



**FRANCK MARCHIS**

**SENIOR  
PLANETARY ASTRONOMER,  
SETI INSTITUTE**

**#517**

1  
00:00:06,800 --> 00:00:11,990

[Music]

2  
00:00:16,310 --> 00:00:14,230

hello and welcome to the show i'm martin

3  
00:00:19,109 --> 00:00:16,320

willis your host and i have a very

4  
00:00:22,310 --> 00:00:19,119

interesting guest from the uh seti

5  
00:00:23,670 --> 00:00:22,320

institute on tonight dr frank marshes or

6  
00:00:26,310 --> 00:00:23,680

marchese i

7  
00:00:28,710 --> 00:00:26,320

he's from france i forgot

8  
00:00:31,990 --> 00:00:28,720

i forgot to ask him

9  
00:00:37,350 --> 00:00:34,790

his last name and uh uh sorry about the

10  
00:00:40,150 --> 00:00:37,360

rough start uh we're ready to go

11  
00:00:41,190 --> 00:00:40,160

can you explain to the audience

12  
00:00:42,630 --> 00:00:41,200

uh

13  
00:00:45,830 --> 00:00:42,640

your background and what got you

14

00:00:48,470 --> 00:00:45,840

interested in the ufo topic

15

00:00:50,069 --> 00:00:48,480

well my i'm an astronomer i'm a senior

16

00:00:51,750 --> 00:00:50,079

astronomer at the set at the set

17

00:00:54,229 --> 00:00:51,760

institute um

18

00:00:56,470 --> 00:00:54,239

an institution we search for life any

19

00:00:57,670 --> 00:00:56,480

type of life in the universe

20

00:01:00,549 --> 00:00:57,680

you probably know about the set

21

00:01:04,630 --> 00:01:00,559

institute and the audience as well

22

00:01:07,270 --> 00:01:04,640

i started my career 25 years ago even

23

00:01:10,789 --> 00:01:09,030

looking for

24

00:01:12,710 --> 00:01:10,799

a building instruments ground-based

25

00:01:15,510 --> 00:01:12,720

telescope instruments with adaptive

26  
00:01:17,990 --> 00:01:15,520  
optics in the goal of improving the

27  
00:01:19,429 --> 00:01:18,000  
image quality of telescopes so starting

28  
00:01:21,590 --> 00:01:19,439  
with four meter class telescope that

29  
00:01:26,230 --> 00:01:21,600  
went to a 10 meter class telescope like

30  
00:01:28,789 --> 00:01:26,240  
the cake the vlt and the image planets

31  
00:01:32,390 --> 00:01:28,799  
um in our solar system asteroids fine

32  
00:01:34,230 --> 00:01:32,400  
asteroids with moons etc then went to

33  
00:01:36,149 --> 00:01:34,240  
the exoplanet field to search for

34  
00:01:37,350 --> 00:01:36,159  
exoplanets planets in orbit and other

35  
00:01:40,310 --> 00:01:37,360  
stars

36  
00:01:42,149 --> 00:01:40,320  
and then basically we went from that to

37  
00:01:43,350 --> 00:01:42,159  
uh i joined the institute the city

38  
00:01:45,350 --> 00:01:43,360

institute

39

00:01:48,310 --> 00:01:45,360

and i've been working there for more

40

00:01:49,910 --> 00:01:48,320

than 10 years now on

41

00:01:51,510 --> 00:01:49,920

developing instruments to search for

42

00:01:53,990 --> 00:01:51,520

life developing instruments to search

43

00:01:56,389 --> 00:01:54,000

for earth-like exoplanets from the

44

00:01:58,310 --> 00:01:56,399

ground but also from space and i'm also

45

00:01:59,990 --> 00:01:58,320

part of the outreach and communication

46

00:02:02,789 --> 00:02:00,000

team of the city institute so i talk a

47

00:02:04,310 --> 00:02:02,799

lot about our search for life

48

00:02:06,709 --> 00:02:04,320

but in fact i'm going to confess

49

00:02:08,550 --> 00:02:06,719

something i found a text i wrote when i

50

00:02:09,510 --> 00:02:08,560

was 17 years

51

00:02:12,630 --> 00:02:09,520

um

52

00:02:14,309 --> 00:02:12,640

i was a kind of a hacker at the time

53

00:02:17,110 --> 00:02:14,319

when i was and i

54

00:02:19,190 --> 00:02:17,120

and i wrote a text that was part of a

55

00:02:21,270 --> 00:02:19,200

program and so on something complicated

56

00:02:24,630 --> 00:02:21,280

but then i can read myself and i talk

57

00:02:26,309 --> 00:02:24,640

about the fermi paradox and i talk about

58

00:02:29,030 --> 00:02:26,319

city and the importance of searching for

59

00:02:31,030 --> 00:02:29,040

life so at 17 i was already

60

00:02:32,710 --> 00:02:31,040

focusing on on doing this but i don't

61

00:02:35,589 --> 00:02:32,720

think i ever dreamed that i would become

62

00:02:36,869 --> 00:02:35,599

an astronomer at the city institute

63

00:02:41,750 --> 00:02:36,879

well i was hoping you're going to say

64

00:02:47,030 --> 00:02:44,710

i've seen a lot of stuff in the sky yes

65

00:02:50,390 --> 00:02:47,040

yeah but but things that you've seen can

66

00:02:53,030 --> 00:02:50,400

be explained so far or yes everything

67

00:02:54,869 --> 00:02:53,040

can be explained yeah yeah

68

00:02:56,790 --> 00:02:54,879

um but and we're going to get into all

69

00:02:58,630 --> 00:02:56,800

that because i i listen to you on

70

00:03:01,509 --> 00:02:58,640

another program you're not close-minded

71

00:03:02,869 --> 00:03:01,519

now i had sort of i would call it a

72

00:03:05,670 --> 00:03:02,879

debate with

73

00:03:07,990 --> 00:03:05,680

your colleague seth shawstak who is now

74

00:03:09,589 --> 00:03:08,000

79 years old and still looks pretty

75

00:03:12,470 --> 00:03:09,599

young for that age he's still doing he's

76

00:03:14,869 --> 00:03:12,480

still right there working away right

77

00:03:18,229 --> 00:03:14,879

yes he's still uh we have meetings every

78

00:03:21,350 --> 00:03:18,239

week in fact

79

00:03:23,589 --> 00:03:21,360

but anyway um you know he was he was i

80

00:03:24,789 --> 00:03:23,599

after listening to you and talking with

81

00:03:26,309 --> 00:03:24,799

seth

82

00:03:29,430 --> 00:03:26,319

i would have to say that you're more

83

00:03:31,589 --> 00:03:29,440

open-minded to the possibility that at

84

00:03:33,750 --> 00:03:31,599

least something is happening um i i

85

00:03:36,229 --> 00:03:33,760

never like to say that it's aliens

86

00:03:38,470 --> 00:03:36,239

myself because i really feel that no one

87

00:03:40,470 --> 00:03:38,480

really knows for sure what that what the

88

00:03:42,869 --> 00:03:40,480

strange objects are that people are

89

00:03:45,350 --> 00:03:42,879

seeing but um what do you think about

90

00:03:47,750 --> 00:03:45,360

that in general and i and one thing i

91

00:03:50,149 --> 00:03:47,760

sort of accused seth of when he was on

92

00:03:52,869 --> 00:03:50,159

my show i said of course if you said

93

00:03:53,750 --> 00:03:52,879

there's possible ufos and it's possible

94

00:03:54,949 --> 00:03:53,760

they

95

00:03:57,270 --> 00:03:54,959

some of them

96

00:03:59,110 --> 00:03:57,280

may be extraterrestrials somehow

97

00:04:01,670 --> 00:03:59,120

then you would lose your funding right

98

00:04:03,429 --> 00:04:01,680

you know i i pose that question to them

99

00:04:05,830 --> 00:04:03,439

but um so

100

00:04:08,149 --> 00:04:05,840

so what do you think in general about um

101  
00:04:10,390 --> 00:04:08,159  
at least what's going on i

102  
00:04:13,270 --> 00:04:10,400  
i know that uh a new program was just

103  
00:04:17,349 --> 00:04:13,280  
set up with a better uh acronym i think

104  
00:04:20,629 --> 00:04:17,359  
it's called aaro or something like that

105  
00:04:22,629 --> 00:04:20,639  
it's about anomalous uh research um but

106  
00:04:24,150 --> 00:04:22,639  
anyway what do you think about all that

107  
00:04:25,670 --> 00:04:24,160  
in general

108  
00:04:28,950 --> 00:04:25,680  
so i think what you're asking me is what

109  
00:04:32,150 --> 00:04:28,960  
i think about the recent activity in the

110  
00:04:34,070 --> 00:04:32,160  
uaps basically right um yeah i mean

111  
00:04:36,070 --> 00:04:34,080  
there's there's more scientific look at

112  
00:04:37,670 --> 00:04:36,080  
it now than ever before

113  
00:04:39,830 --> 00:04:37,680

so

114

00:04:40,870 --> 00:04:39,840

i'm i'm part of these scientists that

115

00:04:42,870 --> 00:04:40,880

believe

116

00:04:45,670 --> 00:04:42,880

that it's interesting that first of all

117

00:04:47,510 --> 00:04:45,680

people pay attention to this and

118

00:04:50,310 --> 00:04:47,520

people are interesting

119

00:04:52,710 --> 00:04:50,320

in the in the existence of uaps and

120

00:04:55,270 --> 00:04:52,720

etcetera civilization i'm part of the

121

00:04:58,390 --> 00:04:55,280

generation who grew up with those people

122

00:05:00,390 --> 00:04:58,400

and and frankly i met some of them and i

123

00:05:01,510 --> 00:05:00,400

do respect what they do some of them are

124

00:05:03,270 --> 00:05:01,520

extremely

125

00:05:05,029 --> 00:05:03,280

using scientific method to try to

126

00:05:07,270 --> 00:05:05,039

understand what's going on building

127

00:05:09,749 --> 00:05:07,280

instruments trying to do some recording

128

00:05:11,749 --> 00:05:09,759

and so on so i think it's important that

129

00:05:13,990 --> 00:05:11,759

we we let the people do their own

130

00:05:15,749 --> 00:05:14,000

investigation science should not be part

131

00:05:17,430 --> 00:05:15,759

only of the scientific community other

132

00:05:19,189 --> 00:05:17,440

people should be able to do science

133

00:05:21,749 --> 00:05:19,199

sometimes they shake

134

00:05:24,390 --> 00:05:21,759

uh our ideas and they bring some new

135

00:05:25,749 --> 00:05:24,400

ideas to the to the field so i do

136

00:05:28,629 --> 00:05:25,759

appreciate that

137

00:05:31,270 --> 00:05:28,639

i have no personal views about uaps

138

00:05:34,390 --> 00:05:31,280

because i'm not part of these people who

139

00:05:36,469 --> 00:05:34,400

have done and studies those videos and

140

00:05:39,749 --> 00:05:36,479

those more recent videos

141

00:05:41,909 --> 00:05:39,759

i believe as scientists we should pay

142

00:05:44,150 --> 00:05:41,919

attention to that as scientists we

143

00:05:45,909 --> 00:05:44,160

should bring our expertise to the

144

00:05:47,830 --> 00:05:45,919

studies of those videos to the

145

00:05:49,749 --> 00:05:47,840

understanding of what's going on what

146

00:05:51,749 --> 00:05:49,759

has been photographed what has been

147

00:05:53,510 --> 00:05:51,759

filmed especially in the most recent

148

00:05:56,629 --> 00:05:53,520

videos especially those coming from

149

00:05:58,950 --> 00:05:56,639

military aircraft and so on because

150

00:06:01,350 --> 00:05:58,960

those instruments are extremely

151

00:06:04,629 --> 00:06:01,360

similar to the instrument we're using

152

00:06:06,629 --> 00:06:04,639

on telescopes so there is people in the

153

00:06:09,590 --> 00:06:06,639

community that can bring expertise in

154

00:06:12,070 --> 00:06:09,600

understanding analyzing those videos

155

00:06:13,430 --> 00:06:12,080

they should be uh astronomers should be

156

00:06:15,189 --> 00:06:13,440

part of it

157

00:06:18,629 --> 00:06:15,199

we should be part of this conversation

158

00:06:20,550 --> 00:06:18,639

and helping analyzing those observations

159

00:06:22,950 --> 00:06:20,560

i have to tell you and since you've been

160

00:06:25,110 --> 00:06:22,960

at this for a while you you probably

161

00:06:27,350 --> 00:06:25,120

would agree don't you think the needle

162

00:06:29,270 --> 00:06:27,360

has moved on that in the last

163

00:06:31,670 --> 00:06:29,280

three years or so

164

00:06:34,550 --> 00:06:31,680

uh because before it was like such a

165

00:06:36,629 --> 00:06:34,560

taboo topic for any scientist and now

166

00:06:39,110 --> 00:06:36,639

there's an organization i have a small

167

00:06:42,309 --> 00:06:39,120

involvement with like the scu the

168

00:06:44,469 --> 00:06:42,319

scientific coalition for uap studies

169

00:06:46,309 --> 00:06:44,479

there's and there that's full of really

170

00:06:49,110 --> 00:06:46,319

great scientists that are

171

00:06:51,909 --> 00:06:49,120

really taking a hard look at this which

172

00:06:54,629 --> 00:06:51,919

uh i think is is important and i you

173

00:06:57,029 --> 00:06:54,639

bring up a good point

174

00:06:59,189 --> 00:06:57,039

that a lot of times someone from the

175

00:07:01,510 --> 00:06:59,199

outside can you know

176

00:07:03,270 --> 00:07:01,520

maybe think out of the box a little bit

177

00:07:05,189 --> 00:07:03,280

uh that may be able to help a lot of

178

00:07:06,230 --> 00:07:05,199

discoveries i'm sure made that in that

179

00:07:07,029 --> 00:07:06,240

manner

180

00:07:10,150 --> 00:07:07,039

yeah

181

00:07:12,790 --> 00:07:10,160

and you know the fact that nasa is as

182

00:07:14,070 --> 00:07:12,800

is putting together an uap independent

183

00:07:16,710 --> 00:07:14,080

study group

184

00:07:18,710 --> 00:07:16,720

is the sign that the needle has moved

185

00:07:21,510 --> 00:07:18,720

is the sign that it does move in a way

186

00:07:22,629 --> 00:07:21,520

that we need to give an answer to the

187

00:07:25,430 --> 00:07:22,639

people

188

00:07:27,990 --> 00:07:25,440

i mean we cannot be scientists living uh

189

00:07:29,670 --> 00:07:28,000

in the bubble tower or hiding our head

190

00:07:32,390 --> 00:07:29,680

in the sand and pretending that nothing

191

00:07:33,990 --> 00:07:32,400

is happening i mean my kids talk to me

192

00:07:37,029 --> 00:07:34,000

about uaps

193

00:07:38,790 --> 00:07:37,039

and uh and they are they teenager they

194

00:07:40,870 --> 00:07:38,800

yeah they want to know what's going on

195

00:07:42,870 --> 00:07:40,880

and that's normal so we need to provide

196

00:07:44,710 --> 00:07:42,880

an answer and providing an answer will

197

00:07:47,430 --> 00:07:44,720

be done using the scientific method in

198

00:07:49,749 --> 00:07:47,440

my mind and that's uh that's why this

199

00:07:52,550 --> 00:07:49,759

community community that nasa is putting

200

00:07:56,309 --> 00:07:52,560

together is a very important step toward

201  
00:07:58,070 --> 00:07:56,319  
bringing answers and maybe ex bringing

202  
00:07:59,909 --> 00:07:58,080  
experts around the table to understand

203  
00:08:02,230 --> 00:07:59,919  
what's going on

204  
00:08:04,150 --> 00:08:02,240  
and uh you know it

205  
00:08:06,550 --> 00:08:04,160  
do you think it's possible that even

206  
00:08:08,629 --> 00:08:06,560  
with all the scientific instruments

207  
00:08:10,629 --> 00:08:08,639  
being used that we still may not be able

208  
00:08:12,550 --> 00:08:10,639  
to even if we have really good data we

209  
00:08:15,029 --> 00:08:12,560  
still may not be able to understand

210  
00:08:17,189 --> 00:08:15,039  
what's going on or do you think that

211  
00:08:18,710 --> 00:08:17,199  
that we definitely will what's your

212  
00:08:20,230 --> 00:08:18,720  
thoughts on that

213  
00:08:23,029 --> 00:08:20,240

well my thought is that there is more

214

00:08:25,830 --> 00:08:23,039

than i forgot the number about 400

215

00:08:27,589 --> 00:08:25,840

sites or 400 recordings of weird stuff

216

00:08:30,150 --> 00:08:27,599

happening in the sky

217

00:08:33,430 --> 00:08:30,160

and we probably gonna spend years and

218

00:08:34,949 --> 00:08:33,440

probably get some explanation for three

219

00:08:36,870 --> 00:08:34,959

quarter or

220

00:08:39,990 --> 00:08:36,880

even more of them and there will be

221

00:08:42,790 --> 00:08:40,000

still some which will remain mysterious

222

00:08:44,310 --> 00:08:42,800

and in a way they miss their use because

223

00:08:46,230 --> 00:08:44,320

they uh because we don't have an

224

00:08:48,630 --> 00:08:46,240

explanation yet but don't forget that

225

00:08:50,310 --> 00:08:48,640

science evolved very quickly

226

00:08:51,750 --> 00:08:50,320

and that's one of the reason i would i

227

00:08:54,150 --> 00:08:51,760

like the fact that we have been putting

228

00:08:55,910 --> 00:08:54,160

together those scientists on the table

229

00:08:58,470 --> 00:08:55,920

because one of the problem we have is

230

00:09:00,389 --> 00:08:58,480

also that we don't have the tools yet to

231

00:09:03,269 --> 00:09:00,399

interpret this data

232

00:09:05,829 --> 00:09:03,279

properly so having those experts around

233

00:09:08,870 --> 00:09:05,839

the table will help getting those

234

00:09:10,790 --> 00:09:08,880

those models to understand what's going

235

00:09:13,030 --> 00:09:10,800

on to be able to analyze this data and

236

00:09:15,110 --> 00:09:13,040

provide a response whatever the response

237

00:09:18,389 --> 00:09:15,120

will be we will have some

238

00:09:21,110 --> 00:09:18,399

some measurements some calculations

239

00:09:22,790 --> 00:09:21,120

right um i think it was shock valet i

240

00:09:24,550 --> 00:09:22,800

don't know if you've ever heard of him

241

00:09:26,630 --> 00:09:24,560

he's out he's out your way he's in san

242

00:09:28,550 --> 00:09:26,640

francisco but he's been looking at this

243

00:09:31,590 --> 00:09:28,560

topic for many years he's a computer

244

00:09:33,030 --> 00:09:31,600

scientist but um

245

00:09:38,070 --> 00:09:33,040

i think

246

00:09:40,070 --> 00:09:38,080

said something along the lines where if

247

00:09:42,150 --> 00:09:40,080

we found out what they were we may not

248

00:09:42,949 --> 00:09:42,160

even understand

249

00:09:47,430 --> 00:09:42,959

and

250

00:09:50,230 --> 00:09:47,440

something along the lines that

251  
00:09:53,030 --> 00:09:50,240  
you know it may be several things all

252  
00:09:54,790 --> 00:09:53,040  
all of you know not just just you know

253  
00:09:56,790 --> 00:09:54,800  
not just extraterrestrial but it could

254  
00:09:59,430 --> 00:09:56,800  
be all all different types of things

255  
00:10:02,470 --> 00:09:59,440  
next week i have dr michael masterzon

256  
00:10:04,710 --> 00:10:02,480  
who has a theory of time travel

257  
00:10:07,269 --> 00:10:04,720  
um you know which is another interesting

258  
00:10:09,430 --> 00:10:07,279  
aspect i i love to hear about all these

259  
00:10:11,350 --> 00:10:09,440  
different thoughts on what we may be

260  
00:10:12,870 --> 00:10:11,360  
seeing but there really is you know i

261  
00:10:15,269 --> 00:10:12,880  
mean when you see

262  
00:10:16,150 --> 00:10:15,279  
someone like david fravor uh talking

263  
00:10:19,590 --> 00:10:16,160

about

264

00:10:21,350 --> 00:10:19,600

that tick tock tick tack encounter back

265

00:10:25,269 --> 00:10:21,360

in 2004

266

00:10:26,389 --> 00:10:25,279

and a a very credible witness um along

267

00:10:28,230 --> 00:10:26,399

um

268

00:10:31,269 --> 00:10:28,240

uh there were some other people also i'm

269

00:10:33,750 --> 00:10:31,279

trying to remember of the name of the

270

00:10:35,430 --> 00:10:33,760

female alex dietrich

271

00:10:36,550 --> 00:10:35,440

also um

272

00:10:39,190 --> 00:10:36,560

was

273

00:10:40,470 --> 00:10:39,200

a wing woman during that and saw the

274

00:10:42,150 --> 00:10:40,480

same thing you know they all saw this

275

00:10:42,949 --> 00:10:42,160

together

276

00:10:45,269 --> 00:10:42,959

and

277

00:10:47,110 --> 00:10:45,279

you know when you get some

278

00:10:49,990 --> 00:10:47,120

credible like that and then you have all

279

00:10:51,750 --> 00:10:50,000

the data from that uh it just seems like

280

00:10:54,389 --> 00:10:51,760

we should be able to

281

00:10:57,030 --> 00:10:54,399

crack something and you know when the

282

00:10:59,030 --> 00:10:57,040

that data the data disappeared on that i

283

00:11:01,190 --> 00:10:59,040

know that uh uh

284

00:11:02,870 --> 00:11:01,200

that it was taken by someone i'm going

285

00:11:04,870 --> 00:11:02,880

to have gary voorhees on here in a

286

00:11:06,630 --> 00:11:04,880

couple weeks he's going to talk about

287

00:11:08,150 --> 00:11:06,640

exactly what happened during that

288

00:11:09,269 --> 00:11:08,160

encounter

289

00:11:10,710 --> 00:11:09,279

so

290

00:11:11,990 --> 00:11:10,720

that thing this has been happening i'm

291

00:11:15,030 --> 00:11:12,000

sure you're probably not aware of this

292

00:11:16,150 --> 00:11:15,040

but for years the government has taken

293

00:11:21,750 --> 00:11:16,160

away

294

00:11:23,350 --> 00:11:21,760

you know from people i don't know where

295

00:11:26,069 --> 00:11:23,360

it is where it went

296

00:11:28,069 --> 00:11:26,079

but that has happened repetit repeatedly

297

00:11:29,030 --> 00:11:28,079

over the years all the way back uh

298

00:11:31,110 --> 00:11:29,040

gordon

299

00:11:33,430 --> 00:11:31,120

um

300

00:11:35,750 --> 00:11:33,440

gordon cooper talks about

301  
00:11:37,269 --> 00:11:35,760  
um when he was out in the desert

302  
00:11:39,750 --> 00:11:37,279  
uh he wasn't filming but they were

303  
00:11:43,190 --> 00:11:39,760  
filming a crew that he had was filming

304  
00:11:45,190 --> 00:11:43,200  
you know some test planes and this ufo

305  
00:11:46,790 --> 00:11:45,200  
came and landed right there

306  
00:11:48,710 --> 00:11:46,800  
during the during the filming so they

307  
00:11:51,110 --> 00:11:48,720  
got it on really good film

308  
00:11:52,949 --> 00:11:51,120  
he brought it had it developed he

309  
00:11:54,470 --> 00:11:52,959  
actually saw it up to the light he could

310  
00:11:56,470 --> 00:11:54,480  
see exactly what they were telling him

311  
00:11:58,870 --> 00:11:56,480  
about but he had to ship that off and

312  
00:12:00,790 --> 00:11:58,880  
that went to washington like a with a

313  
00:12:02,710 --> 00:12:00,800

courier so

314

00:12:05,750 --> 00:12:02,720

the stuff has been going somewhere for

315

00:12:07,910 --> 00:12:05,760

all the way back since the late 1940s

316

00:12:09,509 --> 00:12:07,920

and so but i'm not saying

317

00:12:11,269 --> 00:12:09,519

i'm not saying because it's been going

318

00:12:12,710 --> 00:12:11,279

somewhere

319

00:12:15,910 --> 00:12:12,720

i'm not trying to be a conspiracy

320

00:12:17,790 --> 00:12:15,920

theorist but they probably have

321

00:12:19,590 --> 00:12:17,800

somewhere in the government or

322

00:12:21,910 --> 00:12:19,600

compartmentalized somewhere they have

323

00:12:24,710 --> 00:12:21,920

this data but i don't think they know

324

00:12:27,990 --> 00:12:24,720

anything more about it than anyone else

325

00:12:29,030 --> 00:12:28,000

still i mean that's my thoughts about it

326  
00:12:31,269 --> 00:12:29,040  
yeah

327  
00:12:32,710 --> 00:12:31,279  
just i don't know much about these data

328  
00:12:33,990 --> 00:12:32,720  
but the fact that they exist and the

329  
00:12:35,190 --> 00:12:34,000  
fact that they have been stored

330  
00:12:37,829 --> 00:12:35,200  
somewhere

331  
00:12:40,230 --> 00:12:37,839  
um means that they could be

332  
00:12:42,629 --> 00:12:40,240  
and maybe the fact that nasa will uh

333  
00:12:45,190 --> 00:12:42,639  
request access to them may change the

334  
00:12:46,230 --> 00:12:45,200  
the game here maybe we will have more of

335  
00:12:48,230 --> 00:12:46,240  
those

336  
00:12:49,670 --> 00:12:48,240  
that are revealed because scientific

337  
00:12:52,629 --> 00:12:49,680  
investigation

338  
00:12:55,190 --> 00:12:52,639

have been done on them and scientists

339

00:12:56,470 --> 00:12:55,200

will come with some kind of explanation

340

00:12:57,430 --> 00:12:56,480

that's my hope

341

00:13:00,389 --> 00:12:57,440

again

342

00:13:02,550 --> 00:13:00,399

i i'm a true believer in transparency

343

00:13:03,829 --> 00:13:02,560

for science because that's the way we do

344

00:13:05,030 --> 00:13:03,839

progress

345

00:13:06,710 --> 00:13:05,040

so

346

00:13:09,269 --> 00:13:06,720

the game is changing the rules are

347

00:13:10,949 --> 00:13:09,279

changing and i think the public has been

348

00:13:12,870 --> 00:13:10,959

helping with that and i'm glad that this

349

00:13:14,710 --> 00:13:12,880

is happening

350

00:13:16,470 --> 00:13:14,720

yes uh lee spiegel just

351

00:13:18,629 --> 00:13:16,480

said that was yeah gordon cooper at

352

00:13:21,350 --> 00:13:18,639

edwards air force base uh where that

353

00:13:23,190 --> 00:13:21,360

landing was so i think that's i think

354

00:13:26,150 --> 00:13:23,200

that's great i think that's really great

355

00:13:27,750 --> 00:13:26,160

that that uh people like you do not uh

356

00:13:30,230 --> 00:13:27,760

say i don't know if you ever heard of

357

00:13:33,190 --> 00:13:30,240

stanton friedman he's a uh longtime

358

00:13:35,110 --> 00:13:33,200

ufologist uh he used to say uh don't

359

00:13:37,509 --> 00:13:35,120

bother me with the facts my mind is made

360

00:13:39,030 --> 00:13:37,519

up you know that's how a lot of uh

361

00:13:41,189 --> 00:13:39,040

unfortunately a lot of people in the

362

00:13:42,150 --> 00:13:41,199

science field

363

00:13:44,310 --> 00:13:42,160

kind of

364

00:13:46,629 --> 00:13:44,320

touted that type of response because it

365

00:13:48,389 --> 00:13:46,639

was such a taboo subject they didn't

366

00:13:49,350 --> 00:13:48,399

want to touch ufos

367

00:13:51,189 --> 00:13:49,360

you know

368

00:13:53,509 --> 00:13:51,199

uh now we call them uaps i don't know if

369

00:13:55,430 --> 00:13:53,519

it makes anything better yeah do you do

370

00:13:57,990 --> 00:13:55,440

you ever use the term uap and someone

371

00:13:59,990 --> 00:13:58,000

asks you what what does that mean

372

00:14:03,110 --> 00:14:00,000

and then you have to say ufo

373

00:14:05,509 --> 00:14:03,120

yes yes it's uh

374

00:14:06,470 --> 00:14:05,519

and sometimes in french we say of me

375

00:14:07,829 --> 00:14:06,480

which is

376

00:14:09,829 --> 00:14:07,839

even

377

00:14:12,629 --> 00:14:09,839

more difficult so yeah

378

00:14:14,230 --> 00:14:12,639

yeah i have to explain you a p04 of that

379

00:14:16,150 --> 00:14:14,240

but yeah it's

380

00:14:17,990 --> 00:14:16,160

the way we we call them is not what

381

00:14:19,269 --> 00:14:18,000

really matters is what they are exactly

382

00:14:22,310 --> 00:14:19,279

very important

383

00:14:24,790 --> 00:14:22,320

a rose is a rose yeah um

384

00:14:26,150 --> 00:14:24,800

yeah so well this is this is a

385

00:14:29,269 --> 00:14:26,160

to me this is an interesting

386

00:14:31,350 --> 00:14:29,279

conversation um because i i like what

387

00:14:33,030 --> 00:14:31,360

you you're saying you know science is

388

00:14:34,629 --> 00:14:33,040

supposed to be open you know the

389

00:14:36,949 --> 00:14:34,639

discoveries are happening all the time

390

00:14:39,509 --> 00:14:36,959

and i liked having avi loeb on the

391

00:14:42,069 --> 00:14:39,519

couple times i had him on

392

00:14:44,389 --> 00:14:42,079

um because he is open-minded and he said

393

00:14:46,550 --> 00:14:44,399

we should have the curiosity of a child

394

00:14:48,790 --> 00:14:46,560

looking at these things which i think is

395

00:14:51,030 --> 00:14:48,800

really important

396

00:14:52,870 --> 00:14:51,040

and you know you think about what is is

397

00:14:55,430 --> 00:14:52,880

it dark matter makes up something like

398

00:14:57,350 --> 00:14:55,440

90 something percent of the universe we

399

00:15:00,310 --> 00:14:57,360

have no idea what that is

400

00:15:02,710 --> 00:15:00,320

right i mean yeah

401  
00:15:05,269 --> 00:15:02,720  
we we still don't know a lot we still

402  
00:15:07,189 --> 00:15:05,279  
don't know a lot in fact and that's uh

403  
00:15:09,110 --> 00:15:07,199  
that's why it's great we send space

404  
00:15:11,829 --> 00:15:09,120  
telescopes and

405  
00:15:14,069 --> 00:15:11,839  
take bulldoze gigantic telescope and to

406  
00:15:16,230 --> 00:15:14,079  
realize that how much we don't know

407  
00:15:19,030 --> 00:15:16,240  
about our own universe and we don't even

408  
00:15:20,710 --> 00:15:19,040  
know much about planets in our own solar

409  
00:15:22,470 --> 00:15:20,720  
system we still don't know whether it is

410  
00:15:25,350 --> 00:15:22,480  
beneath the crest of

411  
00:15:27,910 --> 00:15:25,360  
of ice of europe of ocean of

412  
00:15:30,150 --> 00:15:27,920  
europa and ganymede for instance we have

413  
00:15:32,550 --> 00:15:30,160

suspicion that there could be life there

414

00:15:34,629 --> 00:15:32,560

microbiological life but we still didn't

415

00:15:36,550 --> 00:15:34,639

go there so

416

00:15:40,550 --> 00:15:36,560

yeah

417

00:15:43,829 --> 00:15:40,560

i know there's going to be some type of

418

00:15:45,269 --> 00:15:43,839

an observation of that moon right

419

00:15:46,069 --> 00:15:45,279

uh there's something being sent out

420

00:15:47,829 --> 00:15:46,079

there

421

00:15:49,110 --> 00:15:47,839

at some point

422

00:15:52,389 --> 00:15:49,120

yeah there is

423

00:15:54,550 --> 00:15:52,399

two major projects one is to launch

424

00:15:56,230 --> 00:15:54,560

the clipper europa mission is basically

425

00:15:57,269 --> 00:15:56,240

a mission that's going to orbit around

426

00:15:59,829 --> 00:15:57,279

europa

427

00:16:00,790 --> 00:15:59,839

and be able to analyze the

428

00:16:03,829 --> 00:16:00,800

um

429

00:16:05,910 --> 00:16:03,839

the geysers the gas coming out right off

430

00:16:10,470 --> 00:16:05,920

of the crust through the crust

431

00:16:12,150 --> 00:16:10,480

uh that's one one mission and for um

432

00:16:14,790 --> 00:16:12,160

for enceladus

433

00:16:16,949 --> 00:16:14,800

uh which is the moon of saturn there is

434

00:16:19,749 --> 00:16:16,959

this idea of sending a mission through

435

00:16:21,749 --> 00:16:19,759

the vent of the gas there and capturing

436

00:16:24,310 --> 00:16:21,759

crystal of ice because we know it's snow

437

00:16:27,110 --> 00:16:24,320

on the surface of this tiny moon and

438

00:16:28,629 --> 00:16:27,120

analyze those on board the telus onboard

439

00:16:31,910 --> 00:16:28,639

the the

440

00:16:33,350 --> 00:16:31,920

the robotic spacecraft to see if there

441

00:16:36,150 --> 00:16:33,360

is some kind of

442

00:16:37,749 --> 00:16:36,160

biology happening in the surf underneath

443

00:16:40,710 --> 00:16:37,759

the surface as well

444

00:16:42,790 --> 00:16:40,720

so we are making progress we are

445

00:16:44,470 --> 00:16:42,800

developing instruments we don't have yet

446

00:16:46,949 --> 00:16:44,480

the funding for some of those missions

447

00:16:49,189 --> 00:16:46,959

but specifically the one for enceladus

448

00:16:51,749 --> 00:16:49,199

but it may come

449

00:16:54,629 --> 00:16:51,759

right right so can you explain what your

450

00:16:56,389 --> 00:16:54,639

typical day at at city when you're

451  
00:16:59,590 --> 00:16:56,399  
involved in doing something for seti

452  
00:17:02,310 --> 00:16:59,600  
what what is what is that like

453  
00:17:03,509 --> 00:17:02,320  
um so i managed a group of multiple

454  
00:17:05,510 --> 00:17:03,519  
scientists

455  
00:17:07,990 --> 00:17:05,520  
who work on specifically on the

456  
00:17:11,829 --> 00:17:08,000  
unistellar network i don't know if you

457  
00:17:16,829 --> 00:17:12,710  
no

458  
00:17:19,750 --> 00:17:16,839  
unistellar

459  
00:17:22,630 --> 00:17:19,760  
unisa yeah those are the still i have

460  
00:17:25,110 --> 00:17:22,640  
one telescope behind me here um so those

461  
00:17:28,789 --> 00:17:25,120  
are net uh telescopes that people can

462  
00:17:31,510 --> 00:17:28,799  
get uh purchase for themselves which are

463  
00:17:33,510 --> 00:17:31,520

telescope which are extremely powerful

464

00:17:35,029 --> 00:17:33,520

digital smart robotic telescope that

465

00:17:37,350 --> 00:17:35,039

everybody can use

466

00:17:39,190 --> 00:17:37,360

and with this telescope

467

00:17:41,510 --> 00:17:39,200

we have a partnership with the city

468

00:17:43,669 --> 00:17:41,520

institute so we basically at the city

469

00:17:46,310 --> 00:17:43,679

institute we can send alerts to the

470

00:17:49,190 --> 00:17:46,320

entire network of those tiny telescopes

471

00:17:51,270 --> 00:17:49,200

around the world and they observe things

472

00:17:53,430 --> 00:17:51,280

happening in the sky for us

473

00:17:55,510 --> 00:17:53,440

so unistellar

474

00:17:57,350 --> 00:17:55,520

is a private company and set institute

475

00:17:59,510 --> 00:17:57,360

is the scientific

476

00:18:01,110 --> 00:17:59,520

institution for this project

477

00:18:02,870 --> 00:18:01,120

so if there is a comment happening in

478

00:18:06,230 --> 00:18:02,880

the sky like right now there is comment

479

00:18:07,110 --> 00:18:06,240

k2 i can send a notification and people

480

00:18:09,110 --> 00:18:07,120

not

481

00:18:11,270 --> 00:18:09,120

record the observation and send us the

482

00:18:13,909 --> 00:18:11,280

observation and we can create a super

483

00:18:16,390 --> 00:18:13,919

image of this comment by combining all

484

00:18:18,789 --> 00:18:16,400

the data so we're creating a community

485

00:18:21,190 --> 00:18:18,799

of cities and astronauts

486

00:18:23,990 --> 00:18:21,200

and they basically help city institute's

487

00:18:26,150 --> 00:18:24,000

researcher to do research which could be

488

00:18:28,630 --> 00:18:26,160

planetary defense to help defending the

489

00:18:31,270 --> 00:18:28,640

planets comets activity cometary

490

00:18:33,430 --> 00:18:31,280

activity it could be as well transiting

491

00:18:35,990 --> 00:18:33,440

exoplanets we can detect

492

00:18:38,950 --> 00:18:36,000

jupiter size exoplanet transiting stars

493

00:18:41,430 --> 00:18:38,960

using this telescope so we end of course

494

00:18:43,029 --> 00:18:41,440

we're ready for the unexpected if

495

00:18:45,430 --> 00:18:43,039

something happening in the sky and we

496

00:18:47,590 --> 00:18:45,440

want to characterize it quickly i can

497

00:18:50,789 --> 00:18:47,600

just basically send an alert through our

498

00:18:51,750 --> 00:18:50,799

slack channel we have 1 000 observers

499

00:18:53,909 --> 00:18:51,760

right now

500

00:18:56,390 --> 00:18:53,919

and they will be able to observe it it

501  
00:18:58,070 --> 00:18:56,400  
would be night somewhere on this planet

502  
00:19:00,710 --> 00:18:58,080  
and they will be able to observe what's

503  
00:19:02,950 --> 00:19:00,720  
going on so this is one of the one of

504  
00:19:04,470 --> 00:19:02,960  
the big outreach scientific projects of

505  
00:19:06,950 --> 00:19:04,480  
the city institute

506  
00:19:08,870 --> 00:19:06,960  
and i'm the lead of this project

507  
00:19:10,870 --> 00:19:08,880  
and we have multiple scientists

508  
00:19:14,230 --> 00:19:10,880  
doing this so

509  
00:19:16,390 --> 00:19:14,240  
doing this implies uh basically get

510  
00:19:19,350 --> 00:19:16,400  
communicating to the public

511  
00:19:21,110 --> 00:19:19,360  
involving us citizen astronomers making

512  
00:19:24,230 --> 00:19:21,120  
sure they observe

513  
00:19:26,950 --> 00:19:24,240

we have a robotic smart pipeline that

514

00:19:28,549 --> 00:19:26,960

process the data almost in real time so

515

00:19:29,909 --> 00:19:28,559

they get quickly the result of the

516

00:19:32,070 --> 00:19:29,919

observations

517

00:19:33,029 --> 00:19:32,080

so we are creating this community of

518

00:19:36,230 --> 00:19:33,039

eyes

519

00:19:39,190 --> 00:19:36,240

capable of observing the sky 24 7

520

00:19:43,270 --> 00:19:40,950

amazing that's amazing that's really

521

00:19:45,669 --> 00:19:43,280

great that's really great before we move

522

00:19:48,150 --> 00:19:45,679

on i just want to go back quickly to

523

00:19:50,070 --> 00:19:48,160

uh dark matter if i could

524

00:19:50,870 --> 00:19:50,080

and my question is

525

00:19:52,630 --> 00:19:50,880

um

526

00:19:55,110 --> 00:19:52,640

do

527

00:19:56,870 --> 00:19:55,120

astronomers kind of like kick around you

528

00:19:58,870 --> 00:19:56,880

know when they're like i don't know

529

00:20:00,070 --> 00:19:58,880

golfing or out at a bar or something

530

00:20:01,350 --> 00:20:00,080

like that

531

00:20:03,669 --> 00:20:01,360

their thoughts and what the

532

00:20:05,990 --> 00:20:03,679

possibilities i know

533

00:20:07,990 --> 00:20:06,000

no one really knows what it is but uh

534

00:20:09,990 --> 00:20:08,000

what are some of the possibilities that

535

00:20:12,549 --> 00:20:10,000

people kick around that you've heard of

536

00:20:15,270 --> 00:20:12,559

what dark matter may actually be

537

00:20:16,710 --> 00:20:15,280

so that's not my feel at all so okay i'm

538

00:20:19,190 --> 00:20:16,720

not gonna be

539

00:20:21,909 --> 00:20:19,200

i'm just gonna say that one of the most

540

00:20:24,390 --> 00:20:21,919

radical idea that we have about dark

541

00:20:27,430 --> 00:20:24,400

matter and dark matter is that in fact

542

00:20:32,070 --> 00:20:27,440

dark matter is not does not exist

543

00:20:33,990 --> 00:20:32,080

what ex dark matter is here to show

544

00:20:36,390 --> 00:20:34,000

that the fact that we don't understand

545

00:20:38,870 --> 00:20:36,400

the structure of the universe

546

00:20:39,669 --> 00:20:38,880

so dark matter is probably making

547

00:20:44,070 --> 00:20:39,679

yeah

548

00:20:46,789 --> 00:20:44,080

probably makes more sense because i i

549

00:20:48,390 --> 00:20:46,799

know you know einstein's theory and and

550

00:20:49,909 --> 00:20:48,400

and um

551  
00:20:51,669 --> 00:20:49,919  
i'm trying to remember exactly what it's

552  
00:20:54,230 --> 00:20:51,679  
called you know when they're the it's

553  
00:20:55,430 --> 00:20:54,240  
moving away the red uh what's it called

554  
00:20:57,430 --> 00:20:55,440  
the red chief

555  
00:20:58,630 --> 00:20:57,440  
the red shift yeah and stuff like that

556  
00:21:01,190 --> 00:20:58,640  
but uh

557  
00:21:03,110 --> 00:21:01,200  
it's so hard to understand uh

558  
00:21:04,470 --> 00:21:03,120  
everything and like you said earlier you

559  
00:21:06,230 --> 00:21:04,480  
know we're making discoveries all the

560  
00:21:09,750 --> 00:21:06,240  
time science is always making new

561  
00:21:11,270 --> 00:21:09,760  
discoveries and i think the saying um

562  
00:21:12,470 --> 00:21:11,280  
i'm trying to remember

563  
00:21:14,549 --> 00:21:12,480

um

564

00:21:16,789 --> 00:21:14,559

who it was that they the saying goes

565

00:21:18,789 --> 00:21:16,799

something like we we know what we know

566

00:21:19,750 --> 00:21:18,799

is a drop and what we don't know is an

567

00:21:21,990 --> 00:21:19,760

ocean

568

00:21:24,710 --> 00:21:22,000

and that's like a real old saying you

569

00:21:26,870 --> 00:21:24,720

know it's uh that's probably true

570

00:21:29,750 --> 00:21:26,880

and what i often say when i explain

571

00:21:31,750 --> 00:21:29,760

science to uh to people is that science

572

00:21:34,070 --> 00:21:31,760

is not an answer

573

00:21:35,990 --> 00:21:34,080

it's an approximation

574

00:21:37,270 --> 00:21:36,000

so that's mean what i mean by that is

575

00:21:38,390 --> 00:21:37,280

that

576  
00:21:40,630 --> 00:21:38,400  
when you

577  
00:21:43,270 --> 00:21:40,640  
the theory we built

578  
00:21:44,950 --> 00:21:43,280  
are basically an attempt to reflect the

579  
00:21:50,149 --> 00:21:44,960  
reality

580  
00:21:52,870 --> 00:21:50,159  
that what we we can perceive

581  
00:21:56,230 --> 00:21:52,880  
a human being so that's the reason we

582  
00:21:58,230 --> 00:21:56,240  
have very complex now theory of the of

583  
00:21:59,669 --> 00:21:58,240  
the structure of the universe and we

584  
00:22:01,350 --> 00:21:59,679  
have been trying to

585  
00:22:02,149 --> 00:22:01,360  
to basically uh

586  
00:22:05,750 --> 00:22:02,159  
um

587  
00:22:08,149 --> 00:22:05,760  
study them using the lhc and so on

588  
00:22:10,390 --> 00:22:08,159

and they fit more or less the existence

589

00:22:11,590 --> 00:22:10,400

of the boson of x and so on seems to fit

590

00:22:13,110 --> 00:22:11,600

the theory

591

00:22:15,990 --> 00:22:13,120

but now

592

00:22:18,789 --> 00:22:16,000

we are noticing already using the lsc

593

00:22:21,029 --> 00:22:18,799

the large hydrogen collider some slight

594

00:22:23,909 --> 00:22:21,039

variation in the theory

595

00:22:25,430 --> 00:22:23,919

and those slight variations are truly

596

00:22:26,710 --> 00:22:25,440

what is interesting

597

00:22:29,590 --> 00:22:26,720

because they

598

00:22:32,230 --> 00:22:29,600

implies that we we have an approximation

599

00:22:34,710 --> 00:22:32,240

of the reality so we need to build

600

00:22:37,029 --> 00:22:34,720

better theory to really encompass and

601  
00:22:39,029 --> 00:22:37,039  
understand the structure of the universe

602  
00:22:42,310 --> 00:22:39,039  
so that's why science is always an

603  
00:22:45,029 --> 00:22:42,320  
approximation which evolve over time and

604  
00:22:47,430 --> 00:22:45,039  
get better and better i hope

605  
00:22:49,270 --> 00:22:47,440  
so one day we will fix this problem of

606  
00:22:51,350 --> 00:22:49,280  
the dark matter one day we will

607  
00:22:54,870 --> 00:22:51,360  
understand that this black matter is

608  
00:22:57,270 --> 00:22:54,880  
maybe an interaction with particles from

609  
00:22:58,710 --> 00:22:57,280  
another kind of dimension that we don't

610  
00:23:01,830 --> 00:22:58,720  
perceive i don't know i'm making up

611  
00:23:03,909 --> 00:23:01,840  
stories here but we will probably evolve

612  
00:23:06,230 --> 00:23:03,919  
and this evolution is important in

613  
00:23:08,390 --> 00:23:06,240

science science should be always moving

614

00:23:10,070 --> 00:23:08,400

forward and always changing

615

00:23:13,990 --> 00:23:10,080

and the only way you can do that is by

616

00:23:18,230 --> 00:23:16,149

and and and and let go of your beliefs

617

00:23:20,950 --> 00:23:18,240

if they're wrong

618

00:23:24,070 --> 00:23:20,960

right yeah yeah um

619

00:23:25,750 --> 00:23:24,080

so i i would like to talk uh about the

620

00:23:27,590 --> 00:23:25,760

james webb telescope i was really

621

00:23:29,990 --> 00:23:27,600

excited about that i actually got to see

622

00:23:32,549 --> 00:23:30,000

it down at garter's space center when it

623

00:23:33,630 --> 00:23:32,559

was being built um well i was there

624

00:23:37,110 --> 00:23:33,640

around

625

00:23:38,390 --> 00:23:37,120

2017 i think or earlier

626  
00:23:40,390 --> 00:23:38,400  
and

627  
00:23:42,789 --> 00:23:40,400  
you know they started it it started out

628  
00:23:44,230 --> 00:23:42,799  
as a billion dollar project

629  
00:23:47,990 --> 00:23:44,240  
then it was a three billion dollar

630  
00:23:49,110 --> 00:23:48,000  
project and then but it's so complicated

631  
00:23:51,990 --> 00:23:49,120  
because

632  
00:23:54,470 --> 00:23:52,000  
of how they had to get this thing up in

633  
00:23:58,149 --> 00:23:54,480  
space and not have any problems i know

634  
00:24:01,029 --> 00:23:58,159  
there was something like 344

635  
00:24:03,430 --> 00:24:01,039  
first point um failures or something

636  
00:24:05,590 --> 00:24:03,440  
like that before launching but i mean

637  
00:24:08,390 --> 00:24:05,600  
the the mirror is what gets me the

638  
00:24:10,149 --> 00:24:08,400

mirror is like a mirror that stacked

639

00:24:11,510 --> 00:24:10,159

together i saw that i saw the mirror

640

00:24:12,310 --> 00:24:11,520

when they had it out when i was down

641

00:24:13,990 --> 00:24:12,320

there

642

00:24:15,990 --> 00:24:14,000

and um

643

00:24:17,190 --> 00:24:16,000

but it had to be stacked on top of each

644

00:24:19,350 --> 00:24:17,200

other

645

00:24:22,390 --> 00:24:19,360

and then it's uh

646

00:24:24,710 --> 00:24:22,400

it's just crazy how it it it goes out a

647

00:24:27,350 --> 00:24:24,720

million miles in space

648

00:24:28,789 --> 00:24:27,360

and unfolds itself and then the tennis

649

00:24:31,269 --> 00:24:28,799

court size

650

00:24:33,110 --> 00:24:31,279

shield goes out everything went exactly

651  
00:24:34,789 --> 00:24:33,120  
the way it was supposed to which is

652  
00:24:37,110 --> 00:24:34,799  
really amazing and now it can be out

653  
00:24:38,630 --> 00:24:37,120  
there for something like 20 years and

654  
00:24:40,149 --> 00:24:38,640  
not

655  
00:24:41,830 --> 00:24:40,159  
uh with the amount of fuel because

656  
00:24:47,110 --> 00:24:41,840  
everything went so smoothly which i

657  
00:24:51,669 --> 00:24:49,350  
so uh were you following that all along

658  
00:24:53,830 --> 00:24:51,679  
when that launched and everything yeah

659  
00:24:55,110 --> 00:24:53,840  
and in fact the unistellar network that

660  
00:24:57,909 --> 00:24:55,120  
i mentioned

661  
00:25:01,669 --> 00:24:57,919  
uh follow it we follow the entire java

662  
00:25:03,110 --> 00:25:01,679  
ust from the take from the launch almost

663  
00:25:05,590 --> 00:25:03,120

all the way to when you reach the

664

00:25:08,310 --> 00:25:05,600

lagrange point so we have data that i

665

00:25:10,390 --> 00:25:08,320

showed the opening of the sun shield the

666

00:25:13,430 --> 00:25:10,400

opening of the primary mirror has been

667

00:25:15,750 --> 00:25:13,440

detected using our our telescope

668

00:25:19,110 --> 00:25:15,760

and this is done with a community of 50

669

00:25:21,990 --> 00:25:19,120

people around the world 50 observers 57

670

00:25:24,789 --> 00:25:22,000

exactly observe that and we have the

671

00:25:26,710 --> 00:25:24,799

data to show this and we also see the

672

00:25:29,190 --> 00:25:26,720

glint of the solar panel from time to

673

00:25:31,590 --> 00:25:29,200

time when the orientation was perfect we

674

00:25:33,830 --> 00:25:31,600

see as well that located the telescope

675

00:25:36,710 --> 00:25:33,840

in a way that it was spinning on itself

676  
00:25:39,590 --> 00:25:36,720  
in six hours so those are data that we

677  
00:25:41,269 --> 00:25:39,600  
collected with this telescope and

678  
00:25:43,669 --> 00:25:41,279  
basically

679  
00:25:46,230 --> 00:25:43,679  
been very useful for nasa

680  
00:25:48,549 --> 00:25:46,240  
to know as what's going on we hope that

681  
00:25:49,350 --> 00:25:48,559  
in the future when the telescope is

682  
00:25:51,029 --> 00:25:49,360  
being

683  
00:25:52,710 --> 00:25:51,039  
have some issue for istan they will

684  
00:25:54,630 --> 00:25:52,720  
position it the same way that he was

685  
00:25:56,310 --> 00:25:54,640  
when they launched it to the long

686  
00:25:58,230 --> 00:25:56,320  
lagrange point and we can take the same

687  
00:26:00,230 --> 00:25:58,240  
measurement and see for instance some

688  
00:26:02,630 --> 00:26:00,240

variation of light due to the

689

00:26:04,870 --> 00:26:02,640

degradation of the sun shield or the

690

00:26:06,789 --> 00:26:04,880

primary mirror i don't hope for that but

691

00:26:08,710 --> 00:26:06,799

it may happen so we basically have

692

00:26:11,430 --> 00:26:08,720

collected the data that will be the

693

00:26:12,230 --> 00:26:11,440

standard to analyze and to understand

694

00:26:20,789 --> 00:26:12,240

the

695

00:26:23,350 --> 00:26:20,799

could have gone wrong and it's just

696

00:26:26,470 --> 00:26:23,360

amazing that uh it went so smoothly i

697

00:26:28,149 --> 00:26:26,480

mean i'm sure everyone was breathing a

698

00:26:29,750 --> 00:26:28,159

sigh of relief when that

699

00:26:31,990 --> 00:26:29,760

when that launched yeah first of all i

700

00:26:33,909 --> 00:26:32,000

mean you know

701  
00:26:35,510 --> 00:26:33,919  
everybody here's a question yeah here's

702  
00:26:37,590 --> 00:26:35,520  
a question um

703  
00:26:40,470 --> 00:26:37,600  
about the james webb telescope that came

704  
00:26:42,950 --> 00:26:40,480  
in from chat will the webb telescope

705  
00:26:45,430 --> 00:26:42,960  
be able to look at what object is

706  
00:26:47,110 --> 00:26:45,440  
influencing neptune's orbit are you

707  
00:26:49,029 --> 00:26:47,120  
familiar with that

708  
00:26:51,110 --> 00:26:49,039  
yes so we

709  
00:26:52,870 --> 00:26:51,120  
with the the general space telescope is

710  
00:26:54,950 --> 00:26:52,880  
designed to observe in the mid infrared

711  
00:26:56,710 --> 00:26:54,960  
file infrared mostly

712  
00:26:58,710 --> 00:26:56,720  
so it means that he will be able to

713  
00:27:02,870 --> 00:26:58,720

observe very distant

714

00:27:08,070 --> 00:27:04,830

the reason for this is because when they

715

00:27:10,549 --> 00:27:08,080

far they are basically cold because

716

00:27:13,190 --> 00:27:10,559

solar system body don't emit light they

717

00:27:15,350 --> 00:27:13,200

simply reflect light so if they far away

718

00:27:17,830 --> 00:27:15,360

from the sun they have extremely cold

719

00:27:19,269 --> 00:27:17,840

temperatures they reflect light they

720

00:27:20,389 --> 00:27:19,279

emit light which is mostly in the

721

00:27:23,830 --> 00:27:20,399

infrared

722

00:27:26,230 --> 00:27:23,840

so we we hope to be able to use the jwst

723

00:27:28,630 --> 00:27:26,240

to truly understand the outer part of

724

00:27:31,669 --> 00:27:28,640

the solar system understand what's going

725

00:27:34,470 --> 00:27:31,679

on beyond the orbit of neptune detect

726

00:27:36,549 --> 00:27:34,480

even larger transit object we can we

727

00:27:40,310 --> 00:27:36,559

know a few of them which are 1 000

728

00:27:42,389 --> 00:27:40,320

kilometer or less 300 kilometer

729

00:27:44,070 --> 00:27:42,399

around the sun and we know there is

730

00:27:46,789 --> 00:27:44,080

significantly more because we see

731

00:27:49,430 --> 00:27:46,799

perturbation in this complex family so

732

00:27:51,430 --> 00:27:49,440

the jwst will probably find some of them

733

00:27:52,470 --> 00:27:51,440

or at least help us to understand what

734

00:27:55,430 --> 00:27:52,480

they are

735

00:27:58,789 --> 00:27:55,440

what they do in terms of rotation

736

00:28:02,070 --> 00:27:58,799

um on themselves their size if they are

737

00:28:04,870 --> 00:28:02,080

moons etc so it's going to be a game

738

00:28:06,870 --> 00:28:04,880

changer for us to basically be able to

739

00:28:09,669 --> 00:28:06,880

use this telescope to study the outer

740

00:28:13,590 --> 00:28:09,679

part of the solar system

741

00:28:15,510 --> 00:28:13,600

now the the james webb also

742

00:28:18,310 --> 00:28:15,520

has a way to

743

00:28:21,510 --> 00:28:18,320

possibly detect if there's life

744

00:28:22,470 --> 00:28:21,520

on um you know on a um an earth-like

745

00:28:24,710 --> 00:28:22,480

planet

746

00:28:27,190 --> 00:28:24,720

um yeah i'm trying to remember there's

747

00:28:28,950 --> 00:28:27,200

one that's a system that's 40 light

748

00:28:31,110 --> 00:28:28,960

years away trappist

749

00:28:32,470 --> 00:28:31,120

what's it called one

750

00:28:35,029 --> 00:28:32,480

trapezoid

751

00:28:37,190 --> 00:28:35,039

these are the targets yeah three uh

752

00:28:39,190 --> 00:28:37,200

three three earth-like planets around

753

00:28:41,510 --> 00:28:39,200

there now can you explain to the

754

00:28:43,190 --> 00:28:41,520

audience how james webb may be able to

755

00:28:45,750 --> 00:28:43,200

detect i know it has to do with uh

756

00:28:48,310 --> 00:28:45,760

reflect the planet going in front of the

757

00:28:51,990 --> 00:28:48,320

sun and all that can and the atmosphere

758

00:28:54,149 --> 00:28:52,000

right so jwst was not designed to

759

00:28:55,510 --> 00:28:54,159

directly image exoplanets he will but

760

00:28:57,269 --> 00:28:55,520

that's not really what he's going to be

761

00:28:59,430 --> 00:28:57,279

able to do the most

762

00:29:02,149 --> 00:28:59,440

is going to be able to analyze the

763

00:29:05,909 --> 00:29:02,159

atmosphere of a planet when the planet

764

00:29:07,909 --> 00:29:05,919

is passing between us and the host star

765

00:29:09,830 --> 00:29:07,919

so when the star the planet is passing

766

00:29:12,149 --> 00:29:09,840

in from the star the light of the star

767

00:29:13,830 --> 00:29:12,159

slightly decrease in intensity it's very

768

00:29:16,470 --> 00:29:13,840

small and we're talking about

769

00:29:19,350 --> 00:29:16,480

less than a percent definitely

770

00:29:21,510 --> 00:29:19,360

and but jwst will be also able to

771

00:29:22,470 --> 00:29:21,520

analyze the the drop

772

00:29:23,590 --> 00:29:22,480

of

773

00:29:26,470 --> 00:29:23,600

brightness

774

00:29:28,310 --> 00:29:26,480

and see the color of this drop and by

775

00:29:30,710 --> 00:29:28,320

looking at the color of this drop it

776

00:29:33,350 --> 00:29:30,720

will be able to analyze the composition

777

00:29:35,830 --> 00:29:33,360

of the atmosphere of those planets

778

00:29:39,350 --> 00:29:35,840

so one of the big projects we have at

779

00:29:41,830 --> 00:29:39,360

jwst is to observe those planets with

780

00:29:44,070 --> 00:29:41,840

orbit around the star

781

00:29:46,470 --> 00:29:44,080

and are in the habitable zone in the

782

00:29:48,470 --> 00:29:46,480

zone where you expect to find water

783

00:29:51,590 --> 00:29:48,480

and be able to analyze the atmosphere of

784

00:29:53,669 --> 00:29:51,600

those planets if we see for instance the

785

00:29:55,830 --> 00:29:53,679

presence of gas

786

00:29:58,710 --> 00:29:55,840

similar gas is similar to what you see

787

00:30:01,269 --> 00:29:58,720

on earth it may imply that this planet

788

00:30:04,950 --> 00:30:01,279

is very similar to our own planet i'm

789

00:30:06,830 --> 00:30:04,960

talking about detection of nitrogen o3

790

00:30:09,750 --> 00:30:06,840

carbon carbon

791

00:30:11,909 --> 00:30:09,760

dioxide etc etc if we see the same

792

00:30:15,190 --> 00:30:11,919

composition chemical composition in this

793

00:30:18,149 --> 00:30:15,200

on this planet you may say wow there is

794

00:30:19,669 --> 00:30:18,159

life and life similar to our on this

795

00:30:21,510 --> 00:30:19,679

planet

796

00:30:22,789 --> 00:30:21,520

and we have no guarantee that it will

797

00:30:26,149 --> 00:30:22,799

work

798

00:30:29,430 --> 00:30:26,159

but we uh we are starting the search

799

00:30:31,590 --> 00:30:29,440

using this uh space telescope

800

00:30:32,470 --> 00:30:31,600

and so i know that

801  
00:30:35,350 --> 00:30:32,480  
um

802  
00:30:39,029 --> 00:30:35,360  
seti is using the radio telescopes i

803  
00:30:40,149 --> 00:30:39,039  
believe um the array and all that but

804  
00:30:43,430 --> 00:30:40,159  
how

805  
00:30:45,710 --> 00:30:43,440  
ex exactly are

806  
00:30:49,510 --> 00:30:45,720  
i i know the wow signal i can't was that

807  
00:30:51,669 --> 00:30:49,520  
1979 or 1980 or whenever it was

808  
00:30:54,870 --> 00:30:51,679  
that's interesting but how is seti

809  
00:30:58,310 --> 00:30:54,880  
looking besides radio signals what are

810  
00:31:00,070 --> 00:30:58,320  
the other ways is seti trying to protect

811  
00:31:02,149 --> 00:31:00,080  
life out there

812  
00:31:04,230 --> 00:31:02,159  
so there is beautiful way i could talk

813  
00:31:06,310 --> 00:31:04,240

about this for hours but let me just

814

00:31:07,830 --> 00:31:06,320

tell you that one of the major way we

815

00:31:08,950 --> 00:31:07,840

are doing we're developing new

816

00:31:11,029 --> 00:31:08,960

instrument

817

00:31:13,190 --> 00:31:11,039

to search for lasers

818

00:31:16,070 --> 00:31:13,200

coming from civilizations

819

00:31:18,389 --> 00:31:16,080

so you can expect that if a civilization

820

00:31:20,549 --> 00:31:18,399

slightly more advanced than us let's

821

00:31:23,190 --> 00:31:20,559

take 10 20 years

822

00:31:25,350 --> 00:31:23,200

more advanced we'll probably communicate

823

00:31:27,669 --> 00:31:25,360

essentially using lasers

824

00:31:31,590 --> 00:31:27,679

because it's it's a better way it's

825

00:31:33,669 --> 00:31:31,600

faster you can send more data etc so if

826

00:31:36,149 --> 00:31:33,679

they know we are here because there's

827

00:31:38,870 --> 00:31:36,159

already this they've this uh used and

828

00:31:40,870 --> 00:31:38,880

developed a new space telescope

829

00:31:42,950 --> 00:31:40,880

they will basically be able to use their

830

00:31:45,669 --> 00:31:42,960

lasers onto us

831

00:31:48,310 --> 00:31:45,679

to tell us we are here

832

00:31:49,990 --> 00:31:48,320

well if they do that right now

833

00:31:52,149 --> 00:31:50,000

there is very few chance that this will

834

00:31:54,789 --> 00:31:52,159

be detected because almost nobody is

835

00:31:57,909 --> 00:31:54,799

looking for laser guard laser spot in

836

00:32:00,870 --> 00:31:57,919

the sky so cities developed what we call

837

00:32:03,830 --> 00:32:00,880

the laser city array and which is an

838

00:32:05,830 --> 00:32:03,840

area that observe the entire sky 24 7.

839

00:32:07,830 --> 00:32:05,840

we have one station in california a

840

00:32:10,149 --> 00:32:07,840

second one in hawaii and we're going to

841

00:32:12,389 --> 00:32:10,159

open multiple stations around the world

842

00:32:14,870 --> 00:32:12,399

so we can completely cover the entire

843

00:32:16,630 --> 00:32:14,880

sky and see continuously there is a

844

00:32:18,950 --> 00:32:16,640

laser pulse

845

00:32:21,269 --> 00:32:18,960

coming from an intelligent civilization

846

00:32:23,430 --> 00:32:21,279

who simply wants to tell us we are here

847

00:32:25,190 --> 00:32:23,440

and we want to communicate

848

00:32:28,630 --> 00:32:25,200

so this look like science fiction but

849

00:32:30,789 --> 00:32:28,640

it's happening right now um that's one

850

00:32:33,590 --> 00:32:30,799

one project which is the search for

851  
00:32:35,430 --> 00:32:33,600  
techno signatures then at city institute

852  
00:32:38,470 --> 00:32:35,440  
in fact a lot of us

853  
00:32:40,950 --> 00:32:38,480  
i would say more than 70 scientists

854  
00:32:44,149 --> 00:32:40,960  
do work in the search for

855  
00:32:46,070 --> 00:32:44,159  
life in our solar system by

856  
00:32:47,590 --> 00:32:46,080  
helping developing instruments that will

857  
00:32:50,149 --> 00:32:47,600  
be able to dig

858  
00:32:52,070 --> 00:32:50,159  
underneath the surface of mars

859  
00:32:54,389 --> 00:32:52,080  
see in the cave of mars whether or not

860  
00:32:57,430 --> 00:32:54,399  
there is life or stance so enceladus

861  
00:32:59,430 --> 00:32:57,440  
that we mentioned europa etc

862  
00:33:01,269 --> 00:32:59,440  
and a very large proportion of those

863  
00:33:02,470 --> 00:33:01,279

scientists are now developing

864

00:33:04,230 --> 00:33:02,480

instruments

865

00:33:05,669 --> 00:33:04,240

capable of

866

00:33:07,669 --> 00:33:05,679

discovering

867

00:33:10,070 --> 00:33:07,679

and analyzing

868

00:33:12,149 --> 00:33:10,080

analyzing the atmosphere of exoplanets

869

00:33:13,669 --> 00:33:12,159

because exoplanets are really truly the

870

00:33:18,630 --> 00:33:13,679

next

871

00:33:22,710 --> 00:33:18,640

know that there is two exoplanets in

872

00:33:25,269 --> 00:33:22,720

average in our galaxy with 400 billion

873

00:33:27,669 --> 00:33:25,279

stars in our galaxy so that's a lot of

874

00:33:30,470 --> 00:33:27,679

planets and we know that 30

875

00:33:31,830 --> 00:33:30,480

of those planets have liquid water

876

00:33:34,630 --> 00:33:31,840

so that means there is a lot of

877

00:33:37,269 --> 00:33:34,640

potential habitable world over there in

878

00:33:38,710 --> 00:33:37,279

our galaxy so now we need to use those

879

00:33:40,630 --> 00:33:38,720

instruments

880

00:33:44,070 --> 00:33:40,640

that will be a ball

881

00:33:46,789 --> 00:33:44,080

to see or to detect the presence of life

882

00:33:47,909 --> 00:33:46,799

on those exoplanets

883

00:33:49,509 --> 00:33:47,919

now

884

00:33:51,430 --> 00:33:49,519

i'm going to ask you for an opinion i

885

00:33:54,549 --> 00:33:51,440

know scientists don't like to give

886

00:33:57,269 --> 00:33:54,559

opinions too much but um what do you

887

00:33:59,750 --> 00:33:57,279

think how comfortable would you be in

888

00:34:01,509 --> 00:33:59,760

saying that you're 100

889

00:34:04,830 --> 00:34:01,519

certain that there's got to be life out

890

00:34:04,840 --> 00:34:09,270

so got me here

891

00:34:13,430 --> 00:34:12,069

so i will never say 100 certain about

892

00:34:16,470 --> 00:34:13,440

something

893

00:34:17,829 --> 00:34:16,480

even uh even in life i would i will

894

00:34:18,550 --> 00:34:17,839

never say that

895

00:34:21,190 --> 00:34:18,560

but

896

00:34:23,349 --> 00:34:21,200

what motivate me in my research

897

00:34:25,669 --> 00:34:23,359

is the belief that there is a life

898

00:34:27,349 --> 00:34:25,679

elsewhere definitely

899

00:34:28,869 --> 00:34:27,359

i mean i could not be working at the

900

00:34:30,149 --> 00:34:28,879

city institute

901  
00:34:32,950 --> 00:34:30,159  
without

902  
00:34:35,109 --> 00:34:32,960  
believing that there is life elsewhere

903  
00:34:37,829 --> 00:34:35,119  
the likeliness of having no life in our

904  
00:34:40,069 --> 00:34:37,839  
galaxy outside our own planet it's so

905  
00:34:42,310 --> 00:34:40,079  
small that it's impossible i would say

906  
00:34:46,230 --> 00:34:42,320  
so that's my main motivation

907  
00:34:48,149 --> 00:34:46,240  
yeah yeah i mean i i i agree i mean life

908  
00:34:51,109 --> 00:34:48,159  
i mean if you look where we find life on

909  
00:34:54,310 --> 00:34:51,119  
this planet in impossible places and

910  
00:34:56,629 --> 00:34:54,320  
life really fights to be here you know

911  
00:34:59,030 --> 00:34:56,639  
so i imagine it would fight to be

912  
00:35:00,790 --> 00:34:59,040  
uh anywhere uh someone when you were

913  
00:35:02,390 --> 00:35:00,800

talking about your telescope program the

914

00:35:04,790 --> 00:35:02,400

one you have behind you there

915

00:35:08,150 --> 00:35:04,800

someone wanted to know um how they could

916

00:35:09,109 --> 00:35:08,160

get involved in that program

917

00:35:11,990 --> 00:35:09,119

so

918

00:35:14,230 --> 00:35:12,000

uh is that the unistellar program

919

00:35:15,030 --> 00:35:14,240

yes we talk a lot yeah

920

00:35:17,349 --> 00:35:15,040

well

921

00:35:18,710 --> 00:35:17,359

the idea is simply to to purchase a

922

00:35:21,910 --> 00:35:18,720

telescope

923

00:35:24,470 --> 00:35:21,920

uh we do have uh we we have distributors

924

00:35:27,589 --> 00:35:24,480

around the world uh you can also go on

925

00:35:31,270 --> 00:35:27,599

our website unistellar.com

926

00:35:32,950 --> 00:35:31,280

i will put the link somewhere after and

927

00:35:35,030 --> 00:35:32,960

you can get this telescope and as soon

928

00:35:37,750 --> 00:35:35,040

you get this telescope you learn how to

929

00:35:40,950 --> 00:35:37,760

use it for observation in your house

930

00:35:42,150 --> 00:35:40,960

show galaxies nebulae and so on but then

931

00:35:44,550 --> 00:35:42,160

later on

932

00:35:46,470 --> 00:35:44,560

when you feel ready you basically on the

933

00:35:49,349 --> 00:35:46,480

app there is a there is a tiny button

934

00:35:51,829 --> 00:35:49,359

you say join the citizen science project

935

00:35:55,109 --> 00:35:51,839

or something like that and you basically

936

00:35:57,829 --> 00:35:55,119

get from us an invitation to join the

937

00:35:59,670 --> 00:35:57,839

slack channel to get notification when

938

00:36:02,470 --> 00:35:59,680

something is happening in the sky and

939

00:36:04,150 --> 00:36:02,480

then you become citizen scientist

940

00:36:06,150 --> 00:36:04,160

oh how about that well that's really

941

00:36:07,910 --> 00:36:06,160

interesting and that link is in the show

942

00:36:10,150 --> 00:36:07,920

notes for anyone that's listening to

943

00:36:12,310 --> 00:36:10,160

this you can go to our website podcast

944

00:36:14,310 --> 00:36:12,320

ufo and it's right in the show notes for

945

00:36:17,829 --> 00:36:14,320

this particular one uh

946

00:36:19,990 --> 00:36:17,839

mary always has great questions and you

947

00:36:22,790 --> 00:36:20,000

said something about defending the

948

00:36:23,670 --> 00:36:22,800

planet so she wanted to know

949

00:36:24,870 --> 00:36:23,680

um

950

00:36:26,710 --> 00:36:24,880

she wanted to know what you're defending

951

00:36:29,109 --> 00:36:26,720

the planet from

952

00:36:31,030 --> 00:36:29,119

the planetary defense program is

953

00:36:32,790 --> 00:36:31,040

defending the planets again as the road

954

00:36:34,870 --> 00:36:32,800

impact it's not that exciting and i

955

00:36:37,510 --> 00:36:34,880

think that's ending

956

00:36:40,550 --> 00:36:37,520

yeah no aliens i i i think that's

957

00:36:42,630 --> 00:36:40,560

extremely important um you know i don't

958

00:36:44,630 --> 00:36:42,640

i think that's very important because

959

00:36:46,630 --> 00:36:44,640

you know it's happened before and it

960

00:36:48,710 --> 00:36:46,640

could certainly happen

961

00:36:51,030 --> 00:36:48,720

again it's it's it's scary that we're

962

00:36:52,390 --> 00:36:51,040

not you know not really protected from

963

00:36:54,390 --> 00:36:52,400

asteroids and

964

00:36:56,710 --> 00:36:54,400

uh you know we could

965

00:36:58,950 --> 00:36:56,720

you know we saw that happen at celabinsk

966

00:37:01,190 --> 00:36:58,960

um you know several years ago and that

967

00:37:03,589 --> 00:37:01,200

was that was just a small bust-sized one

968

00:37:06,550 --> 00:37:03,599

but i mean you have something four miles

969

00:37:08,470 --> 00:37:06,560

long that is hidden by the sun and all

970

00:37:10,310 --> 00:37:08,480

of a sudden is coming right at us you

971

00:37:13,510 --> 00:37:10,320

know what do we do

972

00:37:14,230 --> 00:37:13,520

what do you think the future of that is

973

00:37:19,349 --> 00:37:14,240

well

974

00:37:20,710 --> 00:37:19,359

that if we want to find intelligent life

975

00:37:23,030 --> 00:37:20,720

elsewhere

976  
00:37:24,790 --> 00:37:23,040  
we need to basically

977  
00:37:26,950 --> 00:37:24,800  
live a long enough

978  
00:37:29,430 --> 00:37:26,960  
in time because we basically start in

979  
00:37:31,349 --> 00:37:29,440  
the search present recently only 35

980  
00:37:34,150 --> 00:37:31,359  
years we observe like

981  
00:37:36,310 --> 00:37:34,160  
a few hundred million stars if you want

982  
00:37:38,310 --> 00:37:36,320  
to observe the 400 billion star and the

983  
00:37:39,670 --> 00:37:38,320  
3 trillion galaxies that's going to take

984  
00:37:40,870 --> 00:37:39,680  
a long time

985  
00:37:42,870 --> 00:37:40,880  
so

986  
00:37:45,910 --> 00:37:42,880  
my idea is that the development of

987  
00:37:47,510 --> 00:37:45,920  
technology of civilization also depends

988  
00:37:49,750 --> 00:37:47,520

on the survival

989

00:37:51,589 --> 00:37:49,760

meaning that if we want to be become an

990

00:37:53,430 --> 00:37:51,599

advanced civilization

991

00:37:54,550 --> 00:37:53,440

we need to have a planetary defense

992

00:37:56,790 --> 00:37:54,560

program

993

00:37:58,790 --> 00:37:56,800

because it will happen that an asteroid

994

00:38:01,270 --> 00:37:58,800

will impact our planet

995

00:38:04,150 --> 00:38:01,280

it will happen maybe not tomorrow it

996

00:38:06,710 --> 00:38:04,160

will happen in 200 years but we need to

997

00:38:08,950 --> 00:38:06,720

have a way to and to know that this is

998

00:38:10,390 --> 00:38:08,960

when this is going to happen and how to

999

00:38:12,710 --> 00:38:10,400

mitigate this

1000

00:38:14,069 --> 00:38:12,720

any intelligent civilization in our

1001

00:38:16,230 --> 00:38:14,079

galaxy

1002

00:38:18,390 --> 00:38:16,240

probably already is facing the same

1003

00:38:19,990 --> 00:38:18,400

issue and they already developed this if

1004

00:38:20,710 --> 00:38:20,000

they were if they're more advanced than

1005

00:38:22,710 --> 00:38:20,720

us

1006

00:38:25,109 --> 00:38:22,720

so that's part of an evolution of a

1007

00:38:28,310 --> 00:38:25,119

technology called civilization to be

1008

00:38:29,270 --> 00:38:28,320

able to do this to divert an asteroid to

1009

00:38:33,030 --> 00:38:29,280

save

1010

00:38:34,870 --> 00:38:33,040

the biosphere of its planet right now if

1011

00:38:37,109 --> 00:38:34,880

we didn't have jupiter we'd be in a lot

1012

00:38:39,270 --> 00:38:37,119

more trouble than we are right

1013

00:38:41,109 --> 00:38:39,280

i mean yes that's uh the shield of

1014

00:38:42,870 --> 00:38:41,119

jupiter has been extremely useful to

1015

00:38:45,109 --> 00:38:42,880

protect us against

1016

00:38:47,589 --> 00:38:45,119

comets specifically coming from the

1017

00:38:50,550 --> 00:38:47,599

distance distant

1018

00:38:51,589 --> 00:38:50,560

out cloud so we should thanks jupiter

1019

00:38:54,390 --> 00:38:51,599

every day

1020

00:38:58,829 --> 00:38:54,400

for being the planet that protected us

1021

00:39:02,950 --> 00:39:01,750

uh hang on just a minute i have i'm

1022

00:39:05,270 --> 00:39:02,960

trying to understand i have an

1023

00:39:06,150 --> 00:39:05,280

astronomer texting me here a friend of

1024

00:39:07,510 --> 00:39:06,160

mine

1025

00:39:08,310 --> 00:39:07,520

and um

1026

00:39:11,829 --> 00:39:08,320

um

1027

00:39:14,069 --> 00:39:11,839

i think uh oh he has uh some remote

1028

00:39:15,589 --> 00:39:14,079

telescopes i'm trying to get this what

1029

00:39:16,390 --> 00:39:15,599

he's trying to say here

1030

00:39:18,870 --> 00:39:16,400

um

1031

00:39:20,870 --> 00:39:18,880

maybe maybe i'll ask him

1032

00:39:24,390 --> 00:39:20,880

to uh to call in

1033

00:39:25,349 --> 00:39:24,400

and if if he can um let me let me just

1034

00:39:28,310 --> 00:39:25,359

uh

1035

00:39:30,390 --> 00:39:28,320

do you mind if i bring on a friend no go

1036

00:39:31,589 --> 00:39:30,400

ahead she's a friend

1037

00:39:33,349 --> 00:39:31,599

yeah yeah

1038

00:39:35,109 --> 00:39:33,359

let's see if i can do this

1039

00:39:36,710 --> 00:39:35,119

um

1040

00:39:40,870 --> 00:39:36,720

i'm gonna just invite him on if he can

1041

00:39:40,880 --> 00:39:46,390

uh he's listening and he has a

1042

00:39:50,390 --> 00:39:47,750

oh i don't think he can come on but

1043

00:39:52,069 --> 00:39:50,400

anyway uh i'll i'll i'll send you his

1044

00:39:52,950 --> 00:39:52,079

question later when i understand exactly

1045

00:39:58,470 --> 00:39:52,960

what

1046

00:39:59,829 --> 00:39:58,480

you are welcome to pose some questions

1047

00:40:01,109 --> 00:39:59,839

in the chat

1048

00:40:03,109 --> 00:40:01,119

um and

1049

00:40:05,349 --> 00:40:03,119

are we only here's one here are we only

1050

00:40:07,349 --> 00:40:05,359

looking for exoplanets in our

1051  
00:40:09,510 --> 00:40:07,359  
own galaxy i mean that's that's the only

1052  
00:40:11,510 --> 00:40:09,520  
capability we have at this point right

1053  
00:40:13,589 --> 00:40:11,520  
if you go out oh here comes here comes

1054  
00:40:15,030 --> 00:40:13,599  
mark right now my friend mark just

1055  
00:40:16,069 --> 00:40:15,040  
joined us but go ahead and answer that

1056  
00:40:18,150 --> 00:40:16,079  
if you would

1057  
00:40:20,150 --> 00:40:18,160  
so we just started searching for

1058  
00:40:22,550 --> 00:40:20,160  
exoplanet outside our galaxy and we

1059  
00:40:24,390 --> 00:40:22,560  
think we found some one of them outside

1060  
00:40:26,710 --> 00:40:24,400  
our galaxy

1061  
00:40:29,910 --> 00:40:26,720  
but we cheated we basically

1062  
00:40:32,069 --> 00:40:29,920  
uh observed a galaxy which has been kind

1063  
00:40:34,870 --> 00:40:32,079

of

1064

00:40:37,349 --> 00:40:34,880

absorbed by our own galaxy and we found

1065

00:40:39,910 --> 00:40:37,359

a planet around one of those stars

1066

00:40:42,150 --> 00:40:39,920

wow that's kind of exciting yeah yeah

1067

00:40:44,550 --> 00:40:42,160

so having all the planets in a planet in

1068

00:40:46,309 --> 00:40:44,560

other galaxies is important

1069

00:40:47,990 --> 00:40:46,319

because we may not maybe the other

1070

00:40:52,470 --> 00:40:48,000

galaxy don't have the same number of

1071

00:40:55,349 --> 00:40:52,480

planets that we we have in our milky way

1072

00:40:57,990 --> 00:40:55,359

all right well uh actually mark is just

1073

00:40:59,109 --> 00:40:58,000

mark d antonio is an astronomer and he

1074

00:41:01,270 --> 00:40:59,119

is

1075

00:41:03,109 --> 00:41:01,280

just mark are you there

1076

00:41:07,349 --> 00:41:03,119

yes i'm here how are you

1077

00:41:09,829 --> 00:41:07,359

hey mark how you doing uh

1078

00:41:11,510 --> 00:41:09,839

yeah uh so mark you hit you were trying

1079

00:41:13,430 --> 00:41:11,520

to send me a question

1080

00:41:15,430 --> 00:41:13,440

so yeah i thought well maybe it's better

1081

00:41:17,510 --> 00:41:15,440

just to have you oh you're on your phone

1082

00:41:19,190 --> 00:41:17,520

that's that's cool how you did that well

1083

00:41:20,950 --> 00:41:19,200

yeah i mean it makes you there's our

1084

00:41:21,990 --> 00:41:20,960

there's our east coast telescope there

1085

00:41:24,470 --> 00:41:22,000

um

1086

00:41:25,589 --> 00:41:24,480

listen one of the questions i had was uh

1087

00:41:27,589 --> 00:41:25,599

frank was

1088

00:41:31,030 --> 00:41:27,599

um you know obviously i've been a

1089

00:41:32,870 --> 00:41:31,040

proponent of seti i i've uh i included

1090

00:41:34,390 --> 00:41:32,880

quotes actually from seth

1091

00:41:36,470 --> 00:41:34,400

in our book you know

1092

00:41:38,710 --> 00:41:36,480

but the question i want to ask was

1093

00:41:40,069 --> 00:41:38,720

um you know we have an observatory uh

1094

00:41:41,510 --> 00:41:40,079

here in the east coast we have one on

1095

00:41:43,589 --> 00:41:41,520

the west coast

1096

00:41:45,030 --> 00:41:43,599

um and the remote systems i run them

1097

00:41:46,470 --> 00:41:45,040

from here

1098

00:41:48,790 --> 00:41:46,480

and um

1099

00:41:51,030 --> 00:41:48,800

the building out in arizona actually has

1100

00:41:54,230 --> 00:41:51,040

room for two more systems

1101  
00:41:55,750 --> 00:41:54,240  
um and we have one system in there now

1102  
00:41:57,190 --> 00:41:55,760  
um but

1103  
00:42:02,470 --> 00:41:57,200  
if

1104  
00:42:05,109 --> 00:42:02,480  
needed or as a test site a beta site

1105  
00:42:07,190 --> 00:42:05,119  
something to test some software

1106  
00:42:09,430 --> 00:42:07,200  
um i'd be willing to to do an

1107  
00:42:11,270 --> 00:42:09,440  
installation out there of equipment for

1108  
00:42:12,309 --> 00:42:11,280  
seti to try and actually further the

1109  
00:42:15,030 --> 00:42:12,319  
cause

1110  
00:42:17,829 --> 00:42:15,040  
actually

1111  
00:42:20,230 --> 00:42:17,839  
intelligent that's a very smart idea

1112  
00:42:20,950 --> 00:42:20,240  
because we're doing that now

1113  
00:42:22,950 --> 00:42:20,960

we're

1114

00:42:24,150 --> 00:42:22,960

using lasers now to do simple ranging

1115

00:42:27,190 --> 00:42:24,160

stuff right

1116

00:42:30,550 --> 00:42:27,200

and i've i've built circuits to modulate

1117

00:42:32,150 --> 00:42:30,560

sound into lasers as well uh i could

1118

00:42:33,750 --> 00:42:32,160

shine a laser in the window and listen

1119

00:42:35,670 --> 00:42:33,760

to the conversation going on in the room

1120

00:42:37,589 --> 00:42:35,680

from hundreds of feet away i guess

1121

00:42:39,750 --> 00:42:37,599

that's kind of a bug right

1122

00:42:41,750 --> 00:42:39,760

but still it was a test you know and

1123

00:42:43,349 --> 00:42:41,760

those things work so i would think that

1124

00:42:46,150 --> 00:42:43,359

another civilization might actually do

1125

00:42:48,069 --> 00:42:46,160

that i like the idea very much

1126

00:42:50,630 --> 00:42:48,079

well we should put you in contact with

1127

00:42:52,710 --> 00:42:50,640

uh elliot gillam he's the director of

1128

00:42:54,950 --> 00:42:52,720

the laser city project

1129

00:42:56,790 --> 00:42:54,960

and in fact he's looking for sites

1130

00:42:58,150 --> 00:42:56,800

around the world to

1131

00:43:00,870 --> 00:42:58,160

set up this

1132

00:43:03,829 --> 00:43:00,880

this instrument so

1133

00:43:05,990 --> 00:43:03,839

yeah definitely we are as i mentioned we

1134

00:43:09,109 --> 00:43:06,000

have a site right now in hawaii another

1135

00:43:10,870 --> 00:43:09,119

one in california but he wants to grow

1136

00:43:13,190 --> 00:43:10,880

the network because we want to take

1137

00:43:16,309 --> 00:43:13,200

advantage of the rotation of earth so

1138

00:43:18,790 --> 00:43:16,319

having bases separated by

1139

00:43:20,790 --> 00:43:18,800

two thousand kilometer all around earth

1140

00:43:21,750 --> 00:43:20,800

will allow us to have a full coverage of

1141

00:43:24,309 --> 00:43:21,760

the sky

1142

00:43:26,309 --> 00:43:24,319

okay that might actually uh

1143

00:43:28,390 --> 00:43:26,319

that might be best suited them for the

1144

00:43:30,390 --> 00:43:28,400

connecticut site uh in the eastern

1145

00:43:33,510 --> 00:43:30,400

united states that we have and

1146

00:43:35,750 --> 00:43:33,520

not maybe not arizona um but the eastern

1147

00:43:38,470 --> 00:43:35,760

site you know we're redoing the building

1148

00:43:39,750 --> 00:43:38,480

um and uh that telescope i just rehabbed

1149

00:43:41,190 --> 00:43:39,760

it and that's going to go in there but

1150

00:43:42,950 --> 00:43:41,200

we're also going to have

1151

00:43:45,190 --> 00:43:42,960

a room for other systems

1152

00:43:46,710 --> 00:43:45,200

so that'd be pretty cool and the nice

1153

00:43:48,950 --> 00:43:46,720

thing is it won't be it won't be too

1154

00:43:49,829 --> 00:43:48,960

dependent on on light pollution

1155

00:43:51,670 --> 00:43:49,839

you know

1156

00:43:53,589 --> 00:43:51,680

for that project i don't think so that

1157

00:43:55,589 --> 00:43:53,599

would be kind of cool

1158

00:43:56,390 --> 00:43:55,599

yes i can't believe how this is looking

1159

00:44:00,790 --> 00:43:56,400

at

1160

00:44:02,550 --> 00:44:00,800

work in uh

1161

00:44:04,309 --> 00:44:02,560

if you don't have if you have a bunch of

1162

00:44:05,589 --> 00:44:04,319

light pollution yeah it'll work anyway

1163

00:44:07,109 --> 00:44:05,599

here we go

1164

00:44:09,030 --> 00:44:07,119

that's very cool wow

1165

00:44:11,270 --> 00:44:09,040

i'm glad this this kind of worked out

1166

00:44:12,950 --> 00:44:11,280

and it's all live so that's great well

1167

00:44:14,710 --> 00:44:12,960

you know martin you're you're a good guy

1168

00:44:16,550 --> 00:44:14,720

you know and and uh you know i like

1169

00:44:17,990 --> 00:44:16,560

listening to your shows well anyway

1170

00:44:20,309 --> 00:44:18,000

thank you frank it was nice to meet you

1171

00:44:22,630 --> 00:44:20,319

thank you very much mo uh and

1172

00:44:25,030 --> 00:44:22,640

maybe maybe he can connect your contact

1173

00:44:26,550 --> 00:44:25,040

yes okay yeah all right all right okay

1174

00:44:28,069 --> 00:44:26,560

thank you thank you thank you

1175

00:44:29,430 --> 00:44:28,079

thanks for coming in

1176

00:44:31,670 --> 00:44:29,440

yeah well that would be great if

1177

00:44:33,750 --> 00:44:31,680

something like that worked out

1178

00:44:35,829 --> 00:44:33,760

definitely you see yeah your show has

1179

00:44:37,510 --> 00:44:35,839

been extremely useful for science it's

1180

00:44:38,390 --> 00:44:37,520

great

1181

00:44:45,430 --> 00:44:38,400

yeah

1182

00:44:47,990 --> 00:44:46,550

so i have

1183

00:44:50,069 --> 00:44:48,000

yeah i have a little trouble with that

1184

00:44:51,990 --> 00:44:50,079

sometimes but i remember i told you in

1185

00:44:54,309 --> 00:44:52,000

the beginning i had aviloba on a couple

1186

00:44:55,589 --> 00:44:54,319

of times and i think that's great that

1187

00:44:57,589 --> 00:44:55,599

he has

1188

00:44:59,430 --> 00:44:57,599

um an open mind

1189

00:45:01,190 --> 00:44:59,440

and you know i know he's really stirred

1190

00:45:03,190 --> 00:45:01,200

up a lot

1191

00:45:05,349 --> 00:45:03,200

there's been a lot of controversy about

1192

00:45:06,870 --> 00:45:05,359

his thoughts on the possibilities but i

1193

00:45:09,349 --> 00:45:06,880

think it's great that he's open to the

1194

00:45:11,910 --> 00:45:09,359

possibility that it could be something

1195

00:45:15,910 --> 00:45:11,920

important and and you know uh

1196

00:45:18,150 --> 00:45:15,920

an antique uh you know dead spacecraft

1197

00:45:20,230 --> 00:45:18,160

or something of possibilities you know

1198

00:45:22,230 --> 00:45:20,240

and the thing that we always think of

1199

00:45:25,270 --> 00:45:22,240

when we think about that is that rock

1200

00:45:26,950 --> 00:45:25,280

that someone did a graphic of but

1201  
00:45:29,510 --> 00:45:26,960  
from the way it reacted

1202  
00:45:31,750 --> 00:45:29,520  
as it went by um the sun it it's

1203  
00:45:32,870 --> 00:45:31,760  
probably really thin something really

1204  
00:45:36,710 --> 00:45:32,880  
thin

1205  
00:45:38,150 --> 00:45:36,720  
that whole situation

1206  
00:45:41,030 --> 00:45:38,160  
so

1207  
00:45:43,190 --> 00:45:41,040  
the one of the major issues with

1208  
00:45:45,750 --> 00:45:43,200  
is the fact that we detected it

1209  
00:45:48,150 --> 00:45:45,760  
after he passed the sun

1210  
00:45:50,230 --> 00:45:48,160  
and that's a problem we basically don't

1211  
00:45:53,349 --> 00:45:50,240  
have enough data point not enough

1212  
00:45:55,950 --> 00:45:53,359  
observation of this body it does exhibit

1213  
00:45:58,550 --> 00:45:55,960

some kind of weird um

1214

00:46:00,550 --> 00:45:58,560

non-gravitational acceleration

1215

00:46:03,510 --> 00:46:00,560

which is basically the idea is that he's

1216

00:46:06,550 --> 00:46:03,520

not following up a very perfect ob that

1217

00:46:07,910 --> 00:46:06,560

you expect uh considering the the

1218

00:46:10,470 --> 00:46:07,920

presence of the sun there'll be some

1219

00:46:13,510 --> 00:46:10,480

slight deviation like if he was blown

1220

00:46:15,190 --> 00:46:13,520

away by something okay we have seen that

1221

00:46:17,430 --> 00:46:15,200

on other solar system bodies we have

1222

00:46:19,589 --> 00:46:17,440

seen that on comets we have seen that on

1223

00:46:22,069 --> 00:46:19,599

asteroids that outgas

1224

00:46:24,069 --> 00:46:22,079

et cetera and we have now discovered

1225

00:46:26,309 --> 00:46:24,079

that a semester whether some kind of

1226

00:46:28,069 --> 00:46:26,319

volcanic activity

1227

00:46:30,150 --> 00:46:28,079

this is a beast that's coming from

1228

00:46:32,309 --> 00:46:30,160

another planetary system with a

1229

00:46:35,190 --> 00:46:32,319

composition that may be very different

1230

00:46:37,750 --> 00:46:35,200

to what we have in our own solar system

1231

00:46:40,470 --> 00:46:37,760

so i don't want to undermine any heavy

1232

00:46:42,069 --> 00:46:40,480

theory but in my mind

1233

00:46:44,309 --> 00:46:42,079

this is the problem the problem is that

1234

00:46:46,230 --> 00:46:44,319

we don't have enough data it's coming

1235

00:46:47,349 --> 00:46:46,240

from very far away from us very

1236

00:46:50,630 --> 00:46:47,359

different

1237

00:46:53,270 --> 00:46:50,640

so maybe he has a very weird behavior

1238

00:46:56,550 --> 00:46:53,280

and we will not know that

1239

00:46:58,309 --> 00:46:56,560

until we go back to try to catch on him

1240

00:47:00,950 --> 00:46:58,319

and see him have a

1241

00:47:02,710 --> 00:47:00,960

mission that basically visits

1242

00:47:04,790 --> 00:47:02,720

and that's gonna be very difficult

1243

00:47:08,150 --> 00:47:04,800

because he's far away already

1244

00:47:11,510 --> 00:47:08,160

or if we find another another one

1245

00:47:12,950 --> 00:47:11,520

soon enough and we study it

1246

00:47:15,990 --> 00:47:12,960

theoretically

1247

00:47:19,190 --> 00:47:16,000

models show that we should have one

1248

00:47:21,829 --> 00:47:19,200

visitor interstellar visitor like that

1249

00:47:24,549 --> 00:47:21,839

every year we saw boris of

1250

00:47:29,589 --> 00:47:24,559

uh two years later if i remember mama

1251

00:47:34,549 --> 00:47:31,750

we are building telescopes

1252

00:47:36,950 --> 00:47:34,559

the vera rubin telescope that will be

1253

00:47:39,750 --> 00:47:36,960

able to cover the entire sky the

1254

00:47:41,990 --> 00:47:39,760

southern sky every three days and we

1255

00:47:44,069 --> 00:47:42,000

have the sensitivity to see objects like

1256

00:47:46,390 --> 00:47:44,079

this earlier

1257

00:47:48,069 --> 00:47:46,400

so we are making progress in science to

1258

00:47:50,470 --> 00:47:48,079

be able to see them

1259

00:47:52,710 --> 00:47:50,480

so i'm getting ready in fact every time

1260

00:47:55,190 --> 00:47:52,720

someone asks me what kind of instrument

1261

00:47:57,829 --> 00:47:55,200

you want to uh install on this next

1262

00:48:01,589 --> 00:47:57,839

space telescopes or on this next

1263

00:48:02,790 --> 00:48:01,599

ground-based telescopes i always say

1264

00:48:06,790 --> 00:48:02,800

something that will be able to

1265

00:48:09,750 --> 00:48:06,800

characterize a umoi like object so we

1266

00:48:12,470 --> 00:48:09,760

have data to understand truly what's

1267

00:48:14,870 --> 00:48:12,480

going on i'm talking about mid-infrared

1268

00:48:16,230 --> 00:48:14,880

spectra to see the composition of the

1269

00:48:19,589 --> 00:48:16,240

surface

1270

00:48:21,829 --> 00:48:19,599

visible light sensitive enough to follow

1271

00:48:24,470 --> 00:48:21,839

their body all the way until they leave

1272

00:48:26,710 --> 00:48:24,480

and when they arrive so all of this it's

1273

00:48:29,030 --> 00:48:26,720

important it's we really need to have

1274

00:48:32,549 --> 00:48:29,040

more instruments capable of observing

1275

00:48:35,109 --> 00:48:32,559

the entire sky 24 7. and this is coming

1276

00:48:37,589 --> 00:48:35,119

lsst is one of them we have the ztf we

1277

00:48:40,470 --> 00:48:37,599

have multiple surveys like that

1278

00:48:43,589 --> 00:48:40,480

at class so we are getting better so my

1279

00:48:45,670 --> 00:48:43,599

answer is let's wait for another room

1280

00:48:47,910 --> 00:48:45,680

before jumping into conclusion for this

1281

00:48:49,430 --> 00:48:47,920

one and let's see maybe it would be very

1282

00:48:51,589 --> 00:48:49,440

different maybe we have used weird

1283

00:48:54,150 --> 00:48:51,599

gravitational acceleration and once

1284

00:48:56,470 --> 00:48:54,160

again let's have an open mind on this

1285

00:48:59,109 --> 00:48:56,480

and do some proper studies so we

1286

00:49:00,790 --> 00:48:59,119

understand what this body could be

1287

00:49:02,630 --> 00:49:00,800

did i see that there's some type of an

1288

00:49:06,150 --> 00:49:02,640

association between

1289

00:49:07,670 --> 00:49:06,160

seti and the galileo project that avilo

1290

00:49:09,349 --> 00:49:07,680

started

1291

00:49:10,150 --> 00:49:09,359

some type of connection

1292

00:49:12,630 --> 00:49:10,160

yes

1293

00:49:15,270 --> 00:49:12,640

maybe it's seven

1294

00:49:18,870 --> 00:49:15,280

is that's what it is yeah yeah that's it

1295

00:49:20,390 --> 00:49:18,880

and and what type of uh contribution are

1296

00:49:23,910 --> 00:49:20,400

they looking

1297

00:49:26,710 --> 00:49:23,920

from so seth himself is not he's not not

1298

00:49:30,150 --> 00:49:26,720

seti it's that's separately from this i

1299

00:49:33,349 --> 00:49:30,160

got it yeah i got it yeah yeah well well

1300

00:49:35,430 --> 00:49:33,359

it's it's all very interesting um i'm

1301  
00:49:38,790 --> 00:49:35,440  
just looking here we have about five

1302  
00:49:41,430 --> 00:49:38,800  
minutes left to the show so um

1303  
00:49:42,870 --> 00:49:41,440  
so what do you think um you

1304  
00:49:44,790 --> 00:49:42,880  
you said on another show that you think

1305  
00:49:45,589 --> 00:49:44,800  
within 10 years where we're going to

1306  
00:49:46,390 --> 00:49:45,599  
find

1307  
00:49:48,150 --> 00:49:46,400  
um

1308  
00:49:50,870 --> 00:49:48,160  
life i don't think you said intelligent

1309  
00:49:52,470 --> 00:49:50,880  
life but do you think the odds are just

1310  
00:49:54,390 --> 00:49:52,480  
as high that there's intelligent life

1311  
00:49:56,230 --> 00:49:54,400  
out there

1312  
00:49:58,630 --> 00:49:56,240  
um you know i know everything else start

1313  
00:50:01,829 --> 00:49:58,640

microbial you know mike yeah everything

1314

00:50:03,670 --> 00:50:01,839

has to start small and evolve but still

1315

00:50:05,190 --> 00:50:03,680

um you know we

1316

00:50:05,990 --> 00:50:05,200

we have the odds are out there that

1317

00:50:07,990 --> 00:50:06,000

there's

1318

00:50:09,670 --> 00:50:08,000

intelligent life and possibly much

1319

00:50:11,990 --> 00:50:09,680

higher intelligent life than we have

1320

00:50:14,470 --> 00:50:12,000

here

1321

00:50:15,910 --> 00:50:14,480

yeah and also i mean intelligent life is

1322

00:50:19,270 --> 00:50:15,920

something that

1323

00:50:21,910 --> 00:50:19,280

we may need to be better characterized

1324

00:50:24,950 --> 00:50:21,920

meaning that uh if we are looking for

1325

00:50:27,270 --> 00:50:24,960

biological intelligent life like ours

1326  
00:50:30,150 --> 00:50:27,280  
we're probably restraining significantly

1327  
00:50:32,710 --> 00:50:30,160  
our search to planets like earth

1328  
00:50:35,270 --> 00:50:32,720  
orbiting around g-type stars sun-like

1329  
00:50:37,589 --> 00:50:35,280  
stars that receive the same kind of

1330  
00:50:40,069 --> 00:50:37,599  
light so have the same kind of

1331  
00:50:43,109 --> 00:50:40,079  
vegetation and as involved in the same

1332  
00:50:44,870 --> 00:50:43,119  
way frankly this kind of life probably

1333  
00:50:47,349 --> 00:50:44,880  
don't are very

1334  
00:50:50,230 --> 00:50:47,359  
there is very small percent of that

1335  
00:50:53,349 --> 00:50:50,240  
if you want to find life like big life

1336  
00:50:55,430 --> 00:50:53,359  
any type of life we will have to learn

1337  
00:50:56,470 --> 00:50:55,440  
to learn more and understand more what

1338  
00:50:58,150 --> 00:50:56,480

is life

1339

00:51:00,870 --> 00:50:58,160

so that's one of the reasons i'm really

1340

00:51:02,790 --> 00:51:00,880

pushing for us to start building those

1341

00:51:03,589 --> 00:51:02,800

new space telescopes

1342

00:51:06,870 --> 00:51:03,599

like

1343

00:51:09,190 --> 00:51:06,880

uvo rx is the cod name we have it's a

1344

00:51:11,349 --> 00:51:09,200

six meter class telescope

1345

00:51:13,430 --> 00:51:11,359

that will be a ball with an adaptive

1346

00:51:16,549 --> 00:51:13,440

optic system in the sky that we're able

1347

00:51:18,390 --> 00:51:16,559

to take images of planets we're not

1348

00:51:20,549 --> 00:51:18,400

talking about transiting nothing like

1349

00:51:22,870 --> 00:51:20,559

this here you see an image of a planet

1350

00:51:24,870 --> 00:51:22,880

for an astronomer an image is a dot just

1351  
00:51:27,670 --> 00:51:24,880  
don't get too excited man

1352  
00:51:30,069 --> 00:51:27,680  
it's just a tiny dot but that's enough

1353  
00:51:32,069 --> 00:51:30,079  
for us because one dot

1354  
00:51:34,790 --> 00:51:32,079  
with the color

1355  
00:51:37,190 --> 00:51:34,800  
and the motion of the dot

1356  
00:51:39,030 --> 00:51:37,200  
the variation of light give us a lot of

1357  
00:51:41,030 --> 00:51:39,040  
information about the planet whether or

1358  
00:51:43,109 --> 00:51:41,040  
not the planet has as an ocean the

1359  
00:51:47,750 --> 00:51:43,119  
composition of the planet whether the

1360  
00:51:50,309 --> 00:51:47,760  
planet has a desertic area um crawfields

1361  
00:51:51,589 --> 00:51:50,319  
all of this the planet we with an image

1362  
00:51:53,270 --> 00:51:51,599  
we get

1363  
00:51:55,829 --> 00:51:53,280

significantly more information we've

1364

00:51:58,150 --> 00:51:55,839

been seeing the shadow of the planet so

1365

00:51:59,829 --> 00:51:58,160

oh yes we um

1366

00:52:01,750 --> 00:51:59,839

huvo ix

1367

00:52:03,510 --> 00:52:01,760

is the top priority of the decadal

1368

00:52:06,549 --> 00:52:03,520

survey of

1369

00:52:08,630 --> 00:52:06,559

of nsf nasa so that's mean that we will

1370

00:52:10,790 --> 00:52:08,640

have funding

1371

00:52:12,150 --> 00:52:10,800

in the next 10 20 years to build this

1372

00:52:15,589 --> 00:52:12,160

instrument

1373

00:52:19,829 --> 00:52:17,990

wow that will be amazing i just wanted

1374

00:52:22,230 --> 00:52:19,839

to show up for the

1375

00:52:24,470 --> 00:52:22,240

for the western this is a very

1376

00:52:25,589 --> 00:52:24,480

interesting image from the web telescope

1377

00:52:28,950 --> 00:52:25,599

and that's like

1378

00:52:34,630 --> 00:52:30,950

it's not like a that's like the birth of

1379

00:52:38,630 --> 00:52:37,270

uh oh i'm not hearing you did we lose

1380

00:52:40,230 --> 00:52:38,640

your audio

1381

00:52:43,430 --> 00:52:40,240

we may have lost your

1382

00:52:45,510 --> 00:52:43,440

your audio uh

1383

00:52:48,390 --> 00:52:45,520

you know we're we're we have to wrap in

1384

00:52:49,109 --> 00:52:48,400

a minute uh less than a minute anyway so

1385

00:52:51,910 --> 00:52:49,119

uh

1386

00:52:54,549 --> 00:52:51,920

you can wave to the audience but thank

1387

00:52:56,390 --> 00:52:54,559

you so much it was really uh a pleasure

1388

00:52:58,470 --> 00:52:56,400

pleasure uh i really enjoyed being here

1389

00:53:00,150 --> 00:52:58,480

there you are you're back yes thank you

1390

00:53:01,990 --> 00:53:00,160

well we have to wrap anyway but i want

1391

00:53:03,990 --> 00:53:02,000

to thank you so much for your for uh

1392

00:53:05,589 --> 00:53:04,000

being on the show tonight

1393

00:53:07,910 --> 00:53:05,599

thank you very much

1394

00:53:10,630 --> 00:53:07,920

all right you take care and uh hopefully

1395

00:53:12,470 --> 00:53:10,640

you'll be the one that uh discovers life

1396

00:53:14,630 --> 00:53:12,480

out there i hope you do

1397

00:53:16,390 --> 00:53:14,640

i would be back all right i will be back

1398

00:53:17,349 --> 00:53:16,400

yeah you can come back all right take

1399

00:53:19,510 --> 00:53:17,359

care

1400

00:53:21,190 --> 00:53:19,520

all right again bye now

1401

00:53:23,109 --> 00:53:21,200

all right everyone so we'll be back next

1402

00:53:24,870 --> 00:53:23,119

week uh we have dr michael masters

1403

00:53:26,630 --> 00:53:24,880

should be a good show thank you so much

1404

00:53:27,870 --> 00:53:26,640

for watching and remember to keep your

1405

00:53:39,120 --> 00:53:27,880

eyes to the sky