,269 --> 00:24:39,360

because it will imply that there are

677

00:24:44,070 --> 00:24:41,279

nurseries that make objects we haven't

678

00:24:45,990 --> 00:24:44,080

expected that are very common

679

00:24:48,390 --> 00:24:46,000

and we will learn something new so my

680

00:24:50,470 --> 00:24:48,400

point is with new evidence you always

681

00:24:53,430 --> 00:24:50,480

learn it's always beneficial to collect

682

00:24:56,070 --> 00:24:53,440

evidence we are not using money that was

683

00:24:58,870 --> 00:24:56,080

otherwise intended for another purpose

684

00:25:01,190 --> 00:24:58,880

we are getting donations and so i should

685

00:25:03,830 --> 00:25:01,200

i would think this project should get

686

00:25:05,750 --> 00:25:03,840

the blessings of all scientists

687

00:25:07,269 --> 00:25:05,760

which it doesn't

688

00:25:09,430 --> 00:25:07,279

well no it doesn't i think because of

689

00:25:11,909 --> 00:25:09,440

the association that it has with the

690

00:25:13,190 --> 00:25:11,919

ufos but like getting into that i think

691

00:25:14,710 --> 00:25:13,200

uh

692

00:25:16,390 --> 00:25:14,720

if you're going to go out on a

693

00:25:18,230 --> 00:25:16,400

scientific expedition you're trying to

694

00:25:20,310 --> 00:25:18,240

gather some data to try to answer some

695

00:25:23,029 --> 00:25:20,320

questions don't you have to have some

696

00:25:25,430 --> 00:25:23,039

kind of existing data set uh that kind

697

00:25:27,190 --> 00:25:25,440

of justifies what you're going to do so

698

00:25:28,870 --> 00:25:27,200

like we've got all these existing

699

00:25:31,750 --> 00:25:28,880

observations that people have had and we

700

00:25:34,149 --> 00:25:31,760

have a few videos and things like that

701

00:25:37,430 --> 00:25:34,159

do you do you think there's a

702

00:25:39,430 --> 00:25:37,440

sufficient data set to justify what what

703

00:25:41,669 --> 00:25:39,440

you're doing in terms of the the

704

00:25:43,590 --> 00:25:41,679

telescope installations and what would

705

00:25:45,669 --> 00:25:43,600

you say is the justification for this

706

00:25:48,070 --> 00:25:45,679

particular experiment that you are doing

707

00:25:51,669 --> 00:25:48,080

well interesting the justification for

708

00:25:57,669 --> 00:25:55,350

od and i that the uap report to congress

709

00:26:00,310 --> 00:25:57,679

had a classified component i didn't see

710

00:26:02,630 --> 00:26:00,320

any of that data but it was presented to

711

00:26:05,510 --> 00:26:02,640

the white house it was presented to many

712

00:26:08,149 --> 00:26:05,520

officials in past administrations and

713

00:26:10,870 --> 00:26:08,159

when cia directors brennan and woolsey

714

00:26:12,789 --> 00:26:10,880

and when former president barack obama

715

00:26:14,950 --> 00:26:12,799

say that it's a serious matter that they

716

00:26:17,430 --> 00:26:14,960

saw the classified component

717

00:26:19,350 --> 00:26:17,440

and it looks convincing what i infer

718

00:26:21,590 --> 00:26:19,360

from that and these are serious people

719

00:26:23,350 --> 00:26:21,600

you see that i trust what i'm far from

720

00:26:25,350 --> 00:26:23,360

that is that there is a mountain of data

721

00:26:28,230 --> 00:26:25,360

that we don't have access to

722

00:26:31,190 --> 00:26:28,240

where the images are much crispier

723

00:26:33,510 --> 00:26:31,200

than we see okay the public sees

724

00:26:35,990 --> 00:26:33,520

now i haven't seen that data but that's

725

00:26:38,470 --> 00:26:36,000

what i infer because you know if these

726
00:26:40,549 --> 00:26:38,480
people saw the same fuzzy images that

727
00:26:42,870 --> 00:26:40,559
the two of us saw

728
00:26:44,710 --> 00:26:42,880
then forget about it it's not convincing

729
00:26:46,950 --> 00:26:44,720
but the fact the way that they spoke

730
00:26:48,789 --> 00:26:46,960
about the subject and include that

731
00:26:50,789 --> 00:26:48,799
includes also bill nelson you know the

732
00:26:52,710 --> 00:26:50,799
director of the the

733
00:26:55,029 --> 00:26:52,720
nasa administrator

734
00:26:57,110 --> 00:26:55,039
uh who expressed

735
00:27:00,470 --> 00:26:57,120
his wish that scientists would look into

736
00:27:02,470 --> 00:27:00,480
the data and you know i i say these

737
00:27:04,630 --> 00:27:02,480
people saw the classified component at

738
00:27:06,710 --> 00:27:04,640

least part of it and they talk about it

739

00:27:09,190 --> 00:27:06,720

seriously so that's sufficient that's a

740

00:27:10,310 --> 00:27:09,200

sufficient threshold for me to say

741

00:27:11,350 --> 00:27:10,320

scientists

742

00:27:13,430 --> 00:27:11,360

should

743

00:27:16,470 --> 00:27:13,440

collect new data

744

00:27:19,029 --> 00:27:16,480

so that it's not classified or open data

745

00:27:21,190 --> 00:27:19,039

and analyze it in a transparent way so

746

00:27:22,310 --> 00:27:21,200

that we get a clear understanding of

747

00:27:28,070 --> 00:27:22,320

this

748

00:27:30,789 --> 00:27:28,080

move on after that if it happens to be a

749

00:27:32,389 --> 00:27:30,799

natural phenomena i have not no quarrel

750

00:27:34,870 --> 00:27:32,399

with it you know whatever the data

751

00:27:37,750 --> 00:27:34,880

reveals we will uh

752

00:27:39,350 --> 00:27:37,760

show to the public and uh now one thing

753

00:27:41,029 --> 00:27:39,360

to keep in mind is

754

00:27:42,549 --> 00:27:41,039

uh it's a mixed bag it's probably a

755

00:27:44,630 --> 00:27:42,559

mixed bag right

756

00:27:46,710 --> 00:27:44,640

i mean there were lots of

757

00:27:49,110 --> 00:27:46,720

reports in the past most of them

758

00:27:50,070 --> 00:27:49,120

probably have some mundane explanation

759

00:27:53,510 --> 00:27:50,080

as you

760

00:27:55,430 --> 00:27:53,520

uh argued on many occasions uh and that

761

00:27:58,310 --> 00:27:55,440

would be completely fine it's the point

762

00:28:00,950 --> 00:27:58,320

is we need to show that all of them at

763

00:28:03,350 --> 00:28:00,960

least those that we can detect uh have

764

00:28:05,269 --> 00:28:03,360

mundane explanations and and and and

765

00:28:08,070 --> 00:28:05,279

some of them may be exotic explanations

766

00:28:10,470 --> 00:28:08,080

you know like rare phenomena in air in

767

00:28:14,149 --> 00:28:10,480

the atmosphere that will be fine with me

768

00:28:16,710 --> 00:28:14,159

but even if there is one object that

769

00:28:17,830 --> 00:28:16,720

is of extraterrestrial origin you know

770

00:28:20,789 --> 00:28:17,840

that would be

771

00:28:22,870 --> 00:28:20,799

major news right so uh what we want is

772

00:28:23,750 --> 00:28:22,880

to have a high enough quality of data on

773

00:28:27,269 --> 00:28:23,760

one

774

00:28:31,269 --> 00:28:27,279

uh that looks really unusual and i don't

775

00:28:34,310 --> 00:28:31,279

care if 99.9 of all the objects we find

776

00:28:36,389 --> 00:28:34,320

uh appear to be made by humans or in the

777

00:28:38,230 --> 00:28:36,399

atmosphere and so forth if we do find

778

00:28:41,750 --> 00:28:38,240

one that seems to be

779

00:28:43,669 --> 00:28:41,760

uh clearly not human made and clearly

780

00:28:45,350 --> 00:28:43,679

not natural

781

00:28:46,870 --> 00:28:45,360

within the atmosphere of the earth that

782

00:28:49,110 --> 00:28:46,880

would be of a

783

00:28:50,950 --> 00:28:49,120

very interesting

784

00:28:54,310 --> 00:28:50,960

that that would motivate me to continue

785

00:28:56,149 --> 00:28:54,320

the search you see yeah yes but the the

786

00:28:59,110 --> 00:28:56,159

this kind of data set essentially the

787

00:29:01,190 --> 00:28:59,120

uap report that you're using as this uh

788

00:29:03,350 --> 00:29:01,200

an impetus for the project is it's kind

789

00:29:05,029 --> 00:29:03,360

of vague and it doesn't really give any

790

00:29:06,950 --> 00:29:05,039

specifics there's no specific cases

791

00:29:08,870 --> 00:29:06,960

listed there's no locations and no no

792

00:29:10,789 --> 00:29:08,880

numbers or anything like that

793

00:29:13,110 --> 00:29:10,799

uh so it really it's just giving you a

794

00:29:15,190 --> 00:29:13,120

kind of like a very broad thing we think

795

00:29:17,110 --> 00:29:15,200

there are we we see things in the air

796

00:29:18,710 --> 00:29:17,120

that yeah i agree with you i agree with

797

00:29:21,269 --> 00:29:18,720

you and and and the

798

00:29:24,310 --> 00:29:21,279

reason for that is presumably that the

799

00:29:27,590 --> 00:29:24,320

more interesting data is classified and

800

00:29:29,350 --> 00:29:27,600

then you ask yourself why would

801
00:29:31,830 --> 00:29:29,360
uh

802
00:29:33,830 --> 00:29:31,840
the intelligence agencies admit that

803
00:29:35,750 --> 00:29:33,840
they're not doing their job because if

804
00:29:37,029 --> 00:29:35,760
you if you just think about this report

805
00:29:38,470 --> 00:29:37,039
they're saying

806
00:29:41,029 --> 00:29:38,480
you know we are getting paid to do

807
00:29:43,190 --> 00:29:41,039
something and we are not doing it they

808
00:29:45,269 --> 00:29:43,200
are telling congress you know we are not

809
00:29:47,430 --> 00:29:45,279
doing our job that's an unusual

810
00:29:48,710 --> 00:29:47,440
admission right that there are objects

811
00:29:51,029 --> 00:29:48,720
in the sky

812
00:29:53,350 --> 00:29:51,039
that they cannot figure out oh it's the

813
00:29:54,950 --> 00:29:53,360

limits of their uh their abilities i

814

00:29:56,389 --> 00:29:54,960

wouldn't say it's not doing their job is

815

00:29:59,350 --> 00:29:56,399

they they admit there are things that

816

00:30:01,269 --> 00:29:59,360

their current capabilities can't uh

817

00:30:03,510 --> 00:30:01,279

contact that's their job right they in

818

00:30:05,590 --> 00:30:03,520

terms of national security their job is

819

00:30:07,510 --> 00:30:05,600

to identify you're also

820

00:30:09,750 --> 00:30:07,520

you're also saying that you think that

821

00:30:11,750 --> 00:30:09,760

they have crisp photographs uh do you

822

00:30:13,110 --> 00:30:11,760

think they essentially have what you are

823

00:30:15,029 --> 00:30:13,120

trying to get

824

00:30:16,870 --> 00:30:15,039

no so i would say that they would not

825

00:30:19,590 --> 00:30:16,880

come out with an admission that they

826

00:30:21,190 --> 00:30:19,600

cannot figure out the nature of these

827

00:30:22,950 --> 00:30:21,200

objects unless

828

00:30:25,190 --> 00:30:22,960

the much better data that they have in

829

00:30:26,549 --> 00:30:25,200

their possession which is not released

830

00:30:27,990 --> 00:30:26,559

to the public

831

00:30:29,510 --> 00:30:28,000

indicated

832

00:30:31,669 --> 00:30:29,520

that they should make such a statement

833

00:30:33,909 --> 00:30:31,679

now i don't know how good the quality of

834

00:30:35,510 --> 00:30:33,919

that data is because i haven't seen it

835

00:30:36,630 --> 00:30:35,520

and i'm not interested in seeing it i'm

836

00:30:39,750 --> 00:30:36,640

just saying

837

00:30:41,350 --> 00:30:39,760

given that the the most conservative

838

00:30:43,990 --> 00:30:41,360

organization

839

00:30:46,230 --> 00:30:44,000

uh that we have which is the government

840

00:30:47,669 --> 00:30:46,240

comes out with a statement like that

841

00:30:51,750 --> 00:30:47,679

given that

842

00:30:54,310 --> 00:30:51,760

you know academia which is a blue sky

843

00:30:56,549 --> 00:30:54,320

organization right it's supposed to be

844

00:30:58,230 --> 00:30:56,559

entertaining all possibilities open be

845

00:30:59,669 --> 00:30:58,240

open-minded

846

00:31:01,110 --> 00:30:59,679

given that the most conservative

847

00:31:03,350 --> 00:31:01,120

organization tells you there is

848

00:31:05,430 --> 00:31:03,360

something we don't understand academia

849

00:31:07,990 --> 00:31:05,440

should respond and say okay we'll figure

850

00:31:09,990 --> 00:31:08,000

it out for you here we are to serve the

851

00:31:11,750 --> 00:31:10,000

nation trying to figure out something

852

00:31:13,830 --> 00:31:11,760

that the government doesn't figure out

853

00:31:16,070 --> 00:31:13,840

and to me it's an interesting puzzle you

854

00:31:18,070 --> 00:31:16,080

know you you might on weekends solve a

855

00:31:20,310 --> 00:31:18,080

crossword puzzles you know and i

856

00:31:22,389 --> 00:31:20,320

wouldn't have i would have nothing

857

00:31:24,230 --> 00:31:22,399

against that so in much the same way

858

00:31:26,710 --> 00:31:24,240

there is a puzzle here there is a

859

00:31:30,230 --> 00:31:26,720

challenge that the government poses

860

00:31:32,070 --> 00:31:30,240

and me you know i as a scientist i'm

861

00:31:34,070 --> 00:31:32,080

intrigued by it and i want to resolve it

862

00:31:35,590 --> 00:31:34,080

and i'm not using funds that were

863

00:31:37,590 --> 00:31:35,600

otherwise used for something else i'm

864

00:31:39,750 --> 00:31:37,600

just saying let's figure it out it's

865

00:31:43,990 --> 00:31:39,760

it's fun you know science is fun and

866

00:31:45,990 --> 00:31:44,000

science is exciting so why damp uh

867

00:31:47,430 --> 00:31:46,000

any investigation into the origin of a

868

00:31:48,950 --> 00:31:47,440

phenomena the government admits it

869

00:31:51,110 --> 00:31:48,960

doesn't understand

870

00:31:52,310 --> 00:31:51,120

yeah yeah and i like the idea of solving

871

00:31:54,630 --> 00:31:52,320

puzzles and that's kind of what i do

872

00:31:56,630 --> 00:31:54,640

when i look at a ufo video i am trying

873

00:31:58,789 --> 00:31:56,640

to just basically figure out what

874

00:32:00,310 --> 00:31:58,799

actually is is going on

875

00:32:02,070 --> 00:32:00,320

um

876

00:32:04,310 --> 00:32:02,080

so the the technology that you're going

877

00:32:07,110 --> 00:32:04,320

to use is you know telescopes and radar

878

00:32:09,750 --> 00:32:07,120

and things like that and for me

879

00:32:11,830 --> 00:32:09,760

uh i i obviously i would like to get uh

880

00:32:13,269 --> 00:32:11,840

photographs a real quick question like

881

00:32:15,509 --> 00:32:13,279

are you going to have well with these

882

00:32:17,110 --> 00:32:15,519

telescopes just be taking photographs or

883

00:32:18,630 --> 00:32:17,120

are they i don't know i mean it's true

884

00:32:20,870 --> 00:32:18,640

it's a stream of photographs so it's a

885

00:32:23,590 --> 00:32:20,880

video basically video of the sky now the

886

00:32:25,029 --> 00:32:23,600

frame rate is to be decided we want the

887

00:32:27,990 --> 00:32:25,039

heiner frame rate so that we can

888

00:32:29,590 --> 00:32:28,000

reconstruct the trajectory of an object

889

00:32:30,710 --> 00:32:29,600

you know so that we can tell if it's a

890

00:32:34,149 --> 00:32:30,720

bird

891

00:32:36,230 --> 00:32:34,159

a drone or a plane or whatever um

892

00:32:38,630 --> 00:32:36,240

so we want to be able to tell what the

893

00:32:40,950 --> 00:32:38,640

object is doing in real time and get an

894

00:32:42,870 --> 00:32:40,960

image of it if possible and then get the

895

00:32:45,430 --> 00:32:42,880

its infrared signature its radio

896

00:32:47,669 --> 00:32:45,440

signature and possibly some

897

00:32:49,590 --> 00:32:47,679

sense of of its spectrum if we have

898

00:32:52,149 --> 00:32:49,600

enough photons if we have enough light

899

00:32:53,830 --> 00:32:52,159

collected so how is the installation

900

00:32:55,909 --> 00:32:53,840

know where to point the telescope how is

901
00:32:57,909 --> 00:32:55,919
it going to lock on to an object right

902
00:32:59,830 --> 00:32:57,919
so we are still discussing it within the

903
00:33:02,070 --> 00:32:59,840
collaboration and you know we just

904
00:33:04,950 --> 00:33:02,080
started the collaboration a few weeks

905
00:33:05,909 --> 00:33:04,960
ago and we have a very lively discussion

906
00:33:08,149 --> 00:33:05,919
on the

907
00:33:10,789 --> 00:33:08,159
optimal instruments to be used and how

908
00:33:13,830 --> 00:33:10,799
to put them together uh but the idea

909
00:33:17,350 --> 00:33:13,840
would be to have a telescope system that

910
00:33:19,350 --> 00:33:17,360
monitors as bigger as most of the sky

911
00:33:20,470 --> 00:33:19,360
let's put it above the site where it's

912
00:33:22,630 --> 00:33:20,480
located

913
00:33:26,470 --> 00:33:22,640

uh and

914

00:33:28,070 --> 00:33:26,480

doing it uh continuously and then

915

00:33:31,750 --> 00:33:28,080

the light is

916

00:33:33,590 --> 00:33:31,760

focused to a camera that takes a video

917

00:33:35,750 --> 00:33:33,600

of the sky you know with some frame rate

918

00:33:37,430 --> 00:33:35,760

and it's a huge amount of data you have

919

00:33:40,230 --> 00:33:37,440

to understand and

920

00:33:42,310 --> 00:33:40,240

we cannot store that so there will be a

921

00:33:44,630 --> 00:33:42,320

a very crucial component is of course

922

00:33:46,310 --> 00:33:44,640

the software that will be used to filter

923

00:33:48,549 --> 00:33:46,320

out most of the time you don't see

924

00:33:50,389 --> 00:33:48,559

anything interesting and but every now

925

00:33:53,110 --> 00:33:50,399

and then there will be an object uh

926
00:33:55,110 --> 00:33:53,120
moving and that would be a target of

927
00:33:57,830 --> 00:33:55,120
interest and of course

928
00:33:59,750 --> 00:33:57,840
once we train the system if it's an ai

929
00:34:02,549 --> 00:33:59,760
system or machine learning whatever

930
00:34:04,470 --> 00:34:02,559
computer algorithm uh there will be

931
00:34:05,990 --> 00:34:04,480
objects that keep repeating like birds

932
00:34:09,030 --> 00:34:06,000
you know they behave in some special way

933
00:34:11,829 --> 00:34:09,040
their image has a special characteristic

934
00:34:13,669 --> 00:34:11,839
and uh we'll just reject things that

935
00:34:16,310 --> 00:34:13,679
look like a bird and

936
00:34:19,109 --> 00:34:16,320
we are not interested in in drones or or

937
00:34:21,669 --> 00:34:19,119
in airplanes uh either you know and uh

938
00:34:24,310 --> 00:34:21,679

so it will take time to train the system

939

00:34:26,230 --> 00:34:24,320

so that we reject those things and we

940

00:34:28,710 --> 00:34:26,240

will look at everything else that is

941

00:34:30,869 --> 00:34:28,720

moving and doing things that are unusual

942

00:34:33,750 --> 00:34:30,879

and try to figure it out and of course

943

00:34:36,149 --> 00:34:33,760

as you said the key is to cover a large

944

00:34:38,310 --> 00:34:36,159

enough chunk of the sky around the earth

945

00:34:39,349 --> 00:34:38,320

so that we have an event rate that

946

00:34:42,710 --> 00:34:39,359

matches

947

00:34:44,629 --> 00:34:42,720

the rate that was reported by pilots now

948

00:34:47,349 --> 00:34:44,639

i should say we might have a much larger

949

00:34:49,750 --> 00:34:47,359

event rate because we are using

950

00:34:52,389 --> 00:34:49,760

instruments that are far better than the

951
00:34:55,190 --> 00:34:52,399
eyes of pilots that are far better than

952
00:34:58,710 --> 00:34:55,200
the instruments on the in the cockpit of

953
00:35:01,349 --> 00:34:58,720
a pilot or in the navy or where wherever

954
00:35:03,030 --> 00:35:01,359
these uh reports came from

955
00:35:05,750 --> 00:35:03,040
and as a result we'll see smaller

956
00:35:07,430 --> 00:35:05,760
objects at greater distances and that

957
00:35:10,390 --> 00:35:07,440
would increase potentially the event

958
00:35:13,510 --> 00:35:10,400
rate but we hope to get much better

959
00:35:15,829 --> 00:35:13,520
quality data and therefore a much better

960
00:35:17,430 --> 00:35:15,839
assessment that you know will imply what

961
00:35:19,430 --> 00:35:17,440
these objects are

962
00:35:22,310 --> 00:35:19,440
so it sounds like from the uh the

963
00:35:24,470 --> 00:35:22,320

filtering aspect of it uh you wouldn't

964

00:35:26,150 --> 00:35:24,480

want to filter out say an aircraft just

965

00:35:27,589 --> 00:35:26,160

on the fact that it's a shiny metal

966

00:35:29,349 --> 00:35:27,599

cylinder in the sky because that could

967

00:35:31,670 --> 00:35:29,359

be an alien spaceship of some sort so

968

00:35:33,670 --> 00:35:31,680

you would be doing the filtering there

969

00:35:36,150 --> 00:35:33,680

uh perhaps more on the motion of the

970

00:35:38,470 --> 00:35:36,160

object would you be looking for unusual

971

00:35:40,710 --> 00:35:38,480

motions no i mean if if you get a high

972

00:35:43,109 --> 00:35:40,720

enough resolution of an airplane it will

973

00:35:45,510 --> 00:35:43,119

be clear okay so you'd be doing just a

974

00:35:47,190 --> 00:35:45,520

visual visual elimination i mean we

975

00:35:49,910 --> 00:35:47,200

pretty much know which airplanes are

976
00:35:51,829 --> 00:35:49,920
being used by humans right so uh yeah

977
00:35:54,310 --> 00:35:51,839
you can build the most of them out just

978
00:35:55,750 --> 00:35:54,320
by the adsb data and you can just uh you

979
00:35:58,790 --> 00:35:55,760
know see what's up that's

980
00:36:00,870 --> 00:35:58,800
part of it yeah we you know the software

981
00:36:02,310 --> 00:36:00,880
as you are alluding to is is extremely

982
00:36:04,390 --> 00:36:02,320
important because you don't want to

983
00:36:07,589 --> 00:36:04,400
throw the baby with the bathtub i mean

984
00:36:09,829 --> 00:36:07,599
if you have if you are too selective you

985
00:36:14,390 --> 00:36:09,839
will throw the baby with a bathtub water

986
00:36:15,910 --> 00:36:14,400
so to speak yeah yeah so yeah so

987
00:36:17,670 --> 00:36:15,920
the the filtering that you're going to

988
00:36:20,950 --> 00:36:17,680

be doing are you saying it will be

989

00:36:22,950 --> 00:36:20,960

mostly a visual filter

990

00:36:24,069 --> 00:36:22,960

or are you looking for specific movement

991

00:36:26,550 --> 00:36:24,079

patterns

992

00:36:29,109 --> 00:36:26,560

well it will be move well it will be the

993

00:36:30,710 --> 00:36:29,119

image the movement and of course if we

994

00:36:31,510 --> 00:36:30,720

have multiple detectors you know if we

995

00:36:33,270 --> 00:36:31,520

have

996

00:36:35,430 --> 00:36:33,280

uh different wavelengths that we are

997

00:36:37,349 --> 00:36:35,440

looking at um

998

00:36:39,589 --> 00:36:37,359

the signature in those different

999

00:36:41,750 --> 00:36:39,599

wavelengths will help us and if we have

1000

00:36:44,069 --> 00:36:41,760

multiple telescopes of course it helps a

1001
00:36:46,230 --> 00:36:44,079
lot because you can reconstruct the

1002
00:36:48,150 --> 00:36:46,240
motion in three dimensions you can

1003
00:36:50,390 --> 00:36:48,160
have redundancy that's very important

1004
00:36:53,190 --> 00:36:50,400
because if one instrument just happens

1005
00:36:54,390 --> 00:36:53,200
to give you for a false alarm because

1006
00:36:57,270 --> 00:36:54,400
something might you know there is a

1007
00:37:00,550 --> 00:36:57,280
malfunction in that instrument then you

1008
00:37:02,310 --> 00:37:00,560
will have others to to check it and then

1009
00:37:03,190 --> 00:37:02,320
so that's important to have redundancy

1010
00:37:05,270 --> 00:37:03,200
yeah

1011
00:37:06,870 --> 00:37:05,280
so you talk about recreating the the

1012
00:37:08,310 --> 00:37:06,880
motion in three dimensions which i think

1013
00:37:10,310 --> 00:37:08,320

is very important because if you're

1014

00:37:13,270 --> 00:37:10,320

going to distinguish things based on the

1015

00:37:14,310 --> 00:37:13,280

path and the motion you know having a 3d

1016

00:37:16,230 --> 00:37:14,320

uh

1017

00:37:17,750 --> 00:37:16,240

a 3d recreation of that is very

1018

00:37:20,950 --> 00:37:17,760

important but can you actually do that

1019

00:37:22,630 --> 00:37:20,960

with two telescopes in one location oh

1020

00:37:24,470 --> 00:37:22,640

yeah because then i mean you can

1021

00:37:26,550 --> 00:37:24,480

calculate the angular resolution you

1022

00:37:29,109 --> 00:37:26,560

need to see a parallax and

1023

00:37:32,069 --> 00:37:29,119

we you know it's it's relatively easy to

1024

00:37:33,829 --> 00:37:32,079

put telescopes at a reasonable even at a

1025

00:37:35,510 --> 00:37:33,839

few meters separation they can get a

1026

00:37:37,750 --> 00:37:35,520

very significant parallax relative to

1027

00:37:39,829 --> 00:37:37,760

their angular resolution and the other

1028

00:37:41,990 --> 00:37:39,839

thing i should mention is if if you

1029

00:37:44,550 --> 00:37:42,000

assume that the standard laws of physics

1030

00:37:46,870 --> 00:37:44,560

apply right and you see an object moving

1031

00:37:49,190 --> 00:37:46,880

faster than the speed of sound then it

1032

00:37:52,230 --> 00:37:49,200

should definitely make sound it should

1033

00:37:54,310 --> 00:37:52,240

make a sonic boom or something uh and

1034

00:37:57,430 --> 00:37:54,320

then if it goes through water it should

1035

00:37:58,310 --> 00:37:57,440

make a splash right so uh the point is

1036

00:38:00,230 --> 00:37:58,320

these

1037

00:38:02,230 --> 00:38:00,240

i mean i'm very curious to see that

1038

00:38:04,230 --> 00:38:02,240

these effects are indeed noticed because

1039

00:38:05,750 --> 00:38:04,240

that would imply the object is real and

1040

00:38:07,910 --> 00:38:05,760

you could constrain the parameters of

1041

00:38:10,550 --> 00:38:07,920

the object so we will have also audio

1042

00:38:11,829 --> 00:38:10,560

sensors trying to figure out you know

1043

00:38:13,670 --> 00:38:11,839

indeed

1044

00:38:15,430 --> 00:38:13,680

whether if we see an object moving

1045

00:38:17,750 --> 00:38:15,440

faster than sound it makes the noise

1046

00:38:19,990 --> 00:38:17,760

that you expect from a sonic boom

1047

00:38:21,349 --> 00:38:20,000

and all of these things should be put

1048

00:38:23,270 --> 00:38:21,359

together i mean

1049

00:38:25,510 --> 00:38:23,280

according to the what we know about

1050

00:38:27,829 --> 00:38:25,520

physics it makes no sense to imagine an

1051
00:38:29,829 --> 00:38:27,839
object with some cross-sectional area

1052
00:38:30,790 --> 00:38:29,839
moving through air and not making any

1053
00:38:33,349 --> 00:38:30,800
sound

1054
00:38:34,870 --> 00:38:33,359
sure yeah yeah uh

1055
00:38:37,190 --> 00:38:34,880
now just digging a little bit into this

1056
00:38:40,230 --> 00:38:37,200
this whole uh issue of locating things

1057
00:38:43,109 --> 00:38:40,240
with with parallax uh it seems like you

1058
00:38:45,670 --> 00:38:43,119
know if you've got a a few 10 meter

1059
00:38:48,310 --> 00:38:45,680
separation on two telescopes and you've

1060
00:38:49,910 --> 00:38:48,320
got something to say 10 kilometers away

1061
00:38:51,750 --> 00:38:49,920
uh the amount of

1062
00:38:53,750 --> 00:38:51,760
uh accuracy you would need would be

1063
00:38:56,390 --> 00:38:53,760

quite significant now the one big

1064

00:38:57,910 --> 00:38:56,400

telescope you mentioned the the 500 000

1065

00:38:59,190 --> 00:38:57,920

one could certainly do it because it's

1066

00:39:01,270 --> 00:38:59,200

like you know super accurate and

1067

00:39:03,270 --> 00:39:01,280

calibrated and fast moving but with the

1068

00:39:05,030 --> 00:39:03,280

smaller telescopes would you be able to

1069

00:39:06,950 --> 00:39:05,040

actually do that do they have sufficient

1070

00:39:09,510 --> 00:39:06,960

resolution in the you know the go-to

1071

00:39:11,349 --> 00:39:09,520

mounts that they have uh to actually do

1072

00:39:13,510 --> 00:39:11,359

that within whatever is required like

1073

00:39:15,190 --> 00:39:13,520

one arc second or whatever yeah it

1074

00:39:17,829 --> 00:39:15,200

depends on the size of the telescope as

1075

00:39:20,150 --> 00:39:17,839

you say and indeed the 10 meters divided

1076

00:39:21,589 --> 00:39:20,160
by 10 kilometers is roughly 2 arc

1077

00:39:22,470 --> 00:39:21,599
seconds

1078

00:39:25,349 --> 00:39:22,480
and

1079

00:39:26,550 --> 00:39:25,359
you know uh so for that you need the a

1080

00:39:28,950 --> 00:39:26,560
bigger

1081

00:39:31,190 --> 00:39:28,960
aperture you need the you know

1082

00:39:33,510 --> 00:39:31,200
something of the order of um at least

1083

00:39:35,510 --> 00:39:33,520
that 10 centimeters you know that gives

1084

00:39:37,349 --> 00:39:35,520
you if you take a wavelength of light

1085

00:39:38,870 --> 00:39:37,359
that is half a micron

1086

00:39:40,390 --> 00:39:38,880
you know that then

1087

00:39:42,310 --> 00:39:40,400
something that is of the order of 10

1088

00:39:46,069 --> 00:39:42,320

centimeters or more it can give you the

1089

00:39:49,430 --> 00:39:48,069

obviously something that

1090

00:39:50,790 --> 00:39:49,440

should be just simple engineering i

1091

00:39:52,630 --> 00:39:50,800

guess you know figuring out you know

1092

00:39:54,870 --> 00:39:52,640

what what the actual resolution of such

1093

00:39:57,349 --> 00:39:54,880

yeah we went through the numbers and it

1094

00:39:59,589 --> 00:39:57,359

works out you know we have exceptional

1095

00:40:02,870 --> 00:39:59,599

uh instrumentalists like

1096

00:40:04,309 --> 00:40:02,880

nick lowe and the gaspar baccos which

1097

00:40:07,190 --> 00:40:04,319

who are

1098

00:40:08,950 --> 00:40:07,200

leading our um telescope design and

1099

00:40:11,270 --> 00:40:08,960

you know these are really the top people

1100

00:40:14,230 --> 00:40:11,280

in the field of astronomy doing these

1101

00:40:16,470 --> 00:40:14,240

things and uh i was very happy to be

1102

00:40:17,910 --> 00:40:16,480

able to recruit them to the team

1103

00:40:19,510 --> 00:40:17,920

so let's talk a little bit about like

1104

00:40:21,910 --> 00:40:19,520

some different approaches that might

1105

00:40:25,270 --> 00:40:21,920

kind of mesh with this uh like suppose

1106

00:40:26,790 --> 00:40:25,280

you're using uh full sky

1107

00:40:29,829 --> 00:40:26,800

cameras that take a picture of the

1108

00:40:31,589 --> 00:40:29,839

entire sky you mean like 50

1109

00:40:34,230 --> 00:40:31,599

yeah essentially yes

1110

00:40:35,510 --> 00:40:34,240

or multiple cameras in different

1111

00:40:37,349 --> 00:40:35,520

segments of the sky so you're just

1112

00:40:39,670 --> 00:40:37,359

getting full coverage of the sky and you

1113

00:40:41,829 --> 00:40:39,680

can you can see things in the sky

1114

00:40:44,870 --> 00:40:41,839

uh could you use

1115

00:40:47,109 --> 00:40:44,880

that with multiple from each station so

1116

00:40:50,230 --> 00:40:47,119

you could triangulate the position

1117

00:40:52,069 --> 00:40:50,240

yeah we are discussing that except then

1118

00:40:52,870 --> 00:40:52,079

again it's a question of cost and how

1119

00:40:55,510 --> 00:40:52,880

many

1120

00:40:57,349 --> 00:40:55,520

can you use and yeah but definitely

1121

00:40:59,750 --> 00:40:57,359

that's something we we actually have

1122

00:41:01,829 --> 00:40:59,760

been discussing last week uh so what

1123

00:41:02,950 --> 00:41:01,839

you're saying makes a lot of sense and

1124

00:41:05,430 --> 00:41:02,960

um

1125

00:41:07,589 --> 00:41:05,440

okay so the issue is really how big of a

1126

00:41:09,349 --> 00:41:07,599

telescope

1127

00:41:11,990 --> 00:41:09,359

do we need

1128

00:41:12,710 --> 00:41:12,000

or if you have multiple telescopes you

1129

00:41:15,430 --> 00:41:12,720

know

1130

00:41:17,270 --> 00:41:15,440

uh how to optimize the number versus

1131

00:41:19,030 --> 00:41:17,280

size and

1132

00:41:20,390 --> 00:41:19,040

given the cost and

1133

00:41:21,670 --> 00:41:20,400

i should say that

1134

00:41:23,829 --> 00:41:21,680

um

1135

00:41:26,230 --> 00:41:23,839

you know the distance to which you can

1136

00:41:28,309 --> 00:41:26,240

resolve objects depends on the size of

1137

00:41:30,390 --> 00:41:28,319

your aperture right so

1138

00:41:33,109 --> 00:41:30,400

and now you have to assume whether the

1139

00:41:36,390 --> 00:41:33,119

number of objects scales as distance

1140

00:41:38,230 --> 00:41:36,400

cubed or as distance squared because

1141

00:41:40,790 --> 00:41:38,240

if if the objects are just hovering

1142

00:41:42,390 --> 00:41:40,800

above the earth surface then it's

1143

00:41:44,230 --> 00:41:42,400

two-dimensional distribution when you

1144

00:41:46,870 --> 00:41:44,240

look towards the horizon the number of

1145

00:41:48,870 --> 00:41:46,880

objects that you see as as a function of

1146

00:41:51,670 --> 00:41:48,880

distance would scale like distance the

1147

00:41:53,750 --> 00:41:51,680

maximum distance squared but if they are

1148

00:41:55,670 --> 00:41:53,760

distributed at all elevations in three

1149

00:41:57,589 --> 00:41:55,680

dimensions then it will go like distance

1150

00:42:00,150 --> 00:41:57,599

cubed and yeah and of course then you

1151

00:42:01,910 --> 00:42:00,160

have to decide is it beneficial to have

1152

00:42:04,150 --> 00:42:01,920

one big telescope because then you can

1153

00:42:05,430 --> 00:42:04,160

see much farther out

1154

00:42:07,990 --> 00:42:05,440

and you gain

1155

00:42:09,670 --> 00:42:08,000

by the size of the aperture cubed

1156

00:42:10,950 --> 00:42:09,680

basically in terms of the volume that

1157

00:42:13,109 --> 00:42:10,960

you're covering

1158

00:42:15,109 --> 00:42:13,119

versus

1159

00:42:16,390 --> 00:42:15,119

a situation where you have a lot of

1160

00:42:18,790 --> 00:42:16,400

small telescopes

1161

00:42:21,510 --> 00:42:18,800

each of which is cheaper but then each

1162

00:42:23,190 --> 00:42:21,520

of them is able to resolve only a

1163

00:42:24,069 --> 00:42:23,200

smaller volume and

1164

00:42:25,430 --> 00:42:24,079

um

1165

00:42:26,870 --> 00:42:25,440

you know so we are going through these

1166

00:42:29,190 --> 00:42:26,880

calculations

1167

00:42:31,349 --> 00:42:29,200

yeah well most of the reports that we

1168

00:42:32,950 --> 00:42:31,359

get are things that happen

1169

00:42:35,910 --> 00:42:32,960

in the troposphere essentially like

1170

00:42:37,349 --> 00:42:35,920

below like say 28 30 000 feet well but

1171

00:42:38,950 --> 00:42:37,359

that may be just because we were

1172

00:42:41,030 --> 00:42:38,960

surveying those

1173

00:42:43,829 --> 00:42:41,040

regions with you know

1174

00:42:45,349 --> 00:42:43,839

airplanes uh yeah we don't really know

1175

00:42:47,589 --> 00:42:45,359

and and the other thing i should mention

1176
00:42:49,750 --> 00:42:47,599
there is another critical element which

1177
00:42:52,710 --> 00:42:49,760
is the distribution of objects as a

1178
00:42:54,309 --> 00:42:52,720
function of size you see um it may well

1179
00:42:56,390 --> 00:42:54,319
be that the reports

1180
00:42:58,630 --> 00:42:56,400
uh focused on

1181
00:43:01,910 --> 00:42:58,640
some size because that's the size that

1182
00:43:04,069 --> 00:43:01,920
was noticeable with either the pilot's

1183
00:43:07,430 --> 00:43:04,079
eyes or or instruments they were using

1184
00:43:09,829 --> 00:43:07,440
and and i'm really curious to know what

1185
00:43:11,750 --> 00:43:09,839
what is the size distribution because

1186
00:43:13,589 --> 00:43:11,760
you you can have many more objects that

1187
00:43:16,790 --> 00:43:13,599
are smaller in size that you can already

1188
00:43:19,910 --> 00:43:16,800

resolve with with big telescopes and um

1189

00:43:22,390 --> 00:43:19,920

so the number of uap that you find will

1190

00:43:25,270 --> 00:43:22,400

depend on the size distribution which is

1191

00:43:27,670 --> 00:43:25,280

on completely unknown and of course on

1192

00:43:30,390 --> 00:43:27,680

the instruments that you are using and

1193

00:43:33,190 --> 00:43:30,400

uh if i had an infinite budget if

1194

00:43:35,349 --> 00:43:33,200

unlimited budget i would use the the

1195

00:43:39,030 --> 00:43:35,359

biggest telescopes we can buy off the

1196

00:43:41,589 --> 00:43:39,040

shelf like one meter let's say or or so

1197

00:43:44,230 --> 00:43:41,599

and then just get as many as possible

1198

00:43:47,510 --> 00:43:44,240

thousands of them uh or more and

1199

00:43:48,630 --> 00:43:47,520

basically uh cover the sky and and just

1200

00:43:49,910 --> 00:43:48,640

monitor it

1201
00:43:55,349 --> 00:43:49,920
yeah

1202
00:43:56,390 --> 00:43:55,359
you can buy all these instruments off

1203
00:43:58,069 --> 00:43:56,400
the shelf

1204
00:44:00,950 --> 00:43:58,079
and it's just a matter of putting them

1205
00:44:03,349 --> 00:44:00,960
together for the the purpose and and i

1206
00:44:05,270 --> 00:44:03,359
should say some astronomers said oh we

1207
00:44:07,349 --> 00:44:05,280
we have telescopes around the globe you

1208
00:44:10,069 --> 00:44:07,359
know we have um

1209
00:44:11,670 --> 00:44:10,079
satellites looking down the point is all

1210
00:44:13,750 --> 00:44:11,680
of these instruments that are currently

1211
00:44:16,470 --> 00:44:13,760
being used are not doing the the job

1212
00:44:18,470 --> 00:44:16,480
that we want them to do because well so

1213
00:44:19,430 --> 00:44:18,480

one instrument that might be doing it is

1214

00:44:21,750 --> 00:44:19,440

um

1215

00:44:23,670 --> 00:44:21,760

you know the the space fence

1216

00:44:26,309 --> 00:44:23,680

which is essentially what the us uses

1217

00:44:27,510 --> 00:44:26,319

for tracking space debris and space junk

1218

00:44:29,750 --> 00:44:27,520

and you talked about things that are

1219

00:44:32,069 --> 00:44:29,760

very very small

1220

00:44:34,870 --> 00:44:32,079

and you know the space fence and there's

1221

00:44:37,750 --> 00:44:34,880

an older version of that as well use

1222

00:44:40,069 --> 00:44:37,760

this uh this multi-static radar

1223

00:44:43,750 --> 00:44:40,079

where essentially it's just it's listing

1224

00:44:44,710 --> 00:44:43,760

for reflections of uh radar pings of of

1225

00:44:45,829 --> 00:44:44,720

objects

1226

00:44:46,950 --> 00:44:45,839

yeah but

1227

00:44:48,790 --> 00:44:46,960

multiples

1228

00:44:51,270 --> 00:44:48,800

they cannot resolve it probably right

1229

00:44:53,349 --> 00:44:51,280

they cannot tell uh they cannot make an

1230

00:44:55,030 --> 00:44:53,359

image of the object they cannot take an

1231

00:44:56,630 --> 00:44:55,040

image but they can they can track it and

1232

00:44:58,630 --> 00:44:56,640

they can track objects that are as small

1233

00:45:00,790 --> 00:44:58,640

as i think 10 centimeters or best

1234

00:45:02,390 --> 00:45:00,800

basketball size i think so but the

1235

00:45:04,309 --> 00:45:02,400

problem with that it would be just like

1236

00:45:06,790 --> 00:45:04,319

those fuzzy images you know we will know

1237

00:45:08,630 --> 00:45:06,800

about an object moving in some so you're

1238

00:45:11,589 --> 00:45:08,640

right we will be able to

1239

00:45:13,510 --> 00:45:11,599

uh infer the trajectory right and yeah

1240

00:45:15,109 --> 00:45:13,520

and i think the trajectory the

1241

00:45:17,109 --> 00:45:15,119

interesting thing about a lot of these

1242

00:45:18,870 --> 00:45:17,119

these things is in fact the trajectory

1243

00:45:20,950 --> 00:45:18,880

and it's it's often not so much what it

1244

00:45:22,630 --> 00:45:20,960

looks like which is often you know just

1245

00:45:24,790 --> 00:45:22,640

just sometimes a sphere or something

1246

00:45:26,550 --> 00:45:24,800

like that but if it has an interesting

1247

00:45:28,950 --> 00:45:26,560

trajectory like it is actually hovering

1248

00:45:31,349 --> 00:45:28,960

in space for example or if it's moving

1249

00:45:33,190 --> 00:45:31,359

and changing directions in a certain way

1250

00:45:34,630 --> 00:45:33,200

this is something that has been reported

1251

00:45:36,950 --> 00:45:34,640

and it would seem like you know an

1252

00:45:37,990 --> 00:45:36,960

effort at gathering data on things that

1253

00:45:39,589 --> 00:45:38,000

do that

1254

00:45:41,990 --> 00:45:39,599

would be important but it would also

1255

00:45:44,230 --> 00:45:42,000

seem that if there were these things

1256

00:45:47,030 --> 00:45:44,240

flying around in the atmosphere

1257

00:45:49,270 --> 00:45:47,040

then uh the technology like this this

1258

00:45:51,589 --> 00:45:49,280

this space fence the uh the multi-static

1259

00:45:52,870 --> 00:45:51,599

radar installation of the us government

1260

00:45:54,790 --> 00:45:52,880

would do it but you know that's

1261

00:45:57,829 --> 00:45:54,800

government but that's what

1262

00:45:59,589 --> 00:45:57,839

i don't yeah i don't want that

1263

00:46:00,630 --> 00:45:59,599

yeah i know you've been approached by

1264

00:46:02,390 --> 00:46:00,640

people who've

1265

00:46:06,470 --> 00:46:02,400

talked to you about

1266

00:46:10,150 --> 00:46:06,480

peter davenport in back in 2004

1267

00:46:13,510 --> 00:46:10,160

proposed a ufo hunting method using

1268

00:46:15,270 --> 00:46:13,520

multi-static radar which uses fm radio

1269

00:46:17,750 --> 00:46:15,280

transmitters and then a bunch of

1270

00:46:22,790 --> 00:46:17,760

receiving stations to to track objects

1271

00:46:26,870 --> 00:46:24,550

you're right that radars are very

1272

00:46:28,710 --> 00:46:26,880

effective at doing that and i i will

1273

00:46:31,430 --> 00:46:28,720

mention an anecdote

1274

00:46:34,069 --> 00:46:31,440

that you may not not know about them so

1275

00:46:37,109 --> 00:46:34,079

uh after omo was discovered

1276

00:46:39,990 --> 00:46:37,119

um i noticed that there is

1277

00:46:41,829 --> 00:46:40,000

a table you know a a website where they

1278

00:46:43,910 --> 00:46:41,839

list

1279

00:46:47,270 --> 00:46:43,920

meteors from the past that were detected

1280

00:46:49,109 --> 00:46:47,280

by u.s government sensors and they list

1281

00:46:51,510 --> 00:46:49,119

the numbers about

1282

00:46:54,230 --> 00:46:51,520

those i mean the velocity components of

1283

00:46:57,109 --> 00:46:54,240

those meteors without giving error bars

1284

00:46:59,190 --> 00:46:57,119

and i asked my student amir siraj to

1285

00:47:02,069 --> 00:46:59,200

look into that table and see if there is

1286

00:47:04,630 --> 00:47:02,079

any object moving faster than you expect

1287

00:47:06,230 --> 00:47:04,640

for meteors originating from the solar

1288

00:47:08,069 --> 00:47:06,240

system so if there is any object that

1289

00:47:10,630 --> 00:47:08,079

could have originated from outside the

1290

00:47:13,510 --> 00:47:10,640

solar system in the meteor data that was

1291

00:47:15,270 --> 00:47:13,520

publicly available and he found in 2015

1292

00:47:16,470 --> 00:47:15,280

there was a meteor that moved much

1293

00:47:18,150 --> 00:47:16,480

faster

1294

00:47:20,549 --> 00:47:18,160

uh than

1295

00:47:23,030 --> 00:47:20,559

expected for an object bound to the

1296

00:47:24,710 --> 00:47:23,040

solar system and we wrote a paper about

1297

00:47:26,470 --> 00:47:24,720

it and said

1298

00:47:28,470 --> 00:47:26,480

here is an example for a meteor that

1299

00:47:31,750 --> 00:47:28,480

could have been interstellar in origin

1300

00:47:32,630 --> 00:47:31,760

and by the way it was reported in 2015

1301

00:47:34,630 --> 00:47:32,640

so it

1302

00:47:36,309 --> 00:47:34,640

predated

1303

00:47:38,390 --> 00:47:36,319

and we wrote a scientific paper

1304

00:47:40,069 --> 00:47:38,400

submitted it to the astrophysical

1305

00:47:42,790 --> 00:47:40,079

journal letter

1306

00:47:45,190 --> 00:47:42,800

letters and then it was refereed and

1307

00:47:46,790 --> 00:47:45,200

then the referee came back and said

1308

00:47:48,470 --> 00:47:46,800

we don't believe the government there is

1309

00:47:50,150 --> 00:47:48,480

no error bar on this measurement

1310

00:47:51,349 --> 00:47:50,160

therefore this paper should not be

1311

00:47:54,390 --> 00:47:51,359

published

1312

00:47:56,549 --> 00:47:54,400

and so i said okay um i know some people

1313

00:47:58,150 --> 00:47:56,559

you know i i shared the board on physics

1314

00:47:59,670 --> 00:47:58,160

and astronomy of the national academies

1315

00:48:01,270 --> 00:47:59,680

and there was a member of the committee

1316

00:48:03,670 --> 00:48:01,280

that uh

1317

00:48:06,069 --> 00:48:03,680

opera you know works in los alamos and

1318

00:48:08,710 --> 00:48:06,079

you know behind the defense so to speak

1319

00:48:11,430 --> 00:48:08,720

and i asked him whether it's possible to

1320

00:48:13,589 --> 00:48:11,440

get any uh limit upper limit on the

1321

00:48:15,510 --> 00:48:13,599

error budget so that we can quote it and

1322

00:48:17,270 --> 00:48:15,520

say you know the error is less than

1323

00:48:19,270 --> 00:48:17,280

something and therefore this object must

1324

00:48:21,829 --> 00:48:19,280

be from outside the solar system

1325

00:48:23,990 --> 00:48:21,839

so after many months he came back and

1326

00:48:26,230 --> 00:48:24,000

then provided the needed

1327

00:48:27,190 --> 00:48:26,240

statement so we put it in the scientific

1328

00:48:29,430 --> 00:48:27,200

paper

1329

00:48:31,829 --> 00:48:29,440

and then the referee said oh that's not

1330

00:48:33,910 --> 00:48:31,839

good enough how do i know that i should

1331

00:48:35,030 --> 00:48:33,920

trust this person that gave you that

1332

00:48:38,230 --> 00:48:35,040

information

1333

00:48:40,549 --> 00:48:38,240

we want to see the data before we accept

1334

00:48:42,710 --> 00:48:40,559

this paper for publication so

1335

00:48:45,990 --> 00:48:42,720

so then the editor came up with a

1336

00:48:49,430 --> 00:48:46,000

creative solution he said

1337

00:48:51,829 --> 00:48:49,440

let me find a referee that has

1338

00:48:53,750 --> 00:48:51,839

uh clearance to look at the actual data

1339

00:48:55,109 --> 00:48:53,760

that was obtained by the government and

1340

00:48:57,109 --> 00:48:55,119

tell us whether

1341

00:48:59,349 --> 00:48:57,119

the data is reliable

1342

00:49:01,910 --> 00:48:59,359

and he couldn't find such a referee so

1343

00:49:04,710 --> 00:49:01,920

the paper was left in limbo

1344

00:49:06,309 --> 00:49:04,720

and it's really unfortunate because

1345

00:49:08,390 --> 00:49:06,319

you know we're talking about a purely

1346

00:49:11,589 --> 00:49:08,400

scientific motivation for getting the

1347

00:49:13,349 --> 00:49:11,599

error budget on a measurement from 2015

1348

00:49:15,109 --> 00:49:13,359

and of course the government has an

1349

00:49:17,270 --> 00:49:15,119

issue because it will say something

1350

00:49:20,790 --> 00:49:17,280

about the sensors were that were used

1351
00:49:23,190 --> 00:49:20,800
that's why you know from this experience

1352
00:49:25,349 --> 00:49:23,200
uh i learned that it's best to collect

1353
00:49:27,430 --> 00:49:25,359
your own data i don't want to look at

1354
00:49:29,990 --> 00:49:27,440
any data because there are layers and

1355
00:49:31,990 --> 00:49:30,000
layers of bureaucracy that prevent us

1356
00:49:33,510 --> 00:49:32,000
from having access to government-owned

1357
00:49:35,030 --> 00:49:33,520
data

1358
00:49:37,589 --> 00:49:35,040
i guess that's the idea that with the

1359
00:49:39,670 --> 00:49:37,599
the multi-static radar thing is that you

1360
00:49:41,510 --> 00:49:39,680
wouldn't use any government data you

1361
00:49:44,150 --> 00:49:41,520
would be able to set up a relatively

1362
00:49:46,790 --> 00:49:44,160
cheap network of uh receiving stations

1363
00:49:49,030 --> 00:49:46,800

that could cover the entire country and

1364

00:49:50,390 --> 00:49:49,040

measure trajectories uh and i think that

1365

00:49:51,910 --> 00:49:50,400

that would be a great that would be

1366

00:49:54,630 --> 00:49:51,920

great except it couldn't give us an

1367

00:49:56,710 --> 00:49:54,640

image so for the trajectories you're

1368

00:49:59,270 --> 00:49:56,720

exactly right but again like i must say

1369

00:50:02,870 --> 00:49:59,280

like i think perhaps this uh the search

1370

00:50:05,109 --> 00:50:02,880

for an image is i feel perhaps a little

1371

00:50:06,950 --> 00:50:05,119

bit misplaced the focus on just

1372

00:50:08,309 --> 00:50:06,960

searching for an image because really

1373

00:50:09,750 --> 00:50:08,319

what you want to demonstrate is that

1374

00:50:11,510 --> 00:50:09,760

there is something

1375

00:50:13,030 --> 00:50:11,520

unusual now sure if you get an image of

1376

00:50:14,870 --> 00:50:13,040

something that looks really weird that

1377

00:50:16,390 --> 00:50:14,880

would be great but you've also got to

1378

00:50:18,549 --> 00:50:16,400

demonstrate really that it's it's moving

1379

00:50:19,510 --> 00:50:18,559

in an unusual way it could be just about

1380

00:50:21,030 --> 00:50:19,520

something

1381

00:50:23,430 --> 00:50:21,040

if we have an image and we see the

1382

00:50:25,589 --> 00:50:23,440

trajectory in 3d with parallax we can

1383

00:50:28,150 --> 00:50:25,599

get both i should say you know there is

1384

00:50:29,670 --> 00:50:28,160

this saying it is worth a thousand words

1385

00:50:31,829 --> 00:50:29,680

in my case i should tell you that the

1386

00:50:33,990 --> 00:50:31,839

picture is worth 66 000 words the number

1387

00:50:35,190 --> 00:50:34,000

of words in my book exothera

1388

00:50:37,589 --> 00:50:35,200

i wouldn't need to write the book

1389

00:50:39,829 --> 00:50:37,599

whatsoever if i had a nice photograph

1390

00:50:41,190 --> 00:50:39,839

that i could

1391

00:50:43,829 --> 00:50:41,200

uh

1392

00:50:45,270 --> 00:50:43,839

you you list three things in the the the

1393

00:50:47,190 --> 00:50:45,280

having user research for the gallery

1394

00:50:48,790 --> 00:50:47,200

project and one of them was uh search

1395

00:50:50,069 --> 00:50:48,800

for satellites and you didn't mention

1396

00:50:51,829 --> 00:50:50,079

that earlier you just mentioned the

1397

00:50:53,270 --> 00:50:51,839

first two is this are you

1398

00:50:54,950 --> 00:50:53,280

are you still doing that or is that uh

1399

00:50:57,270 --> 00:50:54,960

uh

1400

00:51:00,390 --> 00:50:57,280

um yeah that's obviously something of

1401
00:51:02,470 --> 00:51:00,400
interest but that would come third so

1402
00:51:04,549 --> 00:51:02,480
uh we will do in parallel the first two

1403
00:51:05,510 --> 00:51:04,559
investigations uh basically searching

1404
00:51:07,670 --> 00:51:05,520
for you

1405
00:51:10,549 --> 00:51:07,680
i mean identifying uap

1406
00:51:13,910 --> 00:51:10,559
identifying the unidentified that's the

1407
00:51:16,589 --> 00:51:13,920
goal of the first component and then

1408
00:51:20,390 --> 00:51:16,599
trying to find the additional

1409
00:51:23,109 --> 00:51:20,400
omoamoalike objects either in

1410
00:51:24,790 --> 00:51:23,119
upcoming data from pan stars or from the

1411
00:51:25,990 --> 00:51:24,800
vera rubin observatory in a couple of

1412
00:51:27,990 --> 00:51:26,000
years and then

1413
00:51:30,950 --> 00:51:28,000

planning on a space mission that will

1414

00:51:33,430 --> 00:51:30,960

send us a spacecraft with a camera that

1415

00:51:35,990 --> 00:51:33,440

will come close to these objects if we

1416

00:51:37,990 --> 00:51:36,000

we are catching them early enough we can

1417

00:51:39,750 --> 00:51:38,000

intercept their trajectory just like

1418

00:51:41,510 --> 00:51:39,760

osiris-rex

1419

00:51:43,510 --> 00:51:41,520

came close to

1420

00:51:46,630 --> 00:51:43,520

the asteroid benue and actually landed

1421

00:51:48,950 --> 00:51:46,640

on it and we bring back a sample in 2023

1422

00:51:51,109 --> 00:51:48,960

so in much the same way you can easily

1423

00:51:53,030 --> 00:51:51,119

tell the difference between a rock and

1424

00:51:55,670 --> 00:51:53,040

an artificial object

1425

00:51:58,069 --> 00:51:55,680

okay yeah no i i i'm

1426

00:52:00,230 --> 00:51:58,079

like i say i'm very much in favor of uh

1427

00:52:01,829 --> 00:52:00,240

more data i just you know i want to

1428

00:52:03,109 --> 00:52:01,839

focus on getting the the right data and

1429

00:52:05,270 --> 00:52:03,119

obviously that's something that you all

1430

00:52:07,349 --> 00:52:05,280

are talking about

1431

00:52:09,589 --> 00:52:07,359

we agree on the fact that the existing

1432

00:52:11,750 --> 00:52:09,599

data that was released to the public was

1433

00:52:14,069 --> 00:52:11,760

not of high enough quality

1434

00:52:15,589 --> 00:52:14,079

and what we don't know is whether other

1435

00:52:17,589 --> 00:52:15,599

data is more convincing we don't know

1436

00:52:20,790 --> 00:52:17,599

that because we haven't seen it what i'm

1437

00:52:21,750 --> 00:52:20,800

saying is let's try to get that data

1438

00:52:26,549 --> 00:52:21,760

yeah if

1439

00:52:27,670 --> 00:52:26,559

or how are you going to

1440

00:52:29,510 --> 00:52:27,680

i don't say how you're going to get it

1441

00:52:31,030 --> 00:52:29,520

but wouldn't the government not want you

1442

00:52:32,710 --> 00:52:31,040

to get this data if it's something that

1443

00:52:34,390 --> 00:52:32,720

they would classify or do you think it's

1444

00:52:35,349 --> 00:52:34,400

classified for kind of

1445

00:52:37,750 --> 00:52:35,359

reason

1446

00:52:40,390 --> 00:52:37,760

okay i i don't believe the government

1447

00:52:42,470 --> 00:52:40,400

has any agenda i think the issue is

1448

00:52:43,829 --> 00:52:42,480

really that the data was collected by

1449

00:52:46,549 --> 00:52:43,839

sensors

1450

00:52:48,790 --> 00:52:46,559

whose nature is classified because we

1451
00:52:50,309 --> 00:52:48,800
don't want adversaries other nations to

1452
00:52:52,710 --> 00:52:50,319
know exactly what technologies we're

1453
00:52:54,630 --> 00:52:52,720
using to monitor our sky and because the

1454
00:52:56,630 --> 00:52:54,640
sensors are classified the data is also

1455
00:52:59,270 --> 00:52:56,640
classified that was my experience with

1456
00:53:01,349 --> 00:52:59,280
the meteor right the meteor is a

1457
00:53:02,549 --> 00:53:01,359
completely innocent event that has

1458
00:53:05,910 --> 00:53:02,559
nothing to do

1459
00:53:07,750 --> 00:53:05,920
with other nations and nevertheless the

1460
00:53:10,150 --> 00:53:07,760
government had difficulties releasing

1461
00:53:11,829 --> 00:53:10,160
the error budget and the reason is

1462
00:53:15,109 --> 00:53:11,839
because it will say something about the

1463
00:53:17,270 --> 00:53:15,119

sensors that were used and that you know

1464

00:53:19,349 --> 00:53:17,280

the lesson i learned from that is

1465

00:53:21,829 --> 00:53:19,359

the data may not be classified because

1466

00:53:23,670 --> 00:53:21,839

of its nature but more more because of

1467

00:53:26,150 --> 00:53:23,680

it of the of the instruments that were

1468

00:53:28,150 --> 00:53:26,160

used to collect it and i'm saying let's

1469

00:53:30,630 --> 00:53:28,160

get off the shelf instruments that we

1470

00:53:32,309 --> 00:53:30,640

have full control over and then the data

1471

00:53:34,950 --> 00:53:32,319

will be open

1472

00:53:36,069 --> 00:53:34,960

yeah that would be great i would love it

1473

00:53:37,589 --> 00:53:36,079

so

1474

00:53:40,069 --> 00:53:37,599

you

1475

00:53:41,190 --> 00:53:40,079

do a lot of these interviews i could i

1476

00:53:43,190 --> 00:53:41,200

could tell you could pretty much

1477

00:53:45,109 --> 00:53:43,200

interview yourself uh because you

1478

00:53:47,109 --> 00:53:45,119

anticipated the questions over the past

1479

00:53:49,030 --> 00:53:47,119

six months since my book appeared i had

1480

00:53:51,109 --> 00:53:49,040

the more than a thousand interviews

1481

00:53:53,829 --> 00:53:51,119

probably eleven hundred i know what do

1482

00:53:55,829 --> 00:53:53,839

you think uh about

1483

00:53:57,829 --> 00:53:55,839

the issue of

1484

00:54:00,630 --> 00:53:57,839

science popularity and having to

1485

00:54:01,430 --> 00:54:00,640

popularize science and you're having to

1486

00:54:03,829 --> 00:54:01,440

get

1487

00:54:06,069 --> 00:54:03,839

your message out there

1488

00:54:08,630 --> 00:54:06,079

as opposed to simply doing the science i

1489

00:54:11,030 --> 00:54:08,640

mean do you feel like you have to do all

1490

00:54:13,910 --> 00:54:11,040

this this pr work or is it something

1491

00:54:17,270 --> 00:54:13,920

that you you just want to do or what

1492

00:54:20,390 --> 00:54:17,280

okay so in this context um you know

1493

00:54:23,910 --> 00:54:20,400

uh back in february uh my publicist in

1494

00:54:26,390 --> 00:54:23,920

the uk said that good job avi you are

1495

00:54:28,230 --> 00:54:26,400

selling the book quite well and i said

1496

00:54:29,910 --> 00:54:28,240

to him look i'm not trying to sell the

1497

00:54:33,109 --> 00:54:29,920

book i'm trying to convey a message

1498

00:54:34,950 --> 00:54:33,119

which i think is quite important and if

1499

00:54:37,430 --> 00:54:34,960

the public would not care much about my

1500

00:54:39,109 --> 00:54:37,440

message i would still deliver it and if

1501
00:54:40,470 --> 00:54:39,119
the book didn't sell i wouldn't care

1502
00:54:42,150 --> 00:54:40,480
less about it

1503
00:54:44,789 --> 00:54:42,160
so it's really the message that i'm

1504
00:54:47,670 --> 00:54:44,799
trying to convey and my objective is

1505
00:54:49,190 --> 00:54:47,680
simple uh it's important for me that

1506
00:54:50,789 --> 00:54:49,200
humanity as a whole you know our

1507
00:54:52,390 --> 00:54:50,799
civilization will be guided by the

1508
00:54:54,950 --> 00:54:52,400
principles of science you know that's

1509
00:54:56,950 --> 00:54:54,960
really important and therefore as a

1510
00:54:59,670 --> 00:54:56,960
practicing scientist you know i've

1511
00:55:01,270 --> 00:54:59,680
published altogether more than 800

1512
00:55:04,150 --> 00:55:01,280
scientific papers and over the past

1513
00:55:05,910 --> 00:55:04,160

decade i published more than 500 so i'm

1514

00:55:07,109 --> 00:55:05,920

i'm really a practicing scientist i have

1515

00:55:09,030 --> 00:55:07,119

a lot of

1516

00:55:12,150 --> 00:55:09,040

students and and postdocs working with

1517

00:55:14,150 --> 00:55:12,160

me uh so i think it's important that a

1518

00:55:16,349 --> 00:55:14,160

scientist a practicing scientist conveys

1519

00:55:18,470 --> 00:55:16,359

that and not someone that is

1520

00:55:20,950 --> 00:55:18,480

popularizing science so that's a very

1521

00:55:23,349 --> 00:55:20,960

important distinction there are

1522

00:55:27,190 --> 00:55:23,359

a lot of people whose names you know

1523

00:55:29,670 --> 00:55:27,200

who are quite popular and are discussing

1524

00:55:31,349 --> 00:55:29,680

science done by others okay

1525

00:55:33,670 --> 00:55:31,359

and that's a different

1526

00:55:36,150 --> 00:55:33,680

job description here i'm talking about

1527

00:55:38,230 --> 00:55:36,160

myself as a practicing scientist trying

1528

00:55:40,230 --> 00:55:38,240

to explain to the public why science is

1529

00:55:42,309 --> 00:55:40,240

exciting and why it can address

1530

00:55:44,630 --> 00:55:42,319

questions of interest to the public so

1531

00:55:47,589 --> 00:55:44,640

you see the the other issue that bribes

1532

00:55:48,870 --> 00:55:47,599

me is that the scientific community is

1533

00:55:49,990 --> 00:55:48,880

not really

1534

00:55:52,069 --> 00:55:50,000

uh

1535

00:55:55,589 --> 00:55:52,079

always

1536

00:55:59,109 --> 00:55:55,599

true to its its mission

1537

00:56:00,069 --> 00:55:59,119

definition uh the mission of science is

1538

00:56:02,549 --> 00:56:00,079

to

1539

00:56:04,950 --> 00:56:02,559

learn about the world through evidence

1540

00:56:06,630 --> 00:56:04,960

through experiments and

1541

00:56:08,870 --> 00:56:06,640

often what you find in academia is

1542

00:56:10,950 --> 00:56:08,880

people trying to promote their image so

1543

00:56:11,750 --> 00:56:10,960

that they can get more honors and awards

1544

00:56:14,309 --> 00:56:11,760

and

1545

00:56:17,190 --> 00:56:14,319

sometimes it collides with

1546

00:56:18,950 --> 00:56:17,200

getting evidence because you know if you

1547

00:56:21,109 --> 00:56:18,960

believe in the multiverse or if you

1548

00:56:23,829 --> 00:56:21,119

believe in extra dimensions and things

1549

00:56:25,990 --> 00:56:23,839

that cannot be tested then you protect

1550

00:56:28,549 --> 00:56:26,000

yourself against being wrong and that's

1551

00:56:30,630 --> 00:56:28,559

a very comfortable spot to be in it's

1552

00:56:32,789 --> 00:56:30,640

sort of like asking how many angels can

1553

00:56:34,710 --> 00:56:32,799

sit on the tip of the pin that cannot be

1554

00:56:37,030 --> 00:56:34,720

tested experimentally and maybe you can

1555

00:56:38,710 --> 00:56:37,040

make very intelligent intelligent

1556

00:56:40,230 --> 00:56:38,720

arguments about it so that you can

1557

00:56:41,829 --> 00:56:40,240

demonstrate that you are smart and get

1558

00:56:42,870 --> 00:56:41,839

honors and awards from people that do

1559

00:56:45,349 --> 00:56:42,880

the same

1560

00:56:47,510 --> 00:56:45,359

uh so within your club

1561

00:56:49,270 --> 00:56:47,520

that by the way very often feels as if

1562

00:56:51,670 --> 00:56:49,280

it's on a pedestal relative to the

1563

00:56:53,829 --> 00:56:51,680

public you can feel that you are smart

1564

00:56:56,309 --> 00:56:53,839

you are respected and you don't care

1565

00:56:58,710 --> 00:56:56,319

about what the public cares about and

1566

00:57:01,589 --> 00:56:58,720

that i think is a big concern about the

1567

00:57:03,910 --> 00:57:01,599

current culture in academia that that

1568

00:57:05,910 --> 00:57:03,920

academia could work on on issues or

1569

00:57:07,750 --> 00:57:05,920

topics that are not of relevance to

1570

00:57:09,990 --> 00:57:07,760

society that are not of interest to

1571

00:57:12,630 --> 00:57:10,000

society just because there is this

1572

00:57:14,789 --> 00:57:12,640

built-in culture where the values are

1573

00:57:17,430 --> 00:57:14,799

more about demonstrating that you're

1574

00:57:19,270 --> 00:57:17,440

smart rather than describing nature as

1575

00:57:21,589 --> 00:57:19,280

it is because if you were

1576

00:57:23,030 --> 00:57:21,599

to ask what nature is about

1577

00:57:24,470 --> 00:57:23,040

you would risk

1578

00:57:26,069 --> 00:57:24,480

making mistakes it's a learning

1579

00:57:28,069 --> 00:57:26,079

experience you know einstein made three

1580

00:57:29,910 --> 00:57:28,079

mistakes in the last decade of his

1581

00:57:31,430 --> 00:57:29,920

career because he was really curious

1582

00:57:33,270 --> 00:57:31,440

about nature

1583

00:57:34,710 --> 00:57:33,280

and so

1584

00:57:36,549 --> 00:57:34,720

my point is

1585

00:57:37,670 --> 00:57:36,559

in communicating with the public is also

1586

00:57:39,670 --> 00:57:37,680

to change

1587

00:57:41,750 --> 00:57:39,680

the culture which i think is not healthy

1588

00:57:43,750 --> 00:57:41,760

right now where people in academia are

1589

00:57:45,510 --> 00:57:43,760

not necessarily driven i mean in science

1590

00:57:47,589 --> 00:57:45,520

i'm not talking about humanities that's

1591

00:57:49,349 --> 00:57:47,599

a separate method but in science they're

1592

00:57:51,270 --> 00:57:49,359

not driven by the ambition to collect as

1593

00:57:54,230 --> 00:57:51,280

much evidence and discuss only topics

1594

00:57:56,630 --> 00:57:54,240

that can be tested experimentally there

1595

00:57:58,309 --> 00:57:56,640

is there is there are whole cultures of

1596

00:58:00,309 --> 00:57:58,319

people working on things

1597

00:58:02,549 --> 00:58:00,319

either conservative

1598

00:58:05,510 --> 00:58:02,559

items where they just try to refine

1599

00:58:07,349 --> 00:58:05,520

things we already know or another

1600

00:58:09,190 --> 00:58:07,359

community of people that do completely

1601
00:58:11,270 --> 00:58:09,200
speculative things that cannot be tested

1602
00:58:13,829 --> 00:58:11,280
and that's a very safe place to be in

1603
00:58:16,150 --> 00:58:13,839
and both communities live in harmony and

1604
00:58:17,750 --> 00:58:16,160
i think it's unhealthy because we're

1605
00:58:20,230 --> 00:58:17,760
supposed to be guided by evidence we're

1606
00:58:22,630 --> 00:58:20,240
supposed to be taking risks and by

1607
00:58:25,349 --> 00:58:22,640
speaking about it i'm trying to promote

1608
00:58:27,349 --> 00:58:25,359
a better reality of course you know it's

1609
00:58:28,710 --> 00:58:27,359
not a pleasant for me to read things on

1610
00:58:29,430 --> 00:58:28,720
social media that

1611
00:58:31,910 --> 00:58:29,440
uh

1612
00:58:33,910 --> 00:58:31,920
about that attack me personally but it's

1613
00:58:35,750 --> 00:58:33,920

not about me you know you see i'm trying

1614

00:58:37,910 --> 00:58:35,760

to promote a better reality that would

1615

00:58:39,990 --> 00:58:37,920

serve us well and that includes what we

1616

00:58:41,990 --> 00:58:40,000

discussed just before you know trying to

1617

00:58:44,069 --> 00:58:42,000

clear up the fog on a subject that the

1618

00:58:46,150 --> 00:58:44,079

public cares about sure and scientists

1619

00:58:48,309 --> 00:58:46,160

dismiss and i think you know once we

1620

00:58:50,789 --> 00:58:48,319

figure out the nature of uap you know if

1621

00:58:53,670 --> 00:58:50,799

it ends up being a mundane explanation

1622

00:58:55,190 --> 00:58:53,680

we move on you will be free to discuss

1623

00:58:57,510 --> 00:58:55,200

other topics that are more important

1624

00:58:58,870 --> 00:58:57,520

perhaps you know like climate change and

1625

00:59:01,270 --> 00:58:58,880

things uh

1626
00:59:03,670 --> 00:59:01,280
but we will know that this subject is

1627
00:59:06,390 --> 00:59:03,680
over because we realize that these

1628
00:59:09,349 --> 00:59:06,400
objects all have some explanation that

1629
00:59:11,910 --> 00:59:09,359
is rather mundane let's move on so i

1630
00:59:13,910 --> 00:59:11,920
think rather than staying this status

1631
00:59:15,990 --> 00:59:13,920
quo where scientists dismiss subjects

1632
00:59:18,789 --> 00:59:16,000
like that and the public cares a lot

1633
00:59:21,270 --> 00:59:18,799
about them but then there is this this

1634
00:59:22,710 --> 00:59:21,280
frozen situation of uncertainty rather

1635
00:59:24,630 --> 00:59:22,720
than do that let's

1636
00:59:27,349 --> 00:59:24,640
move on you know let's let's

1637
00:59:29,190 --> 00:59:27,359
be forward-looking and and resolve this

1638
00:59:31,670 --> 00:59:29,200

issue

1639

00:59:32,870 --> 00:59:31,680

that's great yeah and uh uh one last

1640

00:59:35,750 --> 00:59:32,880

question i just want to kind of cover a

1641

00:59:37,910 --> 00:59:35,760

little a little bit is uh kind of what

1642

00:59:39,829 --> 00:59:37,920

we think of the proof of concept of of

1643

00:59:42,390 --> 00:59:39,839

getting the the project moving

1644

00:59:44,230 --> 00:59:42,400

especially in regards to getting images

1645

00:59:46,390 --> 00:59:44,240

of things because a big a big issue that

1646

00:59:49,190 --> 00:59:46,400

you have is the atmosphere

1647

00:59:50,789 --> 00:59:49,200

and for me like the atmosphere is the

1648

00:59:53,109 --> 00:59:50,799

limiting factor if i take a picture of

1649

00:59:54,789 --> 00:59:53,119

something horizontally that is five

1650

00:59:56,390 --> 00:59:54,799

miles away i just usually get a blurry

1651

00:59:58,950 --> 00:59:56,400

mess regardless of how big of a

1652

01:00:00,870 --> 00:59:58,960

telescope i get definitely so could you

1653

01:00:03,270 --> 01:00:00,880

do something just as a proof of concept

1654

01:00:05,190 --> 01:00:03,280

like send a drone up um

1655

01:00:06,390 --> 01:00:05,200

like a few miles away at twenty thousand

1656

01:00:07,829 --> 01:00:06,400

feet or something you have to get

1657

01:00:09,670 --> 01:00:07,839

special that's the next

1658

01:00:11,349 --> 01:00:09,680

an excellent point and in fact we were

1659

01:00:12,150 --> 01:00:11,359

discussing this

1660

01:00:14,309 --> 01:00:12,160

so

1661

01:00:15,829 --> 01:00:14,319

first we need to select the instruments

1662

01:00:17,510 --> 01:00:15,839

based on the cost

1663

01:00:21,750 --> 01:00:17,520

and the effectiveness you know just

1664

01:00:23,190 --> 01:00:21,760

doing optimal system design and uh once

1665

01:00:25,270 --> 01:00:23,200

we select the instruments we buy them

1666

01:00:27,510 --> 01:00:25,280

off the shelf you know given the budget

1667

01:00:30,390 --> 01:00:27,520

i'm sure that we can buy at least

1668

01:00:32,309 --> 01:00:30,400

a few systems okay and then indeed as

1669

01:00:34,309 --> 01:00:32,319

you say we need to test them that they

1670

01:00:36,630 --> 01:00:34,319

are performing and one way to test them

1671

01:00:39,670 --> 01:00:36,640

is to fly drones and see that they

1672

01:00:40,950 --> 01:00:39,680

identify them or and look at birds and

1673

01:00:43,430 --> 01:00:40,960

see that they can

1674

01:00:45,670 --> 01:00:43,440

identify them and see airplanes yeah

1675

01:00:47,670 --> 01:00:45,680

definitely the testing is a crucial

1676

01:00:49,910 --> 01:00:47,680

component and i think in the coming

1677

01:00:52,150 --> 01:00:49,920

months you know once we converge on

1678

01:00:54,549 --> 01:00:52,160

systems that we would like to use in the

1679

01:00:56,390 --> 01:00:54,559

coming months we will be engaged in the

1680

01:00:58,789 --> 01:00:56,400

testing phase exactly along the lines

1681

01:01:01,430 --> 01:00:58,799

that you said and once we have a working

1682

01:01:03,349 --> 01:01:01,440

system that is satisfactory then we can

1683

01:01:05,750 --> 01:01:03,359

produce copies of it

1684

01:01:07,349 --> 01:01:05,760

as much as our budget allows and then

1685

01:01:09,589 --> 01:01:07,359

distribute them in various locations

1686

01:01:11,510 --> 01:01:09,599

collect the data make it available to

1687

01:01:13,910 --> 01:01:11,520

everyone you will be able to look at the

1688

01:01:16,870 --> 01:01:13,920

data and the analysis that we will do

1689

01:01:19,829 --> 01:01:16,880

will be transparent so you can you know

1690

01:01:22,309 --> 01:01:19,839

study it and decide if you agree with it

1691

01:01:23,349 --> 01:01:22,319

uh and it's you know all part of the

1692

01:01:25,829 --> 01:01:23,359

standard

1693

01:01:27,589 --> 01:01:25,839

scientific practice that's what we

1694

01:01:30,470 --> 01:01:27,599

try to normalize

1695

01:01:32,309 --> 01:01:30,480

you know the engagement

1696

01:01:33,910 --> 01:01:32,319

uh that

1697

01:01:36,950 --> 01:01:33,920

people have with

1698

01:01:39,829 --> 01:01:36,960

this subject normalized by by normalize

1699

01:01:41,750 --> 01:01:39,839

i mean make it open transparent

1700

01:01:47,670 --> 01:01:41,760

and

1701
01:01:49,829 --> 01:01:47,680
you know we don't know what the dark

1702
01:01:52,549 --> 01:01:49,839
matter is we've been doing it for four

1703
01:01:54,549 --> 01:01:52,559
decades we haven't found the answer i

1704
01:01:57,029 --> 01:01:54,559
say that within the mainstream we have

1705
01:01:59,430 --> 01:01:57,039
situations that are much worse than

1706
01:02:01,349 --> 01:01:59,440
uh you know we invested the hundreds of

1707
01:02:03,750 --> 01:02:01,359
millions we didn't find anything so why

1708
01:02:06,390 --> 01:02:03,760
not do a little bit of i'm talking about

1709
01:02:09,510 --> 01:02:06,400
tens of millions right to clear up the

1710
01:02:11,829 --> 01:02:09,520
fog on this subject yeah but i i you say

1711
01:02:14,150 --> 01:02:11,839
clear up i really think that's a very

1712
01:02:15,910 --> 01:02:14,160
ambitious goal uh because if you don't

1713
01:02:18,950 --> 01:02:15,920

find something over say the next 10

1714

01:02:20,789 --> 01:02:18,960

years and oh definitely 5000 stations

1715

01:02:22,470 --> 01:02:20,799

we know that birds exist right we know

1716

01:02:24,470 --> 01:02:22,480

that yeah well sure sure but you find

1717

01:02:26,549 --> 01:02:24,480

something special i mean like yeah does

1718

01:02:28,630 --> 01:02:26,559

that prove that nothing specially exists

1719

01:02:30,549 --> 01:02:28,640

if we don't find anything if we don't

1720

01:02:32,150 --> 01:02:30,559

find anything unusual

1721

01:02:33,670 --> 01:02:32,160

that's an important conclusion we just

1722

01:02:36,150 --> 01:02:33,680

say yeah

1723

01:02:38,470 --> 01:02:36,160

the uap are all

1724

01:02:40,470 --> 01:02:38,480

conventional things you know or perhaps

1725

01:02:42,870 --> 01:02:40,480

they all know where your telescopes are

1726

01:02:45,829 --> 01:02:42,880

and they're hiding from your telescopes

1727

01:02:48,309 --> 01:02:45,839

well okay so i as i said before we will

1728

01:02:50,789 --> 01:02:48,319

engage only in the laws of physic you

1729

01:02:52,710 --> 01:02:50,799

know we just use known physics

1730

01:02:54,549 --> 01:02:52,720

and we will not engage in any

1731

01:02:56,549 --> 01:02:54,559

conspiracies here i mean

1732

01:02:58,230 --> 01:02:56,559

that's the way science is done you know

1733

01:03:00,710 --> 01:02:58,240

um we don't

1734

01:03:02,470 --> 01:03:00,720

imagine things you know ghosts or

1735

01:03:04,150 --> 01:03:02,480

whatever we don't say that they're

1736

01:03:07,029 --> 01:03:04,160

trying of course you can say that they

1737

01:03:07,910 --> 01:03:07,039

try to avoid the the telescopes we use

1738

01:03:09,510 --> 01:03:07,920

but

1739

01:03:11,589 --> 01:03:09,520

you know we could put the telescopes in

1740

01:03:14,230 --> 01:03:11,599

places that we do do not disclose ahead

1741

01:03:15,510 --> 01:03:14,240

of time right and and we will just do

1742

01:03:17,109 --> 01:03:15,520

our job

1743

01:03:18,870 --> 01:03:17,119

yeah that sounds great and i look

1744

01:03:20,710 --> 01:03:18,880

forward to to what comes out of this i

1745

01:03:23,910 --> 01:03:20,720

think it's it's very interesting project

1746

01:03:26,309 --> 01:03:23,920

and uh yeah because i have been stymied

1747

01:03:28,470 --> 01:03:26,319

so much by the lack of good photographs

1748

01:03:30,390 --> 01:03:28,480

and it's very frustrating when people

1749

01:03:31,829 --> 01:03:30,400

tell you i saw a ufo and they give you

1750

01:03:35,670 --> 01:03:31,839

their iphone photograph and it's a

1751

01:03:41,670 --> 01:03:38,630

we come from the same point of view and

1752

01:03:43,349 --> 01:03:41,680

uh you know the science that i do stems

1753

01:03:45,029 --> 01:03:43,359

from my childhood

1754

01:03:47,109 --> 01:03:45,039

basically when i was a kid you know i

1755

01:03:48,870 --> 01:03:47,119

wouldn't listen to what adults tell me i

1756

01:03:51,029 --> 01:03:48,880

would like to figure it out myself and

1757

01:03:53,190 --> 01:03:51,039

that's the way kids operate and they

1758

01:03:56,309 --> 01:03:53,200

learn new things that the adults are not

1759

01:03:58,309 --> 01:03:56,319

aware of this way and then you know it's

1760

01:04:00,870 --> 01:03:58,319

unfortunate that

1761

01:04:03,270 --> 01:04:00,880

when kids become adult they lose most of

1762

01:04:05,829 --> 01:04:03,280

the time their sense of curiosity and

1763

01:04:07,430 --> 01:04:05,839

they start to argue for things that they

1764

01:04:09,109 --> 01:04:07,440

don't have good evidence for that

1765

01:04:11,190 --> 01:04:09,119

they're trying to pretend that they know

1766

01:04:12,789 --> 01:04:11,200

more than they actually know and i could

1767

01:04:14,870 --> 01:04:12,799

say that throughout my life i was

1768

01:04:17,029 --> 01:04:14,880

fortunate enough to maintain my

1769

01:04:19,029 --> 01:04:17,039

innocence and childhood curiosity and

1770

01:04:22,950 --> 01:04:19,039

what you see in front of you is the same

1771

01:04:25,510 --> 01:04:22,960

farm boy that that was born 59 years ago

1772

01:04:27,270 --> 01:04:25,520

uh you know people that know me from my

1773

01:04:29,029 --> 01:04:27,280

childhood would would tell you that i

1774

01:04:31,510 --> 01:04:29,039

haven't changed much

1775

01:04:33,029 --> 01:04:31,520

yeah that's great and uh i love that

1776

01:04:35,430 --> 01:04:33,039

sense of uh

1777

01:04:36,549 --> 01:04:35,440

adventurism within science is is great

1778

01:04:38,390 --> 01:04:36,559

because i think it's something that we

1779

01:04:39,670 --> 01:04:38,400

do need we can't just be uh you know

1780

01:04:40,950 --> 01:04:39,680

sticking with why should science be

1781

01:04:42,150 --> 01:04:40,960

boring you know science could be

1782

01:04:44,069 --> 01:04:42,160

exciting

1783

01:04:45,829 --> 01:04:44,079

and yeah you know even if we end up

1784

01:04:47,349 --> 01:04:45,839

finding a boring answer that's part of

1785

01:04:48,710 --> 01:04:47,359

science you know that

1786

01:04:50,710 --> 01:04:48,720

when we don't know the answer to

1787

01:04:52,710 --> 01:04:50,720

something we should say we don't know

1788

01:04:53,990 --> 01:04:52,720

adults often invent stories you know

1789

01:04:55,109 --> 01:04:54,000

when they don't know something they

1790

01:04:57,510 --> 01:04:55,119

invent

1791

01:04:59,029 --> 01:04:57,520

that's not necessary you know you just

1792

01:05:00,710 --> 01:04:59,039

say what you know

1793

01:05:02,309 --> 01:05:00,720

and when you collect evidence that

1794

01:05:05,190 --> 01:05:02,319

doesn't show anything unusual you just

1795

01:05:07,029 --> 01:05:05,200

say it i mean that's fine

1796

01:05:08,390 --> 01:05:07,039

well i'd like to thank you very much for

1797

01:05:10,150 --> 01:05:08,400

this discussion it's been very very

1798

01:05:11,829 --> 01:05:10,160

interesting and i wish you well with

1799

01:05:13,910 --> 01:05:11,839

your project and i'm definitely going to

1800

01:05:15,670 --> 01:05:13,920

be following it closely and

1801

01:05:17,029 --> 01:05:15,680

look forward to your your first proof of

1802

01:05:19,109 --> 01:05:17,039

concept photographs that's going to be

1803

01:05:20,870 --> 01:05:19,119

very interesting and and if you do have

1804

01:05:22,470 --> 01:05:20,880

that million of the million dollars that

1805

01:05:26,390 --> 01:05:22,480

you mentioned