1
00:00:02,100 --> 00:00:36,830
[Music]

2
00:00:41,590 --> 00:00:39,950
uh so I'm going to talk about uh results

3
00:00:45,709 --> 00:00:41,600
and developments we have with two

4
00:00:48,990 --> 00:00:45,719
projects that relate to searching for et

5
00:00:54,150 --> 00:00:49,000
and uh extraterrestrial

6
00:00:56,470 --> 00:00:54,160
probes let us start first uh with a um

7
00:00:59,709 --> 00:00:56,480
mind experiment imagine

8
00:01:03,389 --> 00:00:59,719
if instead of searching uh or instead of

9
00:01:06,630 --> 00:01:03,399
w waiting and waiting for a UFO to hover

10
00:01:08,749 --> 00:01:06,640
over your head you could actually use

11
00:01:11,510 --> 00:01:08,759
some kind of technique to search for

12
00:01:14,230 --> 00:01:11,520
unidentified objects that are non-human

13
00:01:15,870 --> 00:01:14,240

and not only to do not only to do uh

14
00:01:18,469 --> 00:01:15,880
these searches but also in case you

15
00:01:21,069 --> 00:01:18,479
detect it directly get a spectrum in

16
00:01:23,190 --> 00:01:21,079
real time that would characterize it

17
00:01:25,749 --> 00:01:23,200
directly localize it in 3D so that you

18
00:01:27,510 --> 00:01:25,759
know where it is and directly validate

19
00:01:30,149 --> 00:01:27,520
it with multiple instruments so that you

20
00:01:31,990 --> 00:01:30,159
know that nothing here is wrong and

21
00:01:34,310 --> 00:01:32,000
imagine now that you could also do that

22
00:01:36,749 --> 00:01:34,320
and get rid of all human objects let's

23
00:01:38,710 --> 00:01:36,759
say satellit space debris and you know

24
00:01:41,030 --> 00:01:38,720
that that's not

25
00:01:44,789 --> 00:01:41,040
human I would be quite interested in

26
00:01:50,350 --> 00:01:47,830
experiment and I'm going to talk about a

27
00:01:53,510 --> 00:01:50,360
potential way how I can do that more or

28
00:01:55,350 --> 00:01:53,520
less uh in the second half of my talk

29
00:01:58,350 --> 00:01:55,360
when we are when we are planning to

30
00:02:00,630 --> 00:01:58,360
build a Global Network that permits us

31
00:02:03,630 --> 00:02:00,640
to um with help help of Widefield

32
00:02:07,550 --> 00:02:03,640
telescopes and high-speed cameras catch

33
00:02:09,910 --> 00:02:07,560
short flashes of light associated with u

34
00:02:13,190 --> 00:02:09,920
nonhuman objects either like Fast

35
00:02:14,990 --> 00:02:13,200
Reflections or short laser pulses or

36
00:02:17,270 --> 00:02:15,000
other kind of

37
00:02:19,229 --> 00:02:17,280
emissions and the point of all this is

38
00:02:21,550 --> 00:02:19,239

that you want to really minimize the

39
00:02:22,990 --> 00:02:21,560
number of false positives because uh

40
00:02:24,430 --> 00:02:23,000
scientists are sometimes a little lazy

41
00:02:26,470 --> 00:02:24,440
and you don't want to go through too

42
00:02:30,070 --> 00:02:26,480
much

43
00:02:31,750 --> 00:02:30,080
data and um you can find a paper in the

44
00:02:33,390 --> 00:02:31,760
the brief where we describ the beginning

45
00:02:36,070 --> 00:02:33,400
of this project from in

46
00:02:38,070 --> 00:02:36,080
February where the goal is to detect

47
00:02:40,430 --> 00:02:38,080
localize verify and reproduce any

48
00:02:42,670 --> 00:02:40,440
finding in real time because once you

49
00:02:43,830 --> 00:02:42,680
see such a short flash you don't know

50
00:02:46,509 --> 00:02:43,840
when you're going to see it again and

51
00:02:48,390 --> 00:02:46,519
especially if you see multiple of them

52
00:02:51,990 --> 00:02:48,400
now you don't you might have to wait

53
00:02:54,070 --> 00:02:52,000
years until you find it and uh we're our

54
00:02:56,670 --> 00:02:54,080
goal is not to find the thing that can't

55
00:02:59,070 --> 00:02:56,680
be identified a goal is to search for a

56
00:03:02,430 --> 00:02:59,080
specific identifiable signature from an

57
00:03:05,470 --> 00:03:02,440
ET probe or non-human object or UFO or

58
00:03:07,350 --> 00:03:05,480
whatever you want to call it and which

59
00:03:10,869 --> 00:03:07,360
means that we are narrowing it down

60
00:03:13,470 --> 00:03:10,879
quite a lot um to a specific hyp

61
00:03:15,390 --> 00:03:13,480
hypothesis a such range is going to be

62
00:03:18,509 --> 00:03:15,400
up to 150 million kilometers from the

63
00:03:20,149 --> 00:03:18,519

earth and uh again this instant

64
00:03:22,350 --> 00:03:20,159
validation and instant Spectra and

65
00:03:25,430 --> 00:03:22,360
instant localization is going to be the

66
00:03:27,509 --> 00:03:25,440
most important bit and in this way we

67
00:03:29,350 --> 00:03:27,519
will get spatial resolution a Time

68
00:03:32,750 --> 00:03:29,360
resolution and a spectral resolution of

69
00:03:33,990 --> 00:03:32,760
any SC however before I'm going to tell

70
00:03:36,309 --> 00:03:34,000
you about the project I'm going to tell

71
00:03:42,789 --> 00:03:36,319
you about the history of why we want to

72
00:03:49,390 --> 00:03:46,350
way let's first think about the

73
00:03:52,270 --> 00:03:49,400
possibilities of life in the Milky

74
00:03:54,030 --> 00:03:52,280
Way so many people are going to say oh

75
00:03:56,030 --> 00:03:54,040
but we we don't know if there is any

76
00:03:58,589 --> 00:03:56,040
other planet except for the Earth that

77
00:04:00,990 --> 00:03:58,599
has life but come on let's think about

78
00:04:03,069 --> 00:04:01,000
the numbers just in the Milky Way you

79
00:04:06,750 --> 00:04:03,079
have something like 200 to 300 billions

80
00:04:09,550 --> 00:04:06,760
of stars you know that 22% of every

81
00:04:13,069 --> 00:04:09,560
sunlike Star has an earth within the

82
00:04:15,710 --> 00:04:13,079
habitable zone now that is quite a lot

83
00:04:18,590 --> 00:04:15,720
and if you count on that you have about

84
00:04:20,670 --> 00:04:18,600
40 billions of earthlike planets just in

85
00:04:21,950 --> 00:04:20,680
the Milky Way where there might be

86
00:04:25,189 --> 00:04:21,960
plenty of

87
00:04:26,950 --> 00:04:25,199
Life they have also found amino acids on

88
00:04:30,430 --> 00:04:26,960

asteroids and meteorites and it will be

89
00:04:32,629 --> 00:04:30,440
so exciting to see what the Osiris Rex

90
00:04:35,070 --> 00:04:32,639
uh samples are going to actually tell us

91
00:04:36,790 --> 00:04:35,080
when they become analyzed that's a

92
00:04:42,670 --> 00:04:36,800
fantastic project where they brought

93
00:04:48,990 --> 00:04:46,950
September so many of uh us are aware of

94
00:04:50,830 --> 00:04:49,000
the first search how the first searches

95
00:04:53,270 --> 00:04:50,840
for extra Trestle have been done the

96
00:04:56,029 --> 00:04:53,280
first generation searches of sa which

97
00:04:58,230 --> 00:04:56,039
has been the radio CTI uh many people

98
00:05:00,189 --> 00:04:58,240
associate CTI with an Institute but CTI

99
00:05:02,189 --> 00:05:00,199
is actually a field of research

100
00:05:03,950 --> 00:05:02,199
and where people have mostly been

101
00:05:06,749 --> 00:05:03,960
dedicated to these searches for their

102
00:05:08,950 --> 00:05:06,759
artificial radio signals one has been

103
00:05:10,710 --> 00:05:08,960
using the green Bank telescopes and one

104
00:05:12,670 --> 00:05:10,720
has searched H one is also using the

105
00:05:14,510 --> 00:05:12,680
Allen telescope array and one is doing

106
00:05:17,469 --> 00:05:14,520
that since the 1960s because this was

107
00:05:19,830 --> 00:05:17,479
the easiest way to look for

108
00:05:22,110 --> 00:05:19,840
et and I don't know how many of you are

109
00:05:25,430 --> 00:05:22,120
familiar with a movie contact where you

110
00:05:27,749 --> 00:05:25,440
have uh Dr Ellie arway searching for uh

111
00:05:30,830 --> 00:05:27,759
radio signals and she searches and she

112
00:05:34,110 --> 00:05:30,840
searches and finally she finds them and

113
00:05:37,510 --> 00:05:34,120

that's kind of uh what the movie is

114
00:05:43,150 --> 00:05:37,520
about I'm sad to say that in real

115
00:05:49,670 --> 00:05:46,430
searching so uh one has also done very

116
00:05:52,749 --> 00:05:49,680
beautiful uh searches for

117
00:05:54,590 --> 00:05:52,759
lasers and this is this is done in much

118
00:05:57,309 --> 00:05:54,600
smaller extent because this is

119
00:05:59,110 --> 00:05:57,319
relatively new because the time as tech

120
00:06:00,950 --> 00:05:59,120
technology develops you can do more and

121
00:06:03,710 --> 00:06:00,960
more things things and this has been

122
00:06:06,710 --> 00:06:03,720
done in the last years and thousands of

123
00:06:09,390 --> 00:06:06,720
stars have been surveyed not 300,000 but

124
00:06:13,150 --> 00:06:09,400
thousands and so far there's there is an

125
00:06:15,070 --> 00:06:13,160
optical desert no lasers have been found

126
00:06:18,029 --> 00:06:15,080
so far that should start getting us a

127
00:06:23,510 --> 00:06:21,070
right I engage personally also in

128
00:06:25,430 --> 00:06:23,520
searches so I was leading up or I'm

129
00:06:27,150 --> 00:06:25,440
leading a project called The Vanishing

130
00:06:29,510 --> 00:06:27,160
and appearing sources during a century

131
00:06:32,270 --> 00:06:29,520
of observation project where I wanted to

132
00:06:34,670 --> 00:06:32,280
find a star that vanishes imagine a star

133
00:06:36,550 --> 00:06:34,680
that is there in multiple images and you

134
00:06:38,110 --> 00:06:36,560
see it and you really know it's there

135
00:06:39,670 --> 00:06:38,120
and then one day it vanishes that would

136
00:06:42,749 --> 00:06:39,680
be a beautiful techn signature of some

137
00:06:45,710 --> 00:06:42,759
completely new physics and since

138
00:06:47,309 --> 00:06:45,720

2016 uh I worked with my team of about

139
00:06:51,150 --> 00:06:47,319
40 people with machine learning

140
00:06:53,710 --> 00:06:51,160
scientist and um astronomers and we

141
00:06:57,270 --> 00:06:53,720
searched for these Stars by comparing

142
00:07:00,189 --> 00:06:57,280
images from the 1950s to images to today

143
00:07:01,749 --> 00:07:00,199
we didn't find us us a star that really

144
00:07:04,469 --> 00:07:01,759
was there and vanish but we found a lot

145
00:07:06,070 --> 00:07:04,479
of weird weird trans we come back to

146
00:07:07,790 --> 00:07:06,080
that now there is something very

147
00:07:11,629 --> 00:07:07,800
beautiful about these place that we were

148
00:07:15,070 --> 00:07:11,639
using we were using photographic plates

149
00:07:18,749 --> 00:07:15,080
that were done in 1950 in early

150
00:07:20,150 --> 00:07:18,759
1950s for those of you who know uh uh

151
00:07:21,869 --> 00:07:20,160
how these photographic plates Works

152
00:07:24,390 --> 00:07:21,879
they're usually quite big Des serve a

153
00:07:27,550 --> 00:07:24,400
big part of the sky and there were very

154
00:07:30,270 --> 00:07:27,560
fine uh uh studies done at Mount Palomar

155
00:07:33,309 --> 00:07:30,280
for example in Le Observatory the

156
00:07:36,790 --> 00:07:33,319
can and one great advantage of these

157
00:07:38,790 --> 00:07:36,800
plays is that there were no satellites

158
00:07:40,950 --> 00:07:38,800
we humans have not yet contaminated the

159
00:07:42,790 --> 00:07:40,960
sky and airplanes are so easy to

160
00:07:45,510 --> 00:07:42,800
distinguish because you just get a

161
00:07:47,869 --> 00:07:45,520
streak so they are excellent for

162
00:07:49,390 --> 00:07:47,879
searching for et but you go back in time

163
00:07:54,350 --> 00:07:49,400

it's like a time machine to when your

164
00:07:56,189 --> 00:07:54,360
sky was uh before Elon Musk and

165
00:07:58,390 --> 00:07:56,199
similars

166
00:07:59,830 --> 00:07:58,400
so we were actually searching for these

167
00:08:02,510 --> 00:07:59,840
Vanishing stars but comparing these

168
00:08:06,710 --> 00:08:02,520
images from 50s and with images from

169
00:08:09,270 --> 00:08:06,720
like more or less today and uh we we

170
00:08:11,230 --> 00:08:09,280
analyzed terabytes of image data

171
00:08:12,670 --> 00:08:11,240
automatically and through a citizen

172
00:08:14,670 --> 00:08:12,680
science project that unfortunately I

173
00:08:16,110 --> 00:08:14,680
cannot show show the animation of

174
00:08:19,990 --> 00:08:16,120
because I have some technical issues

175
00:08:22,510 --> 00:08:20,000
here but it was really a big work where

176
00:08:27,149 --> 00:08:22,520
we look through uh many objects like one

177
00:08:29,629 --> 00:08:27,159
by one and we found many short flashes

178
00:08:31,390 --> 00:08:29,639
that appear on one image and they don't

179
00:08:33,149 --> 00:08:31,400
appear again they were appearing very

180
00:08:35,509 --> 00:08:33,159
shortly briefly on these photographic

181
00:08:38,230 --> 00:08:35,519
place and then just vanish something

182
00:08:40,350 --> 00:08:38,240
that vanishes at time scales less than

183
00:08:43,829 --> 00:08:40,360
50

184
00:08:46,230 --> 00:08:43,839
minutes so that was quite interesting

185
00:08:48,430 --> 00:08:46,240
but not as interesting as when we found

186
00:08:50,470 --> 00:08:48,440
nine of them in a small region of the

187
00:08:52,070 --> 00:08:50,480
space that appear and vanish within 50

188
00:08:55,310 --> 00:08:52,080

minutes because then we say as

189
00:08:58,990 --> 00:08:55,320
astronomers oh what on Earth is that the

190
00:09:01,230 --> 00:08:59,000
paper caused a lot of uh um astronomers

191
00:09:03,150 --> 00:09:01,240
get getting stressed over social media

192
00:09:05,470 --> 00:09:03,160
saying that they should not be citing

193
00:09:06,949 --> 00:09:05,480
the paper because of some sociological

194
00:09:09,949 --> 00:09:06,959
issues actually the same people who are

195
00:09:14,550 --> 00:09:09,959
usually are going for AI also went for

196
00:09:16,550 --> 00:09:14,560
me astronomers are bored sometimes and

197
00:09:19,110 --> 00:09:16,560
what happened here is that we see these

198
00:09:21,389 --> 00:09:19,120
images you see the green circles you

199
00:09:23,750 --> 00:09:21,399
have uh ignore the the purple circles

200
00:09:26,069 --> 00:09:23,760
that are scanning defects that we could

201
00:09:28,269 --> 00:09:26,079
distinguish by comparing different scans

202
00:09:29,630 --> 00:09:28,279
but what you see is that on the 12th of

203
00:09:32,389 --> 00:09:29,640
April

204
00:09:34,630 --> 00:09:32,399
you have nine stars that are there in

205
00:09:36,630 --> 00:09:34,640
one image or transients as I'm going to

206
00:09:38,310 --> 00:09:36,640
say for these short flashes they are

207
00:09:40,870 --> 00:09:38,320
there in one image and they're not there

208
00:09:42,949 --> 00:09:40,880
later and they were not there half an

209
00:09:45,630 --> 00:09:42,959
hour earlier they were not there 6 days

210
00:09:47,710 --> 00:09:45,640
later and they never appeared again and

211
00:09:49,829 --> 00:09:47,720
we like used the big Grand telescop of

212
00:09:52,509 --> 00:09:49,839
canaras and we searched for them with a

213
00:09:55,389 --> 00:09:52,519

Deep Imaging and we found

214
00:09:57,509 --> 00:09:55,399
nothing so we started thinking about all

215
00:09:59,630 --> 00:09:57,519
possible courses astrophysical courses

216
00:10:02,150 --> 00:09:59,640
and we couldn't explain it in any

217
00:10:04,110 --> 00:10:02,160
astrophysical way there is simply

218
00:10:05,630 --> 00:10:04,120
they're so spread over the sky and at

219
00:10:07,630 --> 00:10:05,640
the same time they have these very

220
00:10:10,630 --> 00:10:07,640
typical brightness profiles that come

221
00:10:12,750 --> 00:10:10,640
with real stars so no we couldn't

222
00:10:16,030 --> 00:10:12,760
explain that in any

223
00:10:17,509 --> 00:10:16,040
way now instrumental issues uh we could

224
00:10:19,590 --> 00:10:17,519
exclude a lot of the most common

225
00:10:21,430 --> 00:10:19,600
instrumental issues uh and then some

226
00:10:23,790 --> 00:10:21,440
were turned out to be very unlikely and

227
00:10:26,030 --> 00:10:23,800
of course some of U people think that

228
00:10:27,910 --> 00:10:26,040
maybe you have some kind of plate

229
00:10:29,590 --> 00:10:27,920
defects it's just that these plate

230
00:10:31,590 --> 00:10:29,600
defects in such case

231
00:10:34,230 --> 00:10:31,600
would have to be first by chance each

232
00:10:36,269 --> 00:10:34,240
one of them would have to be looking

233
00:10:38,110 --> 00:10:36,279
exactly like the stars and imitate the

234
00:10:39,509 --> 00:10:38,120
brightness profiles of the real stars

235
00:10:42,030 --> 00:10:39,519
and also on top of that you would need

236
00:10:44,509 --> 00:10:42,040
to have nine of them all coincidentally

237
00:10:49,710 --> 00:10:44,519
star-like and not a mix of various

238
00:10:52,430 --> 00:10:49,720

shapes so it didn't look far too likely

239
00:10:55,990 --> 00:10:52,440
of course this was in uh they started in

240
00:10:58,590 --> 00:10:56,000
2020 because we found a example in March

241
00:11:02,310 --> 00:10:58,600
uh 2020 right when the pandemic started

242
00:11:03,750 --> 00:11:02,320
and in 2021 when we had our referee uh

243
00:11:06,069 --> 00:11:03,760
he he or she

244
00:11:08,110 --> 00:11:06,079
asked how how do you know that it's not

245
00:11:10,829 --> 00:11:08,120
just somebody who sneezed on the

246
00:11:12,470 --> 00:11:10,839
plates and we could again we had to look

247
00:11:16,550 --> 00:11:12,480
at the images look at the size and we

248
00:11:20,190 --> 00:11:16,560
could show nobody sneezed on the

249
00:11:23,590 --> 00:11:20,200
plates we still had one more idea and

250
00:11:25,110 --> 00:11:23,600
that is that um possibly some

251
00:11:28,150 --> 00:11:25,120
photographic plates especially like

252
00:11:31,710 --> 00:11:28,160
x-ray images were sensitive to nuclear

253
00:11:33,750 --> 00:11:31,720
fallout from at bomb tests and that is

254
00:11:35,750 --> 00:11:33,760
and they could produce some kind of fog

255
00:11:39,069 --> 00:11:35,760
Stars maybe not exactly the same

256
00:11:40,629 --> 00:11:39,079
profiles and we we thought that this

257
00:11:43,069 --> 00:11:40,639
might have been an explanation so we

258
00:11:46,030 --> 00:11:43,079
checked with a uh official atomic bomb

259
00:11:48,870 --> 00:11:46,040
test in United States Unfortunately they

260
00:11:52,389 --> 00:11:48,880
were none that year and since I'm not a

261
00:11:55,990 --> 00:11:52,399
conspiracy theorist I went on

262
00:11:57,990 --> 00:11:56,000
further so um there is something that

263
00:12:01,069 --> 00:11:58,000

can actually produce these nine uh

264
00:12:02,670 --> 00:12:01,079
objects that we see and later don't see

265
00:12:05,629 --> 00:12:02,680
and that is if you would have either

266
00:12:07,190 --> 00:12:05,639
some emissions from something let's say

267
00:12:08,910 --> 00:12:07,200
a non-human object in the sky or

268
00:12:11,069 --> 00:12:08,920
Reflections solar

269
00:12:15,189 --> 00:12:11,079
Reflections and

270
00:12:18,110 --> 00:12:15,199
uh well we know it's 1950 so there were

271
00:12:22,910 --> 00:12:18,120
no human objects there but this is a

272
00:12:24,990 --> 00:12:22,920
possibility and um we wrote about it and

273
00:12:26,949 --> 00:12:25,000
this started triggering my imagination

274
00:12:28,350 --> 00:12:26,959
because I of course want to know if

275
00:12:29,949 --> 00:12:28,360
there are more ways how one can test

276
00:12:32,110 --> 00:12:29,959
this possibility

277
00:12:34,990 --> 00:12:32,120
um this was the only thing we could come

278
00:12:37,110 --> 00:12:35,000
up with that actually worked um for the

279
00:12:38,590 --> 00:12:37,120
paper of course we couldn't write it

280
00:12:40,509 --> 00:12:38,600
that way one has to always write it very

281
00:12:43,350 --> 00:12:40,519
very conservatively if you want it

282
00:12:46,310 --> 00:12:43,360
published so I started thinking about

283
00:12:48,189 --> 00:12:46,320
what are the other ways of like

284
00:12:50,310 --> 00:12:48,199
predicting the signatures of these ET

285
00:12:51,910 --> 00:12:50,320
probes well multiple transients is one

286
00:12:54,069 --> 00:12:51,920
of them then you can have triple

287
00:12:56,389 --> 00:12:54,079
transients if you have a rotating dish I

288
00:13:00,030 --> 00:12:56,399

learned but also you can have transin

289
00:13:01,550 --> 00:13:00,040
along a line they don't have to be uh

290
00:13:04,150 --> 00:13:01,560
equally spaced they can have different

291
00:13:05,790 --> 00:13:04,160
kind of spacing and Depends all on the

292
00:13:08,269 --> 00:13:05,800
complexity of the geometry of this

293
00:13:10,990 --> 00:13:08,279
glinting objects but once you have these

294
00:13:13,470 --> 00:13:11,000
uh very flat and reflective

295
00:13:15,389 --> 00:13:13,480
surfaces you can simply have them along

296
00:13:17,030 --> 00:13:15,399
a line so we sent this to act

297
00:13:18,829 --> 00:13:17,040
astronautica we had two or three

298
00:13:22,550 --> 00:13:18,839
referees they were very happy with the

299
00:13:26,110 --> 00:13:22,560
hypothesis test perfect accepted and now

300
00:13:28,269 --> 00:13:26,120
I thought let's just carry it out so um

301
00:13:30,430 --> 00:13:28,279
this is just we we learned of course

302
00:13:32,110 --> 00:13:30,440
also I will just add as a parenthesis

303
00:13:35,069 --> 00:13:32,120
that if you have at least four of them

304
00:13:38,310 --> 00:13:35,079
then it becomes a very good signature of

305
00:13:42,430 --> 00:13:38,320
um that you have transients falling on a

306
00:13:44,350 --> 00:13:42,440
line uh associated with um um movement

307
00:13:47,230 --> 00:13:44,360
in the sky and in that way you can also

308
00:13:50,110 --> 00:13:47,240
even Clearly say that these are no plate

309
00:13:52,590 --> 00:13:50,120
defects as many people or some people I

310
00:13:55,949 --> 00:13:52,600
will say are going to say is a risk it

311
00:13:58,269 --> 00:13:55,959
is so did we find something well we

312
00:14:00,189 --> 00:13:58,279
actually did find some examples of these

313
00:14:02,710 --> 00:14:00,199

things and I'm going to show you the top

314
00:14:06,350 --> 00:14:02,720
two candidates we put them on archive

315
00:14:09,990 --> 00:14:06,360
last year one is from the 6th of August

316
00:14:17,069 --> 00:14:13,910
probability also and another the best

317
00:14:20,710 --> 00:14:17,079
example is from the 28th of July

318
00:14:22,910 --> 00:14:20,720
1952 um we will come back to this and

319
00:14:24,430 --> 00:14:22,920
you see here also this five things that

320
00:14:27,470 --> 00:14:24,440
are there and they just suddenly vanish

321
00:14:30,310 --> 00:14:27,480
so it's kind of becomes very fun now

322
00:14:34,030 --> 00:14:30,320
this paper I sent again to the journals

323
00:14:37,509 --> 00:14:34,040
and once you write that there is um some

324
00:14:41,470 --> 00:14:37,519
kind of uh if once you get a positive

325
00:14:43,509 --> 00:14:41,480
results the journals get nervous so it

326
00:14:45,389 --> 00:14:43,519
doesn't even go to review it doesn't

327
00:14:47,829 --> 00:14:45,399
matter that we carried out exactly the

328
00:14:49,910 --> 00:14:47,839
same hypothesis test that we already had

329
00:14:52,269 --> 00:14:49,920
published and we didn't deviate in any

330
00:14:54,509 --> 00:14:52,279
way from from the published plan this

331
00:14:57,110 --> 00:14:54,519
this paper has a like real issue even

332
00:15:00,230 --> 00:14:57,120
just getting to the review uh

333
00:15:02,350 --> 00:15:00,240
process so what are the implications

334
00:15:05,030 --> 00:15:02,360
well what I Tred to convey is that there

335
00:15:06,829 --> 00:15:05,040
is something some very unexplainable

336
00:15:08,269 --> 00:15:06,839
flashes that come in multiples in the

337
00:15:11,590 --> 00:15:08,279
old photographic plates that shouldn't

338
00:15:14,470 --> 00:15:11,600

be there and these are imp plates taken

339
00:15:16,470 --> 00:15:14,480
before 1957 a possibility that we see

340
00:15:18,189 --> 00:15:16,480
something artificial further out a

341
00:15:19,590 --> 00:15:18,199
possibility is that there is of course

342
00:15:22,990 --> 00:15:19,600
still something wrong with the plates

343
00:15:25,389 --> 00:15:23,000
but I think there's a lot of coincidence

344
00:15:27,590 --> 00:15:25,399
coinciden that us have to line up for

345
00:15:30,829 --> 00:15:27,600
such plate defects

346
00:15:33,350 --> 00:15:30,839
to both appear in multiples and always

347
00:15:36,389 --> 00:15:33,360
perfectly uh imitating the stars and at

348
00:15:40,030 --> 00:15:36,399
the same time being aligned in some

349
00:15:43,350 --> 00:15:40,040
cases and of course if it turns out um

350
00:15:45,749 --> 00:15:43,360
we actually estimated the surface number

351
00:15:48,629 --> 00:15:45,759
density uh of these objects you can

352
00:15:50,309 --> 00:15:48,639
always go to the archive paper now

353
00:15:51,430 --> 00:15:50,319
there's something more fun we have a new

354
00:15:55,150 --> 00:15:51,440
paper

355
00:15:58,590 --> 00:15:55,160
out and this makes it even harder for

356
00:16:00,550 --> 00:15:58,600
the so-called plate defect hypothesis

357
00:16:03,189 --> 00:16:00,560
because suddenly we have three very very

358
00:16:06,470 --> 00:16:03,199
bright stars that you can see there that

359
00:16:08,990 --> 00:16:06,480
are beautiful uh two overlaying and one

360
00:16:10,030 --> 00:16:09,000
here that are seen there on the 19th of

361
00:16:12,509 --> 00:16:10,040
July

362
00:16:14,670 --> 00:16:12,519
1952 and you look later and we actually

363
00:16:17,670 --> 00:16:14,680

looked both half an hour earlier and one

364
00:16:20,230 --> 00:16:17,680
month later and all this image we had

365
00:16:21,870 --> 00:16:20,240
and they weren't there now uh my

366
00:16:23,749 --> 00:16:21,880
colleagues were trying to see can we

367
00:16:27,389 --> 00:16:23,759
explain this in some ways in terms of

368
00:16:29,790 --> 00:16:27,399
gravitational lensing and they could

369
00:16:31,470 --> 00:16:29,800
possibly do it for particular case if

370
00:16:34,110 --> 00:16:31,480
they needed if they placed something

371
00:16:36,590 --> 00:16:34,120
that was um more or less a Milky Way

372
00:16:38,910 --> 00:16:36,600
super massive black hole causing it and

373
00:16:40,990 --> 00:16:38,920
not far from the earth and then you can

374
00:16:43,389 --> 00:16:41,000
do that and then once you have 80 of

375
00:16:47,670 --> 00:16:43,399
these examples you can start wondering a

376
00:16:49,910 --> 00:16:47,680
little um but um let's say we didn't get

377
00:16:52,629 --> 00:16:49,920
closer to an explanation with this paper

378
00:16:54,470 --> 00:16:52,639
but we really uh liked the very

379
00:16:57,069 --> 00:16:54,480
beautiful example that we found that

380
00:16:59,749 --> 00:16:57,079
gives even more weight to this multiple

381
00:17:02,350 --> 00:16:59,759
transients you can see see here is there

382
00:17:05,110 --> 00:17:02,360
in July 1952 it's not there in October

383
00:17:08,870 --> 00:17:05,120
91 you can see it in panar you can't see

384
00:17:10,829 --> 00:17:08,880
it in panar side not in ztf and then we

385
00:17:14,069 --> 00:17:10,839
used the world's largest optical

386
00:17:16,710 --> 00:17:14,079
telescope at 10.4 meter on La Palma our

387
00:17:19,429 --> 00:17:16,720
colleague did beautiful images in the

388
00:17:23,230 --> 00:17:19,439

red in the blue and we saw nothing

389
00:17:26,350 --> 00:17:23,240
there so uh uh we published a paper

390
00:17:28,029 --> 00:17:26,360
discreetly written and it got uh lots of

391
00:17:30,350 --> 00:17:28,039
like hundreds of thousand of views on

392
00:17:32,029 --> 00:17:30,360
various YouTube uh influencers channels

393
00:17:34,150 --> 00:17:32,039
they got very

394
00:17:36,190 --> 00:17:34,160
interested now there is just something I

395
00:17:38,669 --> 00:17:36,200
want to share a coincidence with

396
00:17:40,470 --> 00:17:38,679
you there's something very funny about

397
00:17:43,190 --> 00:17:40,480
the date that I didn't know about when

398
00:17:45,350 --> 00:17:43,200
we found the triple Transit another of

399
00:17:49,029 --> 00:17:45,360
my friends actually my media agent

400
00:17:51,710 --> 00:17:49,039
pointed out you know that date rings a

401
00:17:54,029 --> 00:17:51,720
bell so then I went back and I decided

402
00:17:55,950 --> 00:17:54,039
to take a look at the other candidate

403
00:17:57,070 --> 00:17:55,960
these aligned ones at the top candidates

404
00:17:58,990 --> 00:17:57,080
that we had because we had five

405
00:18:02,789 --> 00:17:59,000
candidates listed

406
00:18:04,669 --> 00:18:02,799
uh and we have still a problem that

407
00:18:07,990 --> 00:18:04,679
again it coincides very close to these

408
00:18:10,710 --> 00:18:08,000
Washington events and I'm going to say

409
00:18:13,270 --> 00:18:10,720
it's just a coincidence

410
00:18:16,470 --> 00:18:13,280
probably so that is why we now are

411
00:18:18,070 --> 00:18:16,480
trying to figure out how can we test

412
00:18:21,070 --> 00:18:18,080
these multiple

413
00:18:24,750 --> 00:18:21,080

transits and actually find out if these

414
00:18:26,830 --> 00:18:24,760
were coincidences or if this is a real

415
00:18:29,390 --> 00:18:26,840
phenomenon because I think it is a real

416
00:18:31,230 --> 00:18:29,400
phenomenon we have like too many

417
00:18:34,870 --> 00:18:31,240
examples but how can we test if this is

418
00:18:36,630 --> 00:18:34,880
related to for example uh Reflections or

419
00:18:39,190 --> 00:18:36,640
emissions associated with non- human

420
00:18:42,149 --> 00:18:39,200
objects this is the key question and

421
00:18:43,990 --> 00:18:42,159
that and that uh we can do and we have

422
00:18:45,310 --> 00:18:44,000
created a new project called EXO probe

423
00:18:47,510 --> 00:18:45,320
that I'm

424
00:18:48,750 --> 00:18:47,520
leading and I'm going to tell you about

425
00:18:52,630 --> 00:18:48,760
that because this is going to be

426
00:18:55,710 --> 00:18:52,640
completely new we have just started it

427
00:18:57,830 --> 00:18:55,720
and I'm going to argue again for why we

428
00:18:59,029 --> 00:18:57,840
should do it this way because I believe

429
00:19:00,909 --> 00:18:59,039
in that

430
00:19:02,950 --> 00:19:00,919
uh extraterrestrial probes are highly

431
00:19:05,390 --> 00:19:02,960
likely I think AI has been giving many

432
00:19:07,310 --> 00:19:05,400
arguments of why this is such a like

433
00:19:09,470 --> 00:19:07,320
realistic idea because we humans can

434
00:19:10,830 --> 00:19:09,480
send something to another star why

435
00:19:14,149 --> 00:19:10,840
shouldn't they be able to send something

436
00:19:15,990 --> 00:19:14,159
to us it's just natural think of Voyager

437
00:19:18,549 --> 00:19:16,000
think of pioneer and you have 40 billion

438
00:19:20,430 --> 00:19:18,559

Earth siiz planets just in the Milky Way

439
00:19:22,750 --> 00:19:20,440
and also nobody said that they have to

440
00:19:27,070 --> 00:19:22,760
be biological in origin you could even

441
00:19:28,630 --> 00:19:27,080
have some kind of AI and robotic little

442
00:19:31,430 --> 00:19:28,640
probes that are spread throughout the

443
00:19:33,950 --> 00:19:31,440
Galaxy and you can search for them we

444
00:19:35,750 --> 00:19:33,960
couldn't do these searches in the 60s

445
00:19:37,630 --> 00:19:35,760
because in the 60s they were talking

446
00:19:39,789 --> 00:19:37,640
about already like Radio City versus

447
00:19:41,990 --> 00:19:39,799
searching for probes but the technology

448
00:19:44,029 --> 00:19:42,000
wasn't there the technology to do these

449
00:19:46,070 --> 00:19:44,039
searches came with a development of the

450
00:19:48,789 --> 00:19:46,080
SEO sensors as you use in your mobile

451
00:19:52,669 --> 00:19:48,799
phone when one digitized the the old

452
00:19:55,190 --> 00:19:52,679
plate surveys or created new Sky surveys

453
00:19:57,990 --> 00:19:55,200
like in the last 10 or 15 years and that

454
00:20:00,149 --> 00:19:58,000
is when we developed the technology to

455
00:20:03,070 --> 00:20:00,159
actually search for et probes so now

456
00:20:07,149 --> 00:20:03,080
when we have it why not do

457
00:20:08,669 --> 00:20:07,159
it so I'm coming back to the again the

458
00:20:11,510 --> 00:20:08,679
global network of telescopes that we

459
00:20:17,070 --> 00:20:11,520
want to work on of course we're going to

460
00:20:22,669 --> 00:20:20,789
number so the idea here is that we I

461
00:20:25,390 --> 00:20:22,679
just to repeat it for those who maybe

462
00:20:27,430 --> 00:20:25,400
forgot is that we want to detect an an

463
00:20:29,310 --> 00:20:27,440

unidentified object we want to validate

464
00:20:33,110 --> 00:20:29,320
it directly from multiple telescopes we

465
00:20:35,350 --> 00:20:33,120
want to acquire a Spectra and see uh

466
00:20:37,190 --> 00:20:35,360
what is it is it different is it similar

467
00:20:39,950 --> 00:20:37,200
what are we actually seeing and we want

468
00:20:41,710 --> 00:20:39,960
to localize it because and if you have

469
00:20:43,830 --> 00:20:41,720
many telescope there's something very

470
00:20:45,549 --> 00:20:43,840
beautiful about all that you can

471
00:20:47,430 --> 00:20:45,559
localize it so accurately that you can

472
00:20:49,590 --> 00:20:47,440
go there and bring it

473
00:20:52,310 --> 00:20:49,600
down and that's something that would be

474
00:20:55,710 --> 00:20:52,320
very neat to do of course so I work on

475
00:20:58,110 --> 00:20:55,720
this um uh with several more scientists

476
00:21:00,029 --> 00:20:58,120
U primarily jof Marcy who is our

477
00:21:02,470 --> 00:21:00,039
exoplanet Pioneer and discovered the

478
00:21:05,029 --> 00:21:02,480
first like 75% of all the first

479
00:21:06,630 --> 00:21:05,039
exoplanets and also Brian Hill John gerz

480
00:21:11,510 --> 00:21:06,640
and there are two more people who are

481
00:21:14,310 --> 00:21:11,520
involved uh Alina stanka and U Stefan

482
00:21:15,870 --> 00:21:14,320
guer so we have a small team this time

483
00:21:18,710 --> 00:21:15,880
we're going to go for a very small team

484
00:21:21,630 --> 00:21:18,720
to uh work effectively and the goal is

485
00:21:24,510 --> 00:21:21,640
to find these short flashes Reflections

486
00:21:26,269 --> 00:21:24,520
or emissions associated with artificial

487
00:21:28,990 --> 00:21:26,279
objects and we're going to look for this

488
00:21:31,390 --> 00:21:29,000

very short like one second uh long

489
00:21:34,190 --> 00:21:31,400
transients because astronomers don't

490
00:21:35,549 --> 00:21:34,200
care about this uh parameter space they

491
00:21:38,070 --> 00:21:35,559
have been looking for transients like

492
00:21:39,430 --> 00:21:38,080
supernovas that are there for months

493
00:21:42,070 --> 00:21:39,440
they have been looking for things that

494
00:21:44,390 --> 00:21:42,080
are lasting for maybe hours but this 1

495
00:21:47,149 --> 00:21:44,400
second parameter space is almost

496
00:21:48,789 --> 00:21:47,159
entirely unsampled so of course it makes

497
00:21:50,549 --> 00:21:48,799
it interesting even from astrophysics

498
00:21:52,269 --> 00:21:50,559
point of view if you find some new

499
00:21:54,789 --> 00:21:52,279
phenomenon or if you find some Optical

500
00:21:56,870 --> 00:21:54,799
Afterglow of a gamma Reb burst it's

501
00:21:59,230 --> 00:21:56,880
there are lot of nice things that you

502
00:22:01,269 --> 00:21:59,240
can do here I I really like to explore

503
00:22:04,470 --> 00:22:01,279
new parameter spaces like when we were

504
00:22:06,990 --> 00:22:04,480
looking for Vanishing stars because you

505
00:22:09,950 --> 00:22:07,000
ter in cognit is just so incredibly

506
00:22:12,390 --> 00:22:09,960
fun and the goal is to detect validate

507
00:22:14,630 --> 00:22:12,400
localize characterize and finally if you

508
00:22:18,029 --> 00:22:14,640
find something bring it down to the

509
00:22:19,870 --> 00:22:18,039
Earth I'm not ashamed to say it so we

510
00:22:22,350 --> 00:22:19,880
started the project on the 1 of August

511
00:22:24,149 --> 00:22:22,360
so it's a very new and it's uh thanks to

512
00:22:26,149 --> 00:22:24,159
the support of a

513
00:22:29,350 --> 00:22:26,159

funer and I'm going to walk you through

514
00:22:33,230 --> 00:22:29,360
the process of how it's going to work

515
00:22:35,789 --> 00:22:33,240
so let's look here first we really need

516
00:22:38,950 --> 00:22:35,799
to select the appropriate

517
00:22:41,430 --> 00:22:38,960
instrumentation and you cannot use just

518
00:22:44,310 --> 00:22:41,440
any telescope of course of of any size

519
00:22:46,669 --> 00:22:44,320
because you need very good tracking on

520
00:22:49,230 --> 00:22:46,679
the mount you need very high Optical

521
00:22:52,390 --> 00:22:49,240
quality when you search for these transs

522
00:22:54,870 --> 00:22:52,400
and you also need a wide field of view

523
00:22:56,669 --> 00:22:54,880
so some people say oh why don't you use

524
00:22:58,230 --> 00:22:56,679
just an amateur telescope well of course

525
00:23:01,029 --> 00:22:58,240
the amateur telescope has Terri able

526
00:23:05,669 --> 00:23:01,039
Optical quality and also it's not going

527
00:23:09,149 --> 00:23:05,679
to uh fulfill any of your needs for the

528
00:23:11,870 --> 00:23:09,159
project and uh you really need that

529
00:23:13,149 --> 00:23:11,880
tracking and so and others are going to

530
00:23:15,789 --> 00:23:13,159
ask so why don't you use some

531
00:23:17,909 --> 00:23:15,799
professional telescope like the jwst or

532
00:23:19,269 --> 00:23:17,919
Nordic optical telescope and those of us

533
00:23:21,390 --> 00:23:19,279
who are astronomers know that it's

534
00:23:23,750 --> 00:23:21,400
incredibly difficult to get more than a

535
00:23:26,070 --> 00:23:23,760
few hours on any of these telescopes and

536
00:23:29,510 --> 00:23:26,080
moreover the field of you matters

537
00:23:32,350 --> 00:23:29,520
because like jwst has a very small field

538
00:23:34,710 --> 00:23:32,360

of view so if you're going to try to use

539
00:23:37,510 --> 00:23:34,720
any of those super telescopes you're

540
00:23:39,310 --> 00:23:37,520
going to end up with something like much

541
00:23:40,950 --> 00:23:39,320
fewer of transients that you can

542
00:23:43,070 --> 00:23:40,960
discover so you really need to balance

543
00:23:46,110 --> 00:23:43,080
it have a balance between the field of

544
00:23:48,750 --> 00:23:46,120
view the the depth you search for

545
00:23:51,029 --> 00:23:48,760
because you cannot use let's say mobile

546
00:23:53,710 --> 00:23:51,039
phones have a very big uh field of view

547
00:23:56,549 --> 00:23:53,720
but they don't have a very much of uh a

548
00:23:58,630 --> 00:23:56,559
depth so all that has to work we have

549
00:24:01,269 --> 00:23:58,640
selected that

550
00:24:03,590 --> 00:24:01,279
next in order to verify and localize a

551
00:24:05,149 --> 00:24:03,600
probe you need at least two telescopes

552
00:24:07,669 --> 00:24:05,159
and the more telescopes you have the

553
00:24:08,950 --> 00:24:07,679
more accurate you will have the location

554
00:24:10,510 --> 00:24:08,960
and you can detect this Flash in

555
00:24:13,310 --> 00:24:10,520
multiple synchronized telescopes and

556
00:24:16,430 --> 00:24:13,320
that's what we want and as they have a

557
00:24:18,230 --> 00:24:16,440
specific set distance that we have U

558
00:24:20,630 --> 00:24:18,240
carefully selected you will be able to

559
00:24:23,390 --> 00:24:20,640
measure the Parallax and say where how

560
00:24:25,830 --> 00:24:23,400
far the object is from us currently we

561
00:24:27,310 --> 00:24:25,840
use three OBS or currently we are uh

562
00:24:29,310 --> 00:24:27,320
planning three observatories I would

563
00:24:31,149 --> 00:24:29,320

rather say because I'm waiting for our

564
00:24:33,110 --> 00:24:31,159
main telescope that is much better than

565
00:24:35,269 --> 00:24:33,120
the other two uh we still need to think

566
00:24:37,590 --> 00:24:35,279
about how to upgrade these two uh the

567
00:24:40,149 --> 00:24:37,600
main telescope is going to be purchased

568
00:24:41,549 --> 00:24:40,159
the coming weeks we have already put in

569
00:24:43,230 --> 00:24:41,559
an order everything and now it goes

570
00:24:44,350 --> 00:24:43,240
through the administrative process of

571
00:24:46,710 --> 00:24:44,360
Stockholm

572
00:24:50,269 --> 00:24:46,720
University the the third thing we do in

573
00:24:52,470 --> 00:24:50,279
order to um make our life easier is that

574
00:24:55,950 --> 00:24:52,480
we skip everything inside the atmosphere

575
00:24:59,190 --> 00:24:55,960
off with the pigeons off with the um

576
00:25:00,789 --> 00:24:59,200
ducks and um um airplanes we don't want

577
00:25:02,870 --> 00:25:00,799
to do anything of that so we stayed

578
00:25:05,029 --> 00:25:02,880
outside atmosphere and not only that we

579
00:25:08,110 --> 00:25:05,039
try to in the initial phases we are

580
00:25:11,149 --> 00:25:08,120
going to try to stay uh even outside the

581
00:25:12,990 --> 00:25:11,159
orbits where we have most of the human

582
00:25:14,669 --> 00:25:13,000
satellites so we are actually probing

583
00:25:18,830 --> 00:25:14,679
the inner solar

584
00:25:20,630 --> 00:25:18,840
system uh we also have a very efficient

585
00:25:22,750 --> 00:25:20,640
method to filter away all human

586
00:25:26,110 --> 00:25:22,760
satellites and space debris in one go as

587
00:25:27,870 --> 00:25:26,120
we observe so uh this is something I'm

588
00:25:30,350 --> 00:25:27,880

very proud proud of I will hope I will

589
00:25:32,950 --> 00:25:30,360
be able to share and this technique I

590
00:25:34,950 --> 00:25:32,960
really like to like exploring new

591
00:25:36,950 --> 00:25:34,960
techniques to get rid of satellites I

592
00:25:39,590 --> 00:25:36,960
can't help it this is an obsession of

593
00:25:42,909 --> 00:25:39,600
mine since the time we are going to use

594
00:25:44,590 --> 00:25:42,919
already existing uh techniques that also

595
00:25:47,149 --> 00:25:44,600
U my colleague joof Marcy has been

596
00:25:49,630 --> 00:25:47,159
developing where you can get real-time

597
00:25:53,230 --> 00:25:49,640
spectroscopy in a wide field and that is

598
00:25:56,110 --> 00:25:53,240
so that we directly can characterize the

599
00:25:58,230 --> 00:25:56,120
thing and of course the goal is to add

600
00:26:02,230 --> 00:25:58,240
more telescopes as I said

601
00:26:03,909 --> 00:26:02,240
um however it's a little bit uh there

602
00:26:06,230 --> 00:26:03,919
are some practical challenges with it

603
00:26:07,909 --> 00:26:06,240
but that can allow us to increase the

604
00:26:09,630 --> 00:26:07,919
range of altitudes and the more

605
00:26:11,870 --> 00:26:09,640
combination you have of these telescopes

606
00:26:14,990 --> 00:26:11,880
where you measure to parallx the more

607
00:26:16,389 --> 00:26:15,000
better is going your localization in 3D

608
00:26:19,590 --> 00:26:16,399
going to

609
00:26:21,430 --> 00:26:19,600
be and of course the most important if

610
00:26:23,669 --> 00:26:21,440
the ET probe detection is

611
00:26:25,750 --> 00:26:23,679
successful let's activate the space

612
00:26:28,190 --> 00:26:25,760
garbage collectors I would hope to find

613
00:26:32,870 --> 00:26:28,200

some company that would like to help us

614
00:26:35,430 --> 00:26:32,880
to bring down the probe and I'm yeah I

615
00:26:38,669 --> 00:26:35,440
wouldn't worry too much about the uh if

616
00:26:41,590 --> 00:26:38,679
the probes agrees with me or not

617
00:26:44,789 --> 00:26:41,600
so and I think it is it will be a

618
00:26:47,269 --> 00:26:44,799
possibility to do so I developed this um

619
00:26:49,389 --> 00:26:47,279
program together with Dr marid as I

620
00:26:51,630 --> 00:26:49,399
mentioned who discovered the first 70

621
00:26:53,750 --> 00:26:51,640
out of 100 exoplanets and also received

622
00:26:55,470 --> 00:26:53,760
the sh prize that he shared with a Nobel

623
00:26:58,230 --> 00:26:55,480
Prize winner Michelle mayora for his

624
00:27:00,710 --> 00:26:58,240
great um

625
00:27:02,830 --> 00:27:00,720
discoveries he's also the the creator of

626
00:27:06,590 --> 00:27:02,840
the Breakthrough listen uh

627
00:27:08,149 --> 00:27:06,600
program and the Vasco team um that have

628
00:27:10,230 --> 00:27:08,159
been working with me on the searches for

629
00:27:13,750 --> 00:27:10,240
transients and Vanishing stars as I

630
00:27:16,310 --> 00:27:13,760
mentioned is a very uh uh is a theme of

631
00:27:20,350 --> 00:27:16,320
40 people with diverse backgrounds and

632
00:27:22,630 --> 00:27:20,360
we enjoy this work together here I had a

633
00:27:26,190 --> 00:27:22,640
very nice animation that I'm I'm afraid

634
00:27:29,070 --> 00:27:26,200
I cannot show here um somehow it doesn't

635
00:27:31,149 --> 00:27:29,080
work but where you would be able to see

636
00:27:33,710 --> 00:27:31,159
how a flash

637
00:27:35,549 --> 00:27:33,720
here uh how something is flashing and as

638
00:27:37,830 --> 00:27:35,559

the globe is moving different telescopes

639
00:27:40,669 --> 00:27:37,840
are seeing everything and are detecting

640
00:27:41,950 --> 00:27:40,679
this Flash and uh of course those who

641
00:27:45,470 --> 00:27:41,960
are interested can come and I can show

642
00:27:47,070 --> 00:27:45,480
you the animation later um and with that

643
00:27:50,470 --> 00:27:47,080
I very much would like to thank you