

PUBLIC LECTURE SERIES

The Universe of Dante Alighieri

Featuring Guest Speaker:
Sperello di Serego Alighieri

1
00:00:07,730 --> 00:00:04,130
welcome to the Space Telescope public

2
00:00:11,270 --> 00:00:07,740
lecture series uh tonight's talk the

3
00:00:14,030 --> 00:00:11,280
universe of Dante Alighieri from the

4
00:00:16,129 --> 00:00:14,040
descendant of Dante Alighieri spirello

5
00:00:19,310 --> 00:00:16,139
disrego allegieri

6
00:00:21,050 --> 00:00:19,320
I am your host uh Dr Frank Summers from

7
00:00:24,230 --> 00:00:21,060
The Office of Public Outreach at the

8
00:00:26,029 --> 00:00:24,240
Space Telescope Science Institute and as

9
00:00:28,670 --> 00:00:26,039
always I want to thank our wonderful

10
00:00:29,810 --> 00:00:28,680
tech team Thomas marufu and Grant

11
00:00:33,110 --> 00:00:29,820
Justice

12
00:00:35,150 --> 00:00:33,120
I will also note that management has

13
00:00:37,430 --> 00:00:35,160

decided that the Space Telescope public

14

00:00:41,150 --> 00:00:37,440

lecture series will continue to be

15

00:00:45,110 --> 00:00:41,160

online only through the rest of 22 2022

16

00:00:46,970 --> 00:00:45,120

and also during 2023 so for the

17

00:00:49,790 --> 00:00:46,980

foreseeable future we will continue to

18

00:00:52,549 --> 00:00:49,800

be online only and we will not have the

19

00:00:54,229 --> 00:00:52,559

in-person uh presentations in the sdsci

20

00:00:57,709 --> 00:00:54,239

auditorium

21

00:01:01,010 --> 00:00:57,719

our upcoming talks and next month on

22

00:01:03,470 --> 00:01:01,020

November 1st Stephanie lamasa from Space

23

00:01:06,230 --> 00:01:03,480

Telescope we'll talk about black holes

24

00:01:07,130 --> 00:01:06,240

how do we see that which gives off no

25

00:01:10,850 --> 00:01:07,140

light

26
00:01:13,730 --> 00:01:10,860
on December 6th we will do high energy

27
00:01:15,770 --> 00:01:13,740
astronomy with the Swift Observatory and

28
00:01:17,810 --> 00:01:15,780
that will feature Steve Kirby from the

29
00:01:20,510 --> 00:01:17,820
Penn State University

30
00:01:23,570 --> 00:01:20,520
on January 10th we will have a talk but

31
00:01:25,490 --> 00:01:23,580
I have not scheduled it so as usual I

32
00:01:28,789 --> 00:01:25,500
put in my placeholder a fascinating

33
00:01:31,910 --> 00:01:28,799
topic by an insightful speaker

34
00:01:37,210 --> 00:01:31,920
uh when we do have that uh talk booked

35
00:01:44,210 --> 00:01:41,929
www.stsci.edu public hyphen lectures uh

36
00:01:46,010 --> 00:01:44,220
on that webpage you will find a link to

37
00:01:49,310 --> 00:01:46,020
our webcasts uh both our YouTube

38
00:01:52,010 --> 00:01:49,320

playlist and our stsci webcast archives

39

00:01:55,130 --> 00:01:52,020

as well as the

40

00:01:56,929 --> 00:01:55,140

um email list where you can put in your

41

00:01:58,670 --> 00:01:56,939

email address and hit the Subscribe

42

00:02:01,130 --> 00:01:58,680

button

43

00:02:03,410 --> 00:02:01,140

also on our website we have the list of

44

00:02:05,090 --> 00:02:03,420

the upcoming lectures and if you click

45

00:02:08,029 --> 00:02:05,100

on one of those lectures you will get

46

00:02:10,850 --> 00:02:08,039

the details the of uh the description

47

00:02:13,729 --> 00:02:10,860

and the speaker as well as after it's

48

00:02:17,150 --> 00:02:13,739

been recorded links to the stsci webcast

49

00:02:20,390 --> 00:02:17,160

and the YouTube webcast

50

00:02:23,089 --> 00:02:20,400

uh for announcements um as I said sign

51
00:02:26,229 --> 00:02:23,099
up at the website you can also subscribe

52
00:02:28,729 --> 00:02:26,239
to our YouTube channel [youtube.com](https://www.youtube.com)

53
00:02:31,369 --> 00:02:28,739
Hubble Space Telescope that's all one

54
00:02:33,890 --> 00:02:31,379
word Hubble Space Telescope uh you will

55
00:02:35,990 --> 00:02:33,900
get new video notices and reminders of

56
00:02:37,610 --> 00:02:36,000
Live Events such as this

57
00:02:39,229 --> 00:02:37,620
finally if you have comments or

58
00:02:42,410 --> 00:02:39,239
questions you can send them to the email

59
00:02:46,070 --> 00:02:42,420
address public lecture all one word at

60
00:02:51,050 --> 00:02:48,890
furthermore you can follow us on social

61
00:02:53,089 --> 00:02:51,060
media we have social media channels for

62
00:02:55,009 --> 00:02:53,099
the Hubble Space Telescope for the web

63
00:02:56,869 --> 00:02:55,019

Space Telescope and for the Space

64

00:02:59,869 --> 00:02:56,879

Telescope Science Institute and you can

65

00:03:03,890 --> 00:02:59,879

find those on Facebook Twitter Youtube

66

00:03:05,990 --> 00:03:03,900

and Instagram I myself do a very minor

67

00:03:09,470 --> 00:03:06,000

amount of stuff on social media on

68

00:03:11,930 --> 00:03:09,480

Facebook and Twitter as Dr Frank Summers

69

00:03:15,050 --> 00:03:11,940

and now our news from the universe for

70

00:03:19,309 --> 00:03:15,060

October 2022.

71

00:03:22,250 --> 00:03:19,319

our story tonight a tarantula caught by

72

00:03:29,390 --> 00:03:25,490

this is the large magellanic cloud and

73

00:03:32,809 --> 00:03:29,400

it is a dwarf Galaxy that is a satellite

74

00:03:34,550 --> 00:03:32,819

Galaxy of our own Milky Way galaxy and

75

00:03:36,170 --> 00:03:34,560

you may say all right it's a dwarf

76
00:03:37,490 --> 00:03:36,180
Galaxy it's kind of small and everything

77
00:03:41,589 --> 00:03:37,500
but

78
00:03:44,570 --> 00:03:41,599
it has the largest star-forming region

79
00:03:46,850 --> 00:03:44,580
anywhere in the local group

80
00:03:49,729 --> 00:03:46,860
this star-forming region called the

81
00:03:51,770 --> 00:03:49,739
tarantula nebula is larger than any

82
00:03:55,369 --> 00:03:51,780
star-forming region in the Milky Way

83
00:03:57,170 --> 00:03:55,379
galaxy or in the Andromeda galaxy there

84
00:03:59,509 --> 00:03:57,180
is an incredible amount of star

85
00:04:01,729 --> 00:03:59,519
formation going on here and of course

86
00:04:03,770 --> 00:04:01,739
astronomers have studied it many many

87
00:04:06,050 --> 00:04:03,780
many many many times

88
00:04:09,710 --> 00:04:06,060

we have studied it with the Hubble Space

89

00:04:13,490 --> 00:04:09,720

Telescope and here is an image from I

90

00:04:16,310 --> 00:04:13,500

think this is 2012 from Hubble this is

91

00:04:18,229 --> 00:04:16,320

both a little bit of visible light and a

92

00:04:22,250 --> 00:04:18,239

good amount of the near infrared from

93

00:04:24,890 --> 00:04:22,260

Hubble and you can see these bubbles uh

94

00:04:27,050 --> 00:04:24,900

created here in the the structure by

95

00:04:28,909 --> 00:04:27,060

newborn stars and the winds and the

96

00:04:31,670 --> 00:04:28,919

Supernova explosions that can happen in

97

00:04:34,310 --> 00:04:31,680

here there's a huge cluster of stars in

98

00:04:36,129 --> 00:04:34,320

here whoops I didn't mean to hit that a

99

00:04:39,469 --> 00:04:36,139

huge cluster of stars in here called

100

00:04:42,290 --> 00:04:39,479

r136 that's sort of the core of the

101
00:04:43,670 --> 00:04:42,300
tarantula nebula uh has also been

102
00:04:45,530 --> 00:04:43,680
studied

103
00:04:48,050 --> 00:04:45,540
um with the Spitzer Space Telescope now

104
00:04:51,050 --> 00:04:48,060
remember this Hubble is done invisible

105
00:04:52,730 --> 00:04:51,060
and a good amount of near infrared so if

106
00:04:54,409 --> 00:04:52,740
I go to the Spitzer Space Telescope

107
00:04:57,290 --> 00:04:54,419
which is infrared

108
00:04:59,090 --> 00:04:57,300
it doesn't look that different

109
00:05:00,770 --> 00:04:59,100
um uh because we have a good amount of

110
00:05:04,310 --> 00:05:00,780
infrared in the Hubble image but you can

111
00:05:06,590 --> 00:05:04,320
see this green material here if I blink

112
00:05:09,650 --> 00:05:06,600
back to the Hubble that corresponds

113
00:05:12,950 --> 00:05:09,660

pretty well to the materials seen in

114

00:05:15,230 --> 00:05:12,960

Spitzer of course Hubble has a much

115

00:05:16,969 --> 00:05:15,240

finer resolution than Spitzer does and

116

00:05:20,030 --> 00:05:16,979

sees more detail

117

00:05:22,189 --> 00:05:20,040

but if you want even more detail well

118

00:05:24,830 --> 00:05:22,199

the James Webb Space Telescope has

119

00:05:27,710 --> 00:05:24,840

looked at the tarantula nebula now and

120

00:05:29,749 --> 00:05:27,720

it took an image in this region here of

121

00:05:31,490 --> 00:05:29,759

the tarantula nebula a region that's

122

00:05:34,150 --> 00:05:31,500

centered on that star cluster called

123

00:05:37,129 --> 00:05:34,160

r136 that I mentioned before

124

00:05:40,909 --> 00:05:37,139

and you can see just from this that this

125

00:05:43,550 --> 00:05:40,919

uh that web is such such a higher it's a

126
00:05:46,070 --> 00:05:43,560
Quantum Leap in resolution over Spitzer

127
00:05:49,370 --> 00:05:46,080
and let's bring that image full screen

128
00:05:52,670 --> 00:05:49,380
and you can see all of the rich detail

129
00:05:53,870 --> 00:05:52,680
we have here in the tarantula nebula

130
00:05:56,749 --> 00:05:53,880
from web

131
00:06:00,590 --> 00:05:56,759
but this doesn't actually do it justice

132
00:06:03,590 --> 00:06:00,600
because this image is about one-fifth or

133
00:06:06,710 --> 00:06:03,600
one-sixth scale that you're seeing it uh

134
00:06:09,050 --> 00:06:06,720
on here so let me zoom into the region

135
00:06:11,689 --> 00:06:09,060
around that star cluster and give you a

136
00:06:13,129 --> 00:06:11,699
somewhat full resolution view of it now

137
00:06:16,249 --> 00:06:13,139
this is of course going to be modified

138
00:06:18,890 --> 00:06:16,259

by my computer to uh out to the the

139

00:06:20,150 --> 00:06:18,900

webcast onto your computer and so you're

140

00:06:23,029 --> 00:06:20,160

not probably not going to see all the

141

00:06:26,029 --> 00:06:23,039

incredible detail here but just look at

142

00:06:28,309 --> 00:06:26,039

all the stars we're seeing here in r136

143

00:06:31,309 --> 00:06:28,319

all right and if we go to a region

144

00:06:34,070 --> 00:06:31,319

that's got a nebula structure well

145

00:06:36,770 --> 00:06:34,080

that's really cool too and you get

146

00:06:39,050 --> 00:06:36,780

incredible detail so we're trying to

147

00:06:42,409 --> 00:06:39,060

illustrate for you the detail that web

148

00:06:46,129 --> 00:06:42,419

is able to see with a six and a half

149

00:06:48,710 --> 00:06:46,139

meter mirror looking in the infrared

150

00:06:50,749 --> 00:06:48,720

all right so that's sort of be expected

151
00:06:53,330 --> 00:06:50,759
we knew Webb was going to be a Quantum

152
00:06:56,510 --> 00:06:53,340
Leap over Spitzer but how does it

153
00:06:59,029 --> 00:06:56,520
compare to Hubble well this is one of

154
00:07:00,590 --> 00:06:59,039
the few images where Hubble has a lot of

155
00:07:02,749 --> 00:07:00,600
infrared

156
00:07:05,029 --> 00:07:02,759
um so it's actually a relatively Apples

157
00:07:08,029 --> 00:07:05,039
to Apples comparison of Hubble versus

158
00:07:10,330 --> 00:07:08,039
web all right and so the on the left is

159
00:07:13,670 --> 00:07:10,340
a Hubble image that I believe is from

160
00:07:16,670 --> 00:07:13,680
2016 and on the right is the brand new

161
00:07:18,350 --> 00:07:16,680
web image of the tarantula nebula

162
00:07:21,230 --> 00:07:18,360
um and you can see in in detail just

163
00:07:23,990 --> 00:07:21,240

from this large-scale view that uh Webb

164

00:07:26,150 --> 00:07:24,000

has a SL has a just a bit more

165

00:07:28,249 --> 00:07:26,160

resolution okay it's about a factor of

166

00:07:30,830 --> 00:07:28,259

one and a half factor of two resolution

167

00:07:32,570 --> 00:07:30,840

that's better better than Hubble but

168

00:07:34,610 --> 00:07:32,580

we're going to zoom in on this lower

169

00:07:37,249 --> 00:07:34,620

left region here um and show you a

170

00:07:39,110 --> 00:07:37,259

little more detail right okay so here's

171

00:07:41,089 --> 00:07:39,120

the Hubble image and I'm going to be

172

00:07:43,309 --> 00:07:41,099

able to Blink back and forth and here is

173

00:07:46,850 --> 00:07:43,319

the web image

174

00:07:49,850 --> 00:07:46,860

okay and Hubble

175

00:07:52,189 --> 00:07:49,860

and web and there you can see that that

176
00:07:53,749 --> 00:07:52,199
there's just that much more sharpness in

177
00:07:56,870 --> 00:07:53,759
the web image than there is in the

178
00:07:59,450 --> 00:07:56,880
Hubble image and also in the Hubble

179
00:08:03,710 --> 00:07:59,460
image we see a lot of this dark gas down

180
00:08:05,809 --> 00:08:03,720
here okay this dark gas that um is

181
00:08:07,790 --> 00:08:05,819
opaque to wavelengths that Hubble

182
00:08:10,490 --> 00:08:07,800
observes but when you go further into

183
00:08:13,189 --> 00:08:10,500
the infrared you actually see through it

184
00:08:15,529 --> 00:08:13,199
and you see more detail and structure of

185
00:08:18,710 --> 00:08:15,539
what's Happening inside these gas clouds

186
00:08:20,089 --> 00:08:18,720
all right and this kind of comparison is

187
00:08:21,290 --> 00:08:20,099
something that you know I haven't done

188
00:08:22,730 --> 00:08:21,300

much I don't haven't done much before

189

00:08:24,230 --> 00:08:22,740

I've done I've done it with a bunch of

190

00:08:25,909 --> 00:08:24,240

things but it's hard to get you know

191

00:08:27,409 --> 00:08:25,919

images that are reasonably well to

192

00:08:29,689 --> 00:08:27,419

compare

193

00:08:32,029 --> 00:08:29,699

um but it brings up questions in people

194

00:08:36,529 --> 00:08:32,039

and people ask me all right well which

195

00:08:38,209 --> 00:08:36,539

is better Hubble or web all right and I

196

00:08:41,690 --> 00:08:38,219

usually respond to that by saying all

197

00:08:45,410 --> 00:08:41,700

right well which is better an SUV or a

198

00:08:47,030 --> 00:08:45,420

sports car right now if you're going out

199

00:08:48,889 --> 00:08:47,040

to a construction site or you want to go

200

00:08:52,310 --> 00:08:48,899

off-roading or you want to you know haul

201
00:08:54,110 --> 00:08:52,320
stuff you want that SUV and if you're

202
00:08:55,610 --> 00:08:54,120
going out onto the highway you want to

203
00:08:58,790 --> 00:08:55,620
Zoop around you want to take those tight

204
00:09:01,550 --> 00:08:58,800
curves well you want that sports car all

205
00:09:04,370 --> 00:09:01,560
right the same thing is going on here if

206
00:09:06,710 --> 00:09:04,380
you're looking in visible light you want

207
00:09:10,610 --> 00:09:06,720
Hubble if you're looking at infrared

208
00:09:12,769 --> 00:09:10,620
light you want James Webb all right so

209
00:09:14,449 --> 00:09:12,779
it's not like one is better than the

210
00:09:16,490 --> 00:09:14,459
other they're designed to do different

211
00:09:19,790 --> 00:09:16,500
things Hubble is designed to look at

212
00:09:22,009 --> 00:09:19,800
Optical light visible light and web is

213
00:09:23,690 --> 00:09:22,019

designed to look at infrared light and

214

00:09:25,970 --> 00:09:23,700

there's a bit of an overlap okay and

215

00:09:27,889 --> 00:09:25,980

where there is an overlap web being the

216

00:09:30,290 --> 00:09:27,899

newer telescope actually has has better

217

00:09:34,430 --> 00:09:30,300

resolution and actually one of the main

218

00:09:38,690 --> 00:09:34,440

advantages of web is that it can get to

219

00:09:41,150 --> 00:09:38,700

a certain uh depth of of an image faster

220

00:09:43,670 --> 00:09:41,160

it has newer detectors it can get to it

221

00:09:46,550 --> 00:09:43,680

can get to the uh the faint stuff faster

222

00:09:48,949 --> 00:09:46,560

than Hubble could do on the same thing

223

00:09:51,550 --> 00:09:48,959

but really you know uh instead of

224

00:09:54,710 --> 00:09:51,560

choosing between a sports car and an SUV

225

00:09:58,190 --> 00:09:54,720

why not both huh and that's what we've

226

00:10:00,650 --> 00:09:58,200

got here we have a wonderful optical

227

00:10:02,269 --> 00:10:00,660

telescope we have a wonderful infrared

228

00:10:06,530 --> 00:10:02,279

telescope and we're sort of in like a

229

00:10:09,650 --> 00:10:06,540

golden age where we get to use them both

230

00:10:12,170 --> 00:10:09,660

together to learn more we take images

231

00:10:14,870 --> 00:10:12,180

with Hubble we take images with web We

232

00:10:17,870 --> 00:10:14,880

compare them we get new new views we

233

00:10:20,269 --> 00:10:17,880

have more understanding and more science

234

00:10:22,430 --> 00:10:20,279

so these next few years when we have

235

00:10:24,530 --> 00:10:22,440

both telescopes operational are going to

236

00:10:27,710 --> 00:10:24,540

be wonderful and I really look forward

237

00:10:30,290 --> 00:10:27,720

to the results we're going to get

238

00:10:31,550 --> 00:10:30,300

all right that's our news summary for

239

00:10:34,250 --> 00:10:31,560

today

240

00:10:37,310 --> 00:10:34,260

um let me stop my screen share

241

00:10:40,190 --> 00:10:37,320

um and invite spirillo to turn on his

242

00:10:42,170 --> 00:10:40,200

screen share unfortunately spur one of

243

00:10:46,130 --> 00:10:42,180

the reasons we started this late is that

244

00:10:47,990 --> 00:10:46,140

spirillo's uh camera is not working uh

245

00:10:49,910 --> 00:10:48,000

his screen share is working but not his

246

00:10:51,769 --> 00:10:49,920

camera so spirilla whenever you have a

247

00:10:54,530 --> 00:10:51,779

red bat there he started his screen

248

00:10:57,470 --> 00:10:54,540

share all right so ladies and gentlemen

249

00:11:00,230 --> 00:10:57,480

our speaker tonight a descendant of

250

00:11:03,710 --> 00:11:00,240

Dante elegieri esperel de solego

251
00:11:06,889 --> 00:11:03,720
allegieri and the most important thing

252
00:11:08,990 --> 00:11:06,899
about him to know is that he's not just

253
00:11:12,290 --> 00:11:09,000
some random descendant he's actually an

254
00:11:14,389 --> 00:11:12,300
astrophysicist he's retired but he did

255
00:11:15,790 --> 00:11:14,399
work at the astrophysical observatory in

256
00:11:18,650 --> 00:11:15,800
arcetri

257
00:11:26,210 --> 00:11:18,660
before he came in and did this research

258
00:11:31,389 --> 00:11:29,870
hello hello everybody thank you for

259
00:11:33,710 --> 00:11:31,399
inviting me

260
00:11:35,590 --> 00:11:33,720
for this

261
00:11:40,009 --> 00:11:35,600
conference

262
00:11:41,090 --> 00:11:40,019
we are going to make a big step back in

263
00:11:45,110 --> 00:11:41,100

time

264

00:11:48,230 --> 00:11:45,120

actually 700 years

265

00:11:50,150 --> 00:11:48,240

America was not yet discovered then

266

00:11:52,550 --> 00:11:50,160

uh anyway

267

00:11:58,190 --> 00:11:53,569

um

268

00:12:01,250 --> 00:11:58,200

yes I am a descendant of Dante

269

00:12:02,690 --> 00:12:01,260

uh but you know this is not the

270

00:12:05,449 --> 00:12:02,700

important thing

271

00:12:08,990 --> 00:12:05,459

because I have no merit in it and of

272

00:12:13,790 --> 00:12:12,110

um it's it's not an easy thing to live

273

00:12:19,250 --> 00:12:13,800

with

274

00:12:21,650 --> 00:12:19,260

but I was helped by my father

275

00:12:24,590 --> 00:12:21,660

um when I was very young starting to

276

00:12:27,170 --> 00:12:24,600

reading six years old

277

00:12:28,370 --> 00:12:27,180

he gave me

278

00:12:30,009 --> 00:12:28,380

um

279

00:12:34,670 --> 00:12:30,019

a book sign

280

00:12:36,490 --> 00:12:34,680

which had some verses of Dante

281

00:12:40,310 --> 00:12:36,500

which are the

282

00:12:43,190 --> 00:12:40,320

few ones that I know by heart

283

00:12:44,949 --> 00:12:43,200

and they say

284

00:12:48,350 --> 00:12:44,959

um actually

285

00:12:52,190 --> 00:12:48,360

let me make a note

286

00:12:53,449 --> 00:12:52,200

I'm going to cite lots of verses of

287

00:12:56,569 --> 00:12:53,459

Dante

288

00:12:58,730 --> 00:12:56,579

I'm going to show them to you in Italian

289

00:12:59,569 --> 00:12:58,740

because this is the way down to vote

290

00:13:04,910 --> 00:12:59,579

them

291

00:13:06,470 --> 00:13:04,920

so this verses you can see it in Italian

292

00:13:10,670 --> 00:13:06,480

and they say

293

00:13:13,190 --> 00:13:10,680

oh little our blood nobility you are

294

00:13:14,389 --> 00:13:13,200

like a month or that soon will get

295

00:13:18,050 --> 00:13:14,399

shorter

296

00:13:19,190 --> 00:13:18,060

so that if you don't add to it day by

297

00:13:24,230 --> 00:13:19,200

day

298

00:13:26,930 --> 00:13:24,240

time will go around with scissors

299

00:13:28,990 --> 00:13:26,940

so this means that nobility and

300

00:13:34,129 --> 00:13:29,000

descendants

301
00:13:37,670 --> 00:13:34,139
have little meaning you if you don't add

302
00:13:42,590 --> 00:13:39,889
um okay so this is what we're trying to

303
00:13:43,310 --> 00:13:42,600
do trying to do tonight

304
00:13:44,870 --> 00:13:43,320
um

305
00:13:46,250 --> 00:13:44,880
and

306
00:13:48,530 --> 00:13:46,260
um

307
00:13:50,050 --> 00:13:48,540
in fact

308
00:13:54,129 --> 00:13:50,060
I've

309
00:13:56,569 --> 00:13:54,139
studied Dante in high school but very

310
00:13:58,310 --> 00:13:56,579
little after that

311
00:14:01,490 --> 00:13:58,320
until

312
00:14:05,509 --> 00:14:01,500
uh some years ago

313
00:14:07,490 --> 00:14:05,519

after most of my astrophysical career

314

00:14:11,810 --> 00:14:07,500

had gone

315

00:14:14,509 --> 00:14:11,820

that I am sharing with Dante something

316

00:14:17,949 --> 00:14:14,519

very important apart from my last name

317

00:14:20,690 --> 00:14:17,959

which is the the passion for astronomy

318

00:14:23,810 --> 00:14:20,700

Dante had this passion there is no doubt

319

00:14:24,829 --> 00:14:23,820

about it in in the con video which is

320

00:14:26,090 --> 00:14:24,839

the

321

00:14:28,129 --> 00:14:26,100

um

322

00:14:32,090 --> 00:14:28,139

if you want the

323

00:14:35,170 --> 00:14:32,100

um 3D philosophical historic or

324

00:14:38,750 --> 00:14:35,180

technical scientific 3D that Dante wrote

325

00:14:42,889 --> 00:14:38,760

in the beginning of the convivor he says

326

00:14:45,410 --> 00:14:42,899

that science is is our ultimate the

327

00:14:51,470 --> 00:14:45,420

ultimate Perfection of our soul

328

00:14:54,110 --> 00:14:51,480

in which states our ultimate happiness

329

00:14:59,150 --> 00:14:54,120

so this is clearly

330

00:15:01,810 --> 00:14:59,160

at the Declaration of love for science

331

00:15:05,389 --> 00:15:01,820

and a little later still in the convivio

332

00:15:08,509 --> 00:15:05,399

Dante says well this astronomy

333

00:15:11,150 --> 00:15:08,519

more than any of the other Sciences is

334

00:15:13,670 --> 00:15:11,160

noble and high because its subject is

335

00:15:16,370 --> 00:15:13,680

noble and high and deals about the

336

00:15:20,030 --> 00:15:16,380

movement of the sky Etc

337

00:15:23,689 --> 00:15:20,040

so science is perfection of our soul and

338

00:15:26,449 --> 00:15:23,699

ultimate happiness and among science is

339

00:15:30,110 --> 00:15:26,459

the the highest and most noble is

340

00:15:33,170 --> 00:15:30,120

astronomy there is obviously clear

341

00:15:36,410 --> 00:15:33,180

passion for astronomy in Dante and he

342

00:15:39,050 --> 00:15:36,420

shows it throughout his works and mostly

343

00:15:40,610 --> 00:15:39,060

of course in in The Divine Comedy in

344

00:15:42,590 --> 00:15:40,620

fact The Divine Comedy

345

00:15:46,550 --> 00:15:42,600

is the story

346

00:15:49,730 --> 00:15:46,560

in Poetic form of a journey throughout

347

00:15:51,710 --> 00:15:49,740

the whole universe like a science

348

00:15:53,150 --> 00:15:51,720

fiction book

349

00:15:54,410 --> 00:15:53,160

anyway

350

00:15:58,610 --> 00:15:54,420

um

351
00:16:01,970 --> 00:15:58,620
of course Dante was talking

352
00:16:11,290 --> 00:16:06,530
astronomy as it was known at its time

353
00:16:17,150 --> 00:16:13,189
leading

354
00:16:21,470 --> 00:16:17,160
astronomy the Ptolemy system done by the

355
00:16:24,230 --> 00:16:21,480
Greeks and got to

356
00:16:27,829 --> 00:16:24,240
to Dante to Europe

357
00:16:30,769 --> 00:16:27,839
back again through the Arabs because

358
00:16:34,569 --> 00:16:30,779
because after the the burn of the

359
00:16:41,030 --> 00:16:37,069
most of the knowledge in the western

360
00:16:43,730 --> 00:16:41,040
world was lost but fortunately the Arabs

361
00:16:46,269 --> 00:16:43,740
kept it and and then they trusted it

362
00:16:50,050 --> 00:16:46,279
back to Europe

363
00:16:55,790 --> 00:16:50,060

uh later okay anyway the ptolemy system

364

00:16:58,730 --> 00:16:55,800

you know he it says that the Earth is in

365

00:17:01,790 --> 00:16:58,740

the middle of the world of the universe

366

00:17:05,090 --> 00:17:01,800

air is standing still in the middle of

367

00:17:07,130 --> 00:17:05,100

the universe and then there are objects

368

00:17:10,549 --> 00:17:07,140

turning around it

369

00:17:13,549 --> 00:17:10,559

first the moon Mercury the sun the sun

370

00:17:18,230 --> 00:17:13,559

is also turning around the Earth

371

00:17:21,829 --> 00:17:18,240

then Venus Mars Jupiter Saturn

372

00:17:24,289 --> 00:17:21,839

and then the fixed Stars so that's the

373

00:17:26,090 --> 00:17:24,299

the system

374

00:17:29,210 --> 00:17:26,100

done this time and of course he's

375

00:17:33,650 --> 00:17:30,770

um

376

00:17:36,770 --> 00:17:33,660

well there are several ways in which

377

00:17:40,549 --> 00:17:36,780

Dante uses astronomy in his works

378

00:17:44,409 --> 00:17:40,559

and one of them maybe well one of the

379

00:17:48,770 --> 00:17:44,419

most important ones is is that he uses

380

00:17:50,150 --> 00:17:48,780

astronomy to tell about time

381

00:17:55,450 --> 00:17:50,160

um

382

00:18:00,289 --> 00:17:55,460

timing of events is often uh shown

383

00:18:03,950 --> 00:18:00,299

with an astronomical uh reference for

384

00:18:05,690 --> 00:18:03,960

example here in in The Inferno

385

00:18:08,169 --> 00:18:05,700

he says

386

00:18:13,669 --> 00:18:08,179

that yesterday

387

00:18:17,390 --> 00:18:13,679

was full moon yesterday was the night in

388

00:18:20,330 --> 00:18:17,400

which Dante had hinted Inferno

389

00:18:22,930 --> 00:18:20,340

it started his trip and and so that it

390

00:18:25,310 --> 00:18:22,940

was full moon

391

00:18:30,350 --> 00:18:25,320

uh well

392

00:18:33,710 --> 00:18:30,360

this is not enough to tell about the the

393

00:18:35,870 --> 00:18:33,720

timing of Dante's Journey

394

00:18:38,090 --> 00:18:35,880

actually there's something important to

395

00:18:41,330 --> 00:18:38,100

tell about this uh of course dentist

396

00:18:44,690 --> 00:18:41,340

journey is an imaginary one

397

00:18:48,049 --> 00:18:44,700

but Dante was not a person who did

398

00:18:51,770 --> 00:18:48,059

things by chance no no no even his

399

00:18:54,730 --> 00:18:51,780

imaginary Journey had to have a place in

400

00:18:58,070 --> 00:18:54,740

time very precise place in time

401
00:19:01,370 --> 00:18:58,080
all readers of Dante throughout the

402
00:19:03,409 --> 00:19:01,380
centuries agree about this that the the

403
00:19:06,770 --> 00:19:03,419
journey had to have

404
00:19:09,470 --> 00:19:06,780
a precise timing

405
00:19:12,409 --> 00:19:09,480
um the problem is that

406
00:19:16,490 --> 00:19:12,419
the leaders of Dante do not agree about

407
00:19:22,549 --> 00:19:17,990
um

408
00:19:26,510 --> 00:19:22,559
of course and so let's look at this

409
00:19:28,490 --> 00:19:26,520
um he he says that it was full moon but

410
00:19:31,610 --> 00:19:28,500
you know full moon there is one every

411
00:19:35,090 --> 00:19:31,620
month and and of course 12 or 13 every

412
00:19:36,289 --> 00:19:35,100
year so it doesn't tell you much

413
00:19:39,350 --> 00:19:36,299

um

414

00:19:42,710 --> 00:19:39,360

most of the readers of Dante

415

00:19:47,150 --> 00:19:42,720

particularly in the old times thought

416

00:19:51,770 --> 00:19:47,160

that the Journey of Dante had happened

417

00:19:54,230 --> 00:19:51,780

in the spring of 1300.

418

00:19:57,710 --> 00:19:54,240

Well Spring is easy because Dante says

419

00:19:59,270 --> 00:19:57,720

that the the sun was in res so it was

420

00:20:03,590 --> 00:19:59,280

spring

421

00:20:05,990 --> 00:20:03,600

but 1300 why 1300 because 1300 was the

422

00:20:09,370 --> 00:20:06,000

first Jubilee year

423

00:20:14,150 --> 00:20:09,380

that that poop

424

00:20:17,510 --> 00:20:14,160

Bonifacio the eight had uh

425

00:20:22,669 --> 00:20:19,010

um

426

00:20:23,330 --> 00:20:22,679

and there are also other historical

427

00:20:25,909 --> 00:20:23,340

um

428

00:20:28,490 --> 00:20:25,919

mentions in The Divine Comedy that

429

00:20:32,289 --> 00:20:28,500

referred to thirteen hundred

430

00:20:34,730 --> 00:20:32,299

the problem is that the astronomical

431

00:20:36,529 --> 00:20:34,740

reference is in Divine Comedy do not

432

00:20:38,230 --> 00:20:36,539

agree with this

433

00:20:41,450 --> 00:20:38,240

in particular

434

00:20:44,450 --> 00:20:41,460

this this event

435

00:20:46,029 --> 00:20:44,460

you know we are at the start of the

436

00:20:51,110 --> 00:20:46,039

Purgatory

437

00:20:53,750 --> 00:20:51,120

Dante it just come out of hell of the

438

00:20:57,650 --> 00:20:53,760

Earth or inside the Earth

439

00:21:00,650 --> 00:20:57,660

to back to see the stars as he says and

440

00:21:01,789 --> 00:21:00,660

of course the the first thing he does he

441

00:21:05,270 --> 00:21:01,799

looks up

442

00:21:07,250 --> 00:21:05,280

and he sees what does he see of course

443

00:21:10,190 --> 00:21:07,260

he sees Venus because Venus is the

444

00:21:11,350 --> 00:21:10,200

brightest objects in the night sky apart

445

00:21:14,870 --> 00:21:11,360

from the Moon

446

00:21:17,690 --> 00:21:14,880

uh and of course if it's there you you

447

00:21:18,950 --> 00:21:17,700

would immediately see it and what does

448

00:21:21,650 --> 00:21:18,960

he say

449

00:21:24,529 --> 00:21:21,660

you can read it in Italian it says that

450

00:21:28,430 --> 00:21:24,539

the the planet Venus

451

00:21:32,390 --> 00:21:28,440

uh was in in the east

452

00:21:34,909 --> 00:21:32,400

and it was in the constellation of of

453

00:21:39,049 --> 00:21:34,919

pieces

454

00:21:42,289 --> 00:21:39,059

well this is very clear very clear

455

00:21:45,110 --> 00:21:42,299

you know Venus

456

00:21:50,289 --> 00:21:45,120

can be seen either

457

00:21:57,409 --> 00:21:54,770

or in the morning before sunrise

458

00:22:00,049 --> 00:21:57,419

this is because the the orbit of Venus

459

00:22:02,870 --> 00:22:00,059

is inside the orbit of the earth and so

460

00:22:05,570 --> 00:22:02,880

you can only see Venus quite close to

461

00:22:12,350 --> 00:22:09,529

now the problem and you know the whether

462

00:22:15,230 --> 00:22:12,360

you see Venus in the evening or in the

463

00:22:18,350 --> 00:22:15,240

morning depends on the relative position

464

00:22:21,890 --> 00:22:18,360

of of Venus the Earth and the sun which

465

00:22:23,690 --> 00:22:21,900

changes but changes it takes many months

466

00:22:27,049 --> 00:22:23,700

to change

467

00:22:30,890 --> 00:22:27,059

and the problem is that in the in the

468

00:22:34,510 --> 00:22:30,900

spring of 1300

469

00:22:37,730 --> 00:22:34,520

Venus was

470

00:22:39,770 --> 00:22:37,740

seen in in the evening not in the

471

00:22:41,810 --> 00:22:39,780

morning and he was not in the business

472

00:22:44,450 --> 00:22:41,820

was in in Taurus

473

00:22:48,230 --> 00:22:44,460

so it doesn't correspond to Dan what

474

00:22:49,789 --> 00:22:48,240

Dante says the spring of 1300

475

00:22:52,490 --> 00:22:49,799

is not a good

476
00:22:55,970 --> 00:22:52,500
date for Dante's Journey according to

477
00:22:58,490 --> 00:22:55,980
this astronomical uh reference

478
00:23:03,529 --> 00:22:58,500
on the other hand

479
00:23:07,070 --> 00:23:05,149
uh

480
00:23:10,010 --> 00:23:07,080
in the spring

481
00:23:12,350 --> 00:23:10,020
Venus was seen in the morning and it was

482
00:23:15,649 --> 00:23:12,360
in the constellation of species just

483
00:23:19,130 --> 00:23:15,659
like that it says so for us astronomers

484
00:23:22,430 --> 00:23:19,140
the Journey of Dante

485
00:23:26,649 --> 00:23:22,440
started in the night between the 24th

486
00:23:28,370 --> 00:23:26,659
and the 25th of March

487
00:23:31,130 --> 00:23:28,380
1301.

488
00:23:33,649 --> 00:23:31,140

it was full moon

489

00:23:35,990 --> 00:23:33,659

Venus was seen in the morning and it was

490

00:23:37,909 --> 00:23:36,000

in the pieces

491

00:23:42,470 --> 00:23:37,919

now you can ask

492

00:23:47,810 --> 00:23:44,810

well

493

00:23:56,750 --> 00:23:53,810

was promoted by Pope Bonifacio the eight

494

00:23:58,549 --> 00:23:56,760

and this book was not someone that Dante

495

00:24:00,529 --> 00:23:58,559

liked

496

00:24:02,870 --> 00:24:00,539

but anyway

497

00:24:06,190 --> 00:24:02,880

uh

498

00:24:09,409 --> 00:24:06,200

Dante was from Florence and at the time

499

00:24:11,029 --> 00:24:09,419

the calendar in Florence was such that

500

00:24:15,830 --> 00:24:11,039

the first

501
00:24:19,490 --> 00:24:15,840
day of the year was the 25th of March

502
00:24:23,029 --> 00:24:19,500
so the night between the 24th and the

503
00:24:26,210 --> 00:24:23,039
25th of March was still in the Jubilee

504
00:24:31,070 --> 00:24:26,220
year if you really want to listen to

505
00:24:33,529 --> 00:24:31,080
that anyway I don't want to

506
00:24:36,649 --> 00:24:33,539
uh

507
00:24:41,450 --> 00:24:36,659
um hide the fact that in the Divine

508
00:24:43,789 --> 00:24:41,460
Comedy there is a conflict between uh

509
00:24:44,930 --> 00:24:43,799
historical dating and an astronomical

510
00:24:47,510 --> 00:24:44,940
dating

511
00:24:50,090 --> 00:24:47,520
nobody has solved this problem and of

512
00:24:52,669 --> 00:24:50,100
course it's we cannot solve it now

513
00:24:54,710 --> 00:24:52,679

I just want to point it out and of

514

00:24:57,890 --> 00:24:54,720

course for us astronomers the the right

515

00:25:00,710 --> 00:24:57,900

dating is the economical one

516

00:25:02,930 --> 00:25:00,720

uh yeah let's go on

517

00:25:04,909 --> 00:25:02,940

without astronomical reference we are

518

00:25:06,289 --> 00:25:04,919

still on the first

519

00:25:09,890 --> 00:25:06,299

um

520

00:25:12,250 --> 00:25:09,900

uh Kanto of the Purgatory

521

00:25:17,630 --> 00:25:12,260

so just after

522

00:25:19,310 --> 00:25:17,640

Dante looked up and saw Venus

523

00:25:20,750 --> 00:25:19,320

he says

524

00:25:23,330 --> 00:25:20,760

I looked

525

00:25:24,649 --> 00:25:23,340

on my right

526
00:25:27,950 --> 00:25:24,659
and

527
00:25:31,610 --> 00:25:27,960
looked for the other Pole

528
00:25:32,510 --> 00:25:31,620
and I saw four stars which were we had

529
00:25:36,769 --> 00:25:32,520
no

530
00:25:39,649 --> 00:25:36,779
had never seen before except

531
00:25:41,930 --> 00:25:39,659
to the first people except from the

532
00:25:43,070 --> 00:25:41,940
first people

533
00:25:47,990 --> 00:25:43,080
well

534
00:25:50,890 --> 00:25:49,269
you know

535
00:25:53,750 --> 00:25:50,900
Dante

536
00:25:57,350 --> 00:25:53,760
was someone who would

537
00:26:00,110 --> 00:25:57,360
travel by Night several times and at

538
00:26:02,690 --> 00:26:00,120

those times of course he didn't have any

539

00:26:07,390 --> 00:26:02,700

lights there were no lights so the only

540

00:26:10,190 --> 00:26:07,400

things he could use to orient himself

541

00:26:13,850 --> 00:26:10,200

knowing where he was going

542

00:26:15,769 --> 00:26:13,860

was look at the stars and you know in in

543

00:26:17,990 --> 00:26:15,779

the northern hemisphere if you want to

544

00:26:21,710 --> 00:26:18,000

orient yourself the first thing you do

545

00:26:23,169 --> 00:26:21,720

you look at the uh at the northern Stars

546

00:26:47,930 --> 00:26:23,179

the

547

00:26:49,450 --> 00:26:47,940

so

548

00:26:54,409 --> 00:26:49,460

now

549

00:26:57,710 --> 00:26:54,419

Dante has got out of the of the Earth on

550

00:27:00,950 --> 00:26:57,720

the other side he knew that

551
00:27:04,610 --> 00:27:00,960
so he knew that he could not look at the

552
00:27:05,810 --> 00:27:04,620
Polar Star the northern polar Stars

553
00:27:09,529 --> 00:27:05,820
but

554
00:27:12,110 --> 00:27:09,539
still he knew that the

555
00:27:15,710 --> 00:27:12,120
the rotation axis of the Earth

556
00:27:19,549 --> 00:27:15,720
would would get to the to the sky also

557
00:27:24,310 --> 00:27:19,559
to the South so he in order to to

558
00:27:28,610 --> 00:27:24,320
understand how he was I would Escape how

559
00:27:30,169 --> 00:27:28,620
he was oriented he he looks at the other

560
00:27:32,990 --> 00:27:30,179
Pole

561
00:27:35,690 --> 00:27:33,000
that's what he does and

562
00:27:41,390 --> 00:27:39,289
the the problem is that on the other on

563
00:27:43,610 --> 00:27:41,400

the southern sky

564

00:27:45,950 --> 00:27:43,620

where the rotation axis of the earth

565

00:27:48,830 --> 00:27:45,960

gets to the gets to the sky there is no

566

00:27:50,330 --> 00:27:48,840

blight star they are not lucky

567

00:27:54,230 --> 00:27:50,340

as we are

568

00:27:57,710 --> 00:27:54,240

but near there there is a Southern Cross

569

00:28:01,070 --> 00:27:57,720

the sound of cross is the four stars so

570

00:28:05,049 --> 00:28:01,080

he saw he sees the four stars

571

00:28:07,669 --> 00:28:05,059

now the one one could ask

572

00:28:10,430 --> 00:28:07,679

how did he know about the Southern Cross

573

00:28:15,890 --> 00:28:10,440

well that's easy that's easy because

574

00:28:17,750 --> 00:28:15,900

Dante had uh access to uh star Maps done

575

00:28:19,490 --> 00:28:17,760

by the herbs

576

00:28:21,169 --> 00:28:19,500

and the Arabs

577

00:28:23,210 --> 00:28:21,179

because they knew about the Southern

578

00:28:25,190 --> 00:28:23,220

Cross because you can see you can see

579

00:28:27,470 --> 00:28:25,200

the Southern Cross from Saudi Arabia of

580

00:28:29,570 --> 00:28:27,480

all three hours were traveling around so

581

00:28:32,330 --> 00:28:29,580

they knew about the the Southern Cross

582

00:28:34,310 --> 00:28:32,340

and they had put it in the in the in the

583

00:28:37,130 --> 00:28:34,320

star maps that Dante could could have

584

00:28:39,850 --> 00:28:37,140

access to so there is no problem that he

585

00:28:43,250 --> 00:28:39,860

knew about the the the

586

00:28:45,649 --> 00:28:43,260

sound for us but the problem is is the

587

00:28:49,070 --> 00:28:45,659

following verse which says that these

588

00:28:52,250 --> 00:28:49,080

four stars had never been seen

589

00:28:54,529 --> 00:28:52,260

uh before except to the

590

00:28:59,570 --> 00:28:54,539

first people

591

00:29:01,850 --> 00:28:59,580

the Southern Cross

592

00:29:05,390 --> 00:29:01,860

now again here there is an easy answer

593

00:29:06,769 --> 00:29:05,400

and a more clever one the easy answer is

594

00:29:10,430 --> 00:29:06,779

well

595

00:29:14,269 --> 00:29:10,440

the first people are Adam and Eve Adam

596

00:29:16,789 --> 00:29:14,279

and Eve lived in the in the terrestrial

597

00:29:18,590 --> 00:29:16,799

Paradise such as the paradise is on the

598

00:29:20,710 --> 00:29:18,600

top of the mountain of purgatory and of

599

00:29:24,970 --> 00:29:20,720

course it is on the other side so they

600

00:29:27,889 --> 00:29:24,980

they they would have seen the sound

601
00:29:31,850 --> 00:29:27,899
Southern Cross

602
00:29:33,190 --> 00:29:31,860
but but that's uh not a nice explanation

603
00:29:35,810 --> 00:29:33,200
and

604
00:29:39,169 --> 00:29:35,820
it gets

605
00:29:41,029 --> 00:29:39,179
it's not right also because Dante would

606
00:29:44,930 --> 00:29:41,039
have never

607
00:29:47,750 --> 00:29:44,940
called people two persons Adam and Eve

608
00:29:50,870 --> 00:29:47,760
are not people they are two

609
00:29:54,350 --> 00:29:50,880
so if he says about people it cannot be

610
00:29:56,810 --> 00:29:54,360
Adam and Eve and there is a much more uh

611
00:29:58,970 --> 00:29:56,820
interesting explanation to this which

612
00:30:01,210 --> 00:29:58,980
has to do with the perceptual

613
00:30:03,649 --> 00:30:01,220

procession of equinoxes

614

00:30:06,169 --> 00:30:03,659

uh now I suppose I don't need to explain

615

00:30:09,470 --> 00:30:06,179

to you what the perception of equinoxes

616

00:30:11,830 --> 00:30:09,480

is well it's a simple fact that the

617

00:30:15,649 --> 00:30:11,840

rotation axis of the Earth

618

00:30:17,450 --> 00:30:15,659

turns around in a cycle which is about

619

00:30:19,789 --> 00:30:17,460

26 uh

620

00:30:22,130 --> 00:30:19,799

thousand years long

621

00:30:22,930 --> 00:30:22,140

which makes that the

622

00:30:26,450 --> 00:30:22,940

um

623

00:30:30,049 --> 00:30:26,460

the rotation axis of the earth points to

624

00:30:32,810 --> 00:30:30,059

different Stars throughout the centuries

625

00:30:34,909 --> 00:30:32,820

and of course also that the the stars

626
00:30:38,690 --> 00:30:34,919
that you can see at any latitude would

627
00:30:42,230 --> 00:30:38,700
change in in the centuries and in fact

628
00:30:44,930 --> 00:30:42,240
if you use stellarium

629
00:30:50,870 --> 00:30:44,940
to

630
00:30:52,610 --> 00:30:50,880
seven thousand years ago

631
00:30:54,289 --> 00:30:52,620
well you can clearly see that the

632
00:30:55,909 --> 00:30:54,299
Southern Cross was vegetable from

633
00:30:58,909 --> 00:30:55,919
Florence because

634
00:31:01,310 --> 00:30:58,919
of the possession of the equinoxes why

635
00:31:05,269 --> 00:31:01,320
why did I put did I

636
00:31:07,730 --> 00:31:05,279
try 7000 years ago well because

637
00:31:11,049 --> 00:31:07,740
at the time of Dante he was told that

638
00:31:13,610 --> 00:31:11,059

the the creation of the world and and

639

00:31:17,810 --> 00:31:13,620

soon after that the

640

00:31:22,010 --> 00:31:17,820

um population of

641

00:31:24,769 --> 00:31:22,020

the Earth by the descendants of Adam and

642

00:31:27,889 --> 00:31:24,779

Eve happened five thousand years before

643

00:31:30,049 --> 00:31:27,899

Christ which is seven thousand years ago

644

00:31:32,149 --> 00:31:30,059

so seven thousand years ago

645

00:31:34,549 --> 00:31:32,159

the sounding Clause was visible at our

646

00:31:37,370 --> 00:31:34,559

latitudes and the first people that

647

00:31:39,409 --> 00:31:37,380

Dante talks about are actually the the

648

00:31:41,750 --> 00:31:39,419

descendants of Adam and Eve who

649

00:31:45,769 --> 00:31:41,760

populated the

650

00:31:47,810 --> 00:31:45,779

um our lands the Euro and our latitudes

651
00:31:49,070 --> 00:31:47,820
which is a much more satisfactory

652
00:31:50,870 --> 00:31:49,080
explanation

653
00:31:52,350 --> 00:31:50,880
okay

654
00:31:54,110 --> 00:31:52,360
um

655
00:31:56,269 --> 00:31:54,120
[Music]

656
00:31:59,810 --> 00:31:56,279
okay well

657
00:32:02,029 --> 00:31:59,820
the question is did Dante know about the

658
00:32:02,750 --> 00:32:02,039
procession of the equinoxes of course he

659
00:32:04,789 --> 00:32:02,760
did

660
00:32:07,490 --> 00:32:04,799
in fact in the convenient again he says

661
00:32:11,750 --> 00:32:07,500
that there is this movement very slow

662
00:32:15,769 --> 00:32:11,760
movement which goes from west to east

663
00:32:18,769 --> 00:32:15,779

by a degree every hundred years

664

00:32:22,370 --> 00:32:18,779

a degree every 100 years means that to

665

00:32:27,169 --> 00:32:22,380

do a full term 360 degrees

666

00:32:28,850 --> 00:32:27,179

it would take 36 000 years no 36 000

667

00:32:32,210 --> 00:32:28,860

years is

668

00:32:33,769 --> 00:32:32,220

is a bit longer than the 26 000 years

669

00:32:35,510 --> 00:32:33,779

that we know is the period of the

670

00:32:39,350 --> 00:32:35,520

possession of the equinoxes but that

671

00:32:40,850 --> 00:32:39,360

doesn't matter uh okay the possession of

672

00:32:43,850 --> 00:32:40,860

the Equinox is the period was

673

00:32:46,250 --> 00:32:43,860

overestimated by some

674

00:32:48,649 --> 00:32:46,260

amount but that's not the problem he

675

00:32:51,049 --> 00:32:48,659

knew about it and he could he could tell

676
00:32:53,930 --> 00:32:51,059
that that the sounding Clause could be

677
00:32:55,669 --> 00:32:53,940
visible by Florence long ago

678
00:32:57,430 --> 00:32:55,679
okay

679
00:32:59,930 --> 00:32:57,440
um

680
00:33:01,370 --> 00:32:59,940
now we go to

681
00:33:02,529 --> 00:33:01,380
um

682
00:33:06,830 --> 00:33:02,539
another

683
00:33:11,870 --> 00:33:06,840
part of the Divine Comedy it's the uh 27

684
00:33:14,570 --> 00:33:11,880
26th Kanto of The Inferno and there is

685
00:33:17,149 --> 00:33:14,580
Ulysses who well actually Dante and

686
00:33:20,090 --> 00:33:17,159
virgilio encounter

687
00:33:23,330 --> 00:33:20,100
ulises and Ulysses tell

688
00:33:30,950 --> 00:33:27,130

his last trip recently the last trip

689

00:33:34,070 --> 00:33:30,960

when he was already old

690

00:33:34,970 --> 00:33:34,080

with his uh

691

00:33:39,710 --> 00:33:34,980

um

692

00:33:44,230 --> 00:33:39,720

uh friends were also old and they what

693

00:33:49,250 --> 00:33:44,240

they did they went to Gibraltar

694

00:33:53,870 --> 00:33:49,260

Gibraltar was the was told at the time

695

00:33:57,950 --> 00:33:53,880

of Dante to be the extreme

696

00:34:00,350 --> 00:33:57,960

um west of the of the world and it was

697

00:34:03,950 --> 00:34:00,360

something that you could not

698

00:34:05,870 --> 00:34:03,960

go further because there was the rest

699

00:34:09,470 --> 00:34:05,880

was completely unknown

700

00:34:14,510 --> 00:34:09,480

but in fact ulises he wanted to discover

701
00:34:16,250 --> 00:34:14,520
what was after that so what he did uh

702
00:34:20,409 --> 00:34:16,260
you see

703
00:34:24,290 --> 00:34:20,419
um he crossed Gibraltar and of course

704
00:34:29,690 --> 00:34:24,300
when well doing that he would leave

705
00:34:33,349 --> 00:34:29,700
Sevilla so Spain to his right and to his

706
00:34:34,909 --> 00:34:33,359
left he would leave shelter which is in

707
00:34:38,210 --> 00:34:34,919
maroc

708
00:34:41,750 --> 00:34:38,220
and and okay well this shows actually

709
00:34:45,829 --> 00:34:41,760
what is the geography at Dante's time

710
00:34:49,490 --> 00:34:45,839
you see these are the emerged lands that

711
00:34:52,310 --> 00:34:49,500
were to to exist at that this time they

712
00:34:55,550 --> 00:34:52,320
are all in the Northern Hemisphere and

713
00:34:56,750 --> 00:34:55,560

not by chance Jerusalem is at the center

714

00:35:00,230 --> 00:34:56,760

of them

715

00:35:03,230 --> 00:35:00,240

if you go 90 degrees to the west of

716

00:35:06,530 --> 00:35:03,240

Jerusalem you get to to Gibraltar

717

00:35:08,329 --> 00:35:06,540

if you go 90 degrees to the east you get

718

00:35:10,730 --> 00:35:08,339

to the

719

00:35:13,010 --> 00:35:10,740

um the exit of ganja the ganja river

720

00:35:15,710 --> 00:35:13,020

which was thought to be the extreme East

721

00:35:18,609 --> 00:35:15,720

and then to the north to the northern

722

00:35:21,650 --> 00:35:18,619

Europe and and to the South to

723

00:35:23,450 --> 00:35:21,660

equatorial Africa so that were the

724

00:35:28,970 --> 00:35:23,460

emergent lands

725

00:35:31,010 --> 00:35:28,980

uh so ulises uh crosses Gibraltar and of

726

00:35:34,730 --> 00:35:31,020

course what they did was of course they

727

00:35:36,349 --> 00:35:34,740

had the the back of their sheep in in

728

00:35:40,730 --> 00:35:36,359

the east

729

00:35:43,970 --> 00:35:40,740

and so they were going west but they

730

00:35:45,970 --> 00:35:43,980

would they would go left from the west

731

00:35:49,609 --> 00:35:45,980

or south

732

00:35:51,730 --> 00:35:49,619

and then of course going south

733

00:35:55,069 --> 00:35:51,740

at some point they crossed the equator

734

00:35:58,910 --> 00:35:55,079

and if I they say that that they would

735

00:36:03,109 --> 00:35:58,920

see all the stars from from from the

736

00:36:06,109 --> 00:36:03,119

Southern Hemisphere and and our pole was

737

00:36:08,510 --> 00:36:06,119

so low that it went below the Horizon

738

00:36:12,109 --> 00:36:08,520

you know when you cross the Equator the

739

00:36:15,109 --> 00:36:12,119

Northern Star doesn't get

740

00:36:15,890 --> 00:36:15,119

out of the sea

741

00:36:18,170 --> 00:36:15,900

um

742

00:36:22,370 --> 00:36:18,180

so they were going south this is another

743

00:36:25,310 --> 00:36:22,380

way to to see so they crossed Gibraltar

744

00:36:27,849 --> 00:36:25,320

they're going south crossing the Equator

745

00:36:30,770 --> 00:36:27,859

and they were going on and at some point

746

00:36:33,550 --> 00:36:30,780

they reached

747

00:36:37,910 --> 00:36:33,560

this mountain of purgatory which is a

748

00:36:42,349 --> 00:36:37,920

the opposite of Jerusalem you see

749

00:36:46,370 --> 00:36:42,359

and of course seeing this land after

750

00:36:50,630 --> 00:36:46,380

five months of traveling

751
00:36:53,150 --> 00:36:50,640
in in C because they they were happy but

752
00:36:57,370 --> 00:36:53,160
soon uh they were not happy anymore

753
00:37:05,690 --> 00:37:01,010
it started the storm which got to his

754
00:37:08,930 --> 00:37:05,700
boat and and uh make make the boat Turn

755
00:37:13,609 --> 00:37:08,940
three times and then four times the boat

756
00:37:16,609 --> 00:37:13,619
went down and and they and it sank and

757
00:37:19,849 --> 00:37:17,630
um

758
00:37:23,150 --> 00:37:19,859
well

759
00:37:25,310 --> 00:37:23,160
so what I want to point to you is it's

760
00:37:27,050 --> 00:37:25,320
just actually one important thing which

761
00:37:28,550 --> 00:37:27,060
is actually the most important thing

762
00:37:32,569 --> 00:37:28,560
which I'm going to tell you which I

763
00:37:36,230 --> 00:37:34,010

um

764

00:37:38,329 --> 00:37:36,240

Dante

765

00:37:44,210 --> 00:37:38,339

as a

766

00:37:46,670 --> 00:37:44,220

how he was

767

00:37:51,410 --> 00:37:46,680

he could get

768

00:37:56,990 --> 00:37:51,420

contain into his mind all the knowledge

769

00:38:03,589 --> 00:38:00,829

this is something that for us it is hard

770

00:38:06,290 --> 00:38:03,599

to understand because we've lost this

771

00:38:08,270 --> 00:38:06,300

capability we've lost its capability not

772

00:38:11,510 --> 00:38:08,280

only because we're not genius as Dante

773

00:38:15,109 --> 00:38:11,520

was but also because the knowledge

774

00:38:15,890 --> 00:38:15,119

in all fields has

775

00:38:17,810 --> 00:38:15,900

um

776

00:38:21,230 --> 00:38:17,820

of course grown

777

00:38:24,530 --> 00:38:21,240

very much in all these centuries so that

778

00:38:25,370 --> 00:38:24,540

one single mind cannot contain all of

779

00:38:28,910 --> 00:38:25,380

them

780

00:38:29,450 --> 00:38:28,920

but Dante could do it

781

00:38:31,849 --> 00:38:29,460

um

782

00:38:34,730 --> 00:38:31,859

for us it's not easy to understand but

783

00:38:38,089 --> 00:38:34,740

there are several effects of from from

784

00:38:42,230 --> 00:38:38,099

this Fact one important one is that

785

00:38:46,609 --> 00:38:42,240

in order to understand Dante

786

00:38:48,890 --> 00:38:46,619

uh one person is not enough

787

00:38:52,970 --> 00:38:48,900

because we

788

00:38:58,010 --> 00:38:52,980

uh at our time we

789

00:39:00,730 --> 00:38:58,020

people who deal with knowledge

790

00:39:03,650 --> 00:39:00,740

if we want to

791

00:39:06,770 --> 00:39:03,660

say something new in the field of

792

00:39:09,770 --> 00:39:06,780

knowledge we have to specialize there is

793

00:39:11,329 --> 00:39:09,780

no way out of this

794

00:39:14,569 --> 00:39:11,339

so

795

00:39:16,310 --> 00:39:14,579

we are all specialized we know well one

796

00:39:22,250 --> 00:39:16,320

thing

797

00:39:25,430 --> 00:39:22,260

well we cannot know well

798

00:39:28,670 --> 00:39:25,440

so in order to explain that

799

00:39:31,609 --> 00:39:28,680

you you cannot listen to just one person

800

00:39:34,790 --> 00:39:31,619

you have to listen to several persons

801
00:39:36,290 --> 00:39:34,800
don't trust somebody who tells you I

802
00:39:38,810 --> 00:39:36,300
know everything about Dante that's not

803
00:39:41,450 --> 00:39:39,950
um

804
00:39:44,210 --> 00:39:41,460
so

805
00:39:47,750 --> 00:39:44,220
the other fact is that I'm going to talk

806
00:39:51,589 --> 00:39:47,760
to you about astronomy in Dante

807
00:39:55,490 --> 00:39:51,599
I'm and I don't want to uh say that this

808
00:39:58,810 --> 00:39:55,500
is all actually I invite you to listen

809
00:40:01,990 --> 00:39:58,820
to other people for the other aspects of

810
00:40:02,390 --> 00:40:02,000
uh of Dante

811
00:40:03,829 --> 00:40:02,400
[Music]

812
00:40:08,470 --> 00:40:03,839
um

813
00:40:14,270 --> 00:40:08,480

anyway so now I've talked to you about

814

00:40:16,609 --> 00:40:14,280

the the releases uh story in Dante just

815

00:40:19,250 --> 00:40:16,619

to show you about the geography but of

816

00:40:21,109 --> 00:40:19,260

course in in in in

817

00:40:23,150 --> 00:40:21,119

Ulysses stories in Dante there is much

818

00:40:28,190 --> 00:40:23,160

more but you have to listen to other

819

00:40:32,690 --> 00:40:30,710

um yeah the passage at the center of the

820

00:40:36,530 --> 00:40:32,700

Earth

821

00:40:40,490 --> 00:40:36,540

um you know Dante and Vegeta get down

822

00:40:42,589 --> 00:40:40,500

into hell until they reach the center of

823

00:40:45,349 --> 00:40:42,599

the earth at the center of the earth

824

00:40:48,770 --> 00:40:45,359

there is Lucifer

825

00:40:50,329 --> 00:40:48,780

um the devil who who is stuck there just

826
00:40:52,010 --> 00:40:50,339
at the center

827
00:40:56,870 --> 00:40:52,020
and

828
00:40:58,609 --> 00:40:56,880
so they go down Lucifer's body

829
00:41:01,490 --> 00:40:58,619
until

830
00:41:04,370 --> 00:41:01,500
uh they reached the center of the earth

831
00:41:06,290 --> 00:41:04,380
and at the time of Dante it was still

832
00:41:08,390 --> 00:41:06,300
that gravity

833
00:41:09,890 --> 00:41:08,400
was a property

834
00:41:12,349 --> 00:41:09,900
uh

835
00:41:14,410 --> 00:41:12,359
over the center of the Earth

836
00:41:16,310 --> 00:41:14,420
every

837
00:41:17,870 --> 00:41:16,320
body

838
00:41:21,349 --> 00:41:17,880

is

839

00:41:23,210 --> 00:41:21,359

attracted by the center of the Earth

840

00:41:25,130 --> 00:41:23,220

so what happens at the center of the

841

00:41:27,050 --> 00:41:25,140

earth is the gravity

842

00:41:28,609 --> 00:41:27,060

turns over

843

00:41:30,890 --> 00:41:28,619

so

844

00:41:34,690 --> 00:41:30,900

where when they go

845

00:41:37,069 --> 00:41:34,700

along the body of Lucifer at some point

846

00:41:42,589 --> 00:41:37,079

gravity turns over

847

00:41:46,190 --> 00:41:42,599

and and so what what they do is is they

848

00:41:48,230 --> 00:41:46,200

they were they were going down and at

849

00:41:51,109 --> 00:41:48,240

some point they're starting go up

850

00:41:53,030 --> 00:41:51,119

so that dances and in the beginning he

851
00:41:55,670 --> 00:41:53,040
thinks well are we going back into hell

852
00:41:57,770 --> 00:41:55,680
no they're not they're going to the

853
00:41:59,930 --> 00:41:57,780
other side of course we all know that

854
00:42:03,770 --> 00:41:59,940
this is not true and I don't need to

855
00:42:08,930 --> 00:42:05,450
um

856
00:42:12,790 --> 00:42:08,940
okay well this we have already said well

857
00:42:16,310 --> 00:42:12,800
that's that's another another

858
00:42:18,650 --> 00:42:16,320
uh aspect I want to tell you about

859
00:42:19,609 --> 00:42:18,660
astronomy in Dante you know the Milky

860
00:42:21,349 --> 00:42:19,619
Way

861
00:42:24,050 --> 00:42:21,359
Dante talks

862
00:42:28,069 --> 00:42:24,060
several times about the Milky Way in the

863
00:42:31,849 --> 00:42:28,079

hell and in the hell it refers to the

864

00:42:34,790 --> 00:42:31,859

the Greek mythological story about the

865

00:42:38,450 --> 00:42:34,800

origin of the Milky Way and and the

866

00:42:44,089 --> 00:42:38,460

Greek mythological story is that fetonte

867

00:42:46,010 --> 00:42:44,099

it was a son of Apollo the the god of of

868

00:42:49,250 --> 00:42:46,020

the Sun

869

00:42:56,329 --> 00:42:53,390

taken the Chariot of his father the

870

00:43:00,230 --> 00:42:56,339

childhood was taking the sun around and

871

00:43:04,309 --> 00:43:00,240

see he took he took this Chariot uh you

872

00:43:07,730 --> 00:43:04,319

know as a as a son uh stealing the cow

873

00:43:11,210 --> 00:43:07,740

with his father and since he was did not

874

00:43:12,730 --> 00:43:11,220

know how to drive how to drive it he

875

00:43:17,990 --> 00:43:12,740

went around

876

00:43:25,370 --> 00:43:18,000

the sky in a funny way and and and and

877

00:43:27,950 --> 00:43:25,380

and and that trip left this blinds

878

00:43:30,050 --> 00:43:27,960

steep across the sky which is the Milky

879

00:43:31,970 --> 00:43:30,060

Way so that's the that's the

880

00:43:35,690 --> 00:43:31,980

mythological story and then we first

881

00:43:37,730 --> 00:43:35,700

read in the hair actually not just one

882

00:43:39,170 --> 00:43:37,740

time a couple of times

883

00:43:42,530 --> 00:43:39,180

but then

884

00:43:45,349 --> 00:43:42,540

uh in the in the paradise

885

00:43:48,890 --> 00:43:45,359

easy he talks again about the Milky Way

886

00:43:50,930 --> 00:43:48,900

and and he says you see here that the

887

00:43:56,329 --> 00:43:50,940

Milky Way is

888

00:43:58,130 --> 00:43:56,339

is made of minor and major lines which

889

00:44:01,910 --> 00:43:58,140

is Stars

890

00:44:05,390 --> 00:44:01,920

so this is our our view and actually in

891

00:44:07,490 --> 00:44:05,400

the con video he is much more precise

892

00:44:10,430 --> 00:44:07,500

about this

893

00:44:13,670 --> 00:44:10,440

um and he says that the Galaxy is

894

00:44:18,050 --> 00:44:13,680

nothing nothing else than a a multitude

895

00:44:21,349 --> 00:44:18,060

of of fixed stars that in that part are

896

00:44:23,089 --> 00:44:21,359

so small that we cannot distinguish them

897

00:44:30,530 --> 00:44:23,099

but

898

00:44:33,470 --> 00:44:30,540

that we call Galaxy so this is very

899

00:44:36,050 --> 00:44:33,480

clear so Dante knew that the Galaxy was

900

00:44:38,690 --> 00:44:36,060

made of stars but he was

901
00:44:43,370 --> 00:44:38,700
as a medieval man he was in the middle

902
00:44:48,410 --> 00:44:43,380
between the old mythological stories and

903
00:44:48,420 --> 00:44:52,370
um oops

904
00:44:56,750 --> 00:44:55,490
well this is an image of of the Milky

905
00:44:58,430 --> 00:44:56,760
Way

906
00:45:01,190 --> 00:44:58,440
um as we know it

907
00:45:05,750 --> 00:45:01,200
I don't need to tell you about the Milky

908
00:45:10,069 --> 00:45:05,760
Way uh this is an external Galaxy which

909
00:45:12,710 --> 00:45:10,079
uh uh looks very similar to what the

910
00:45:16,069 --> 00:45:12,720
Milky Way would look like if we could be

911
00:45:18,050 --> 00:45:17,270
okay

912
00:45:21,650 --> 00:45:18,060
um

913
00:45:25,730 --> 00:45:21,660

this is the one but last uh theme that I

914

00:45:31,670 --> 00:45:28,630

um it

915

00:45:34,490 --> 00:45:31,680

we are dealing about errors we're

916

00:45:37,990 --> 00:45:34,500

dealing about mistakes

917

00:45:41,150 --> 00:45:38,000

now of course you know very well that

918

00:45:43,130 --> 00:45:41,160

mistakes are not a problem for us

919

00:45:45,829 --> 00:45:43,140

scientists

920

00:45:48,589 --> 00:45:45,839

actually we know that

921

00:45:50,230 --> 00:45:48,599

in many cases science it progresses

922

00:45:52,730 --> 00:45:50,240

because we

923

00:45:56,930 --> 00:45:52,740

recognize that we've made some mistakes

924

00:46:01,430 --> 00:45:56,940

and we try to collect them and and by

925

00:46:04,250 --> 00:46:01,440

doing this the science goes on

926
00:46:06,710 --> 00:46:04,260
of course this way to deal with mistakes

927
00:46:09,710 --> 00:46:06,720
is not it's not the same for everybody

928
00:46:14,410 --> 00:46:09,720
as we unfortunately know

929
00:46:19,910 --> 00:46:17,329
we are in the second Canto of the

930
00:46:19,920 --> 00:46:22,809
uh

931
00:46:29,150 --> 00:46:25,309
had to leave

932
00:46:32,270 --> 00:46:29,160
his leader virgilio who led him

933
00:46:34,790 --> 00:46:32,280
through hell and through to Inferno and

934
00:46:38,809 --> 00:46:34,800
and purgatory

935
00:46:40,430 --> 00:46:38,819
uh because virgilio could not go beyond

936
00:46:43,970 --> 00:46:40,440
purgatory

937
00:46:47,750 --> 00:46:43,980
because he was not baptized

938
00:46:49,849 --> 00:46:47,760

um and so Dante had to find a new leader

939

00:46:53,630 --> 00:46:49,859

and

940

00:46:55,670 --> 00:46:53,640

he finds Beatrice of course this is not

941

00:46:56,270 --> 00:46:55,680

my chance

942

00:46:59,750 --> 00:46:56,280

um

943

00:47:03,109 --> 00:46:59,760

and you know starting his trip with

944

00:47:06,250 --> 00:47:04,190

um

945

00:47:13,030 --> 00:47:06,260

the first

946

00:47:17,990 --> 00:47:13,040

sky of the Moon

947

00:47:20,569 --> 00:47:18,000

uh and well you know the Moon

948

00:47:23,410 --> 00:47:20,579

had a big problem

949

00:47:26,270 --> 00:47:23,420

you know the Moon is the only

950

00:47:28,849 --> 00:47:26,280

uh Knight

951
00:47:32,270 --> 00:47:28,859

Sky body

952
00:47:35,870 --> 00:47:32,280

that you can distinguish I mean that you

953
00:47:39,950 --> 00:47:35,880

can resolve by naked eye

954
00:47:41,930 --> 00:47:39,960

uh and of course Dante only had naked

955
00:47:44,030 --> 00:47:41,940

eye there were no instruments except

956
00:47:46,430 --> 00:47:44,040

from the eye

957
00:47:54,109 --> 00:47:49,510

all the other bodies in the sky you know

958
00:47:56,870 --> 00:47:54,119

Mars Jupiter Saturday were all points

959
00:47:59,329 --> 00:47:56,880

the only thing that that

960
00:48:01,430 --> 00:47:59,339

done this I could resolve in the night

961
00:48:04,309 --> 00:48:01,440

sky is the Moon

962
00:48:06,050 --> 00:48:04,319

but the moon had a problem the moon had

963
00:48:07,190 --> 00:48:06,060

spots

964

00:48:09,109 --> 00:48:07,200

well

965

00:48:13,270 --> 00:48:09,119

how comes that

966

00:48:17,990 --> 00:48:13,280

they all told us that the sky is perfect

967

00:48:21,410 --> 00:48:18,000

you know circles spheres

968

00:48:24,170 --> 00:48:21,420

but the moments has spots but this is

969

00:48:26,510 --> 00:48:24,180

not perfect so how comes that

970

00:48:29,390 --> 00:48:26,520

and and of course Dante well takes the

971

00:48:33,170 --> 00:48:29,400

opportunity that he has Beatrice

972

00:48:35,450 --> 00:48:33,180

and so he asks him about the origin of

973

00:48:39,230 --> 00:48:35,460

of moon spots

974

00:48:43,690 --> 00:48:39,240

and you can see here he says he asked

975

00:48:49,069 --> 00:48:43,700

Beatrice please tell me what uh this

976
00:48:54,050 --> 00:48:49,079
dark spots on this body that people down

977
00:48:58,069 --> 00:48:54,060
on the earth uh think they are like the

978
00:48:59,870 --> 00:48:58,079
um the face of kaina

979
00:49:05,630 --> 00:48:59,880
well

980
00:49:07,609 --> 00:49:05,640
thought that the the moons the the moon

981
00:49:09,170 --> 00:49:07,619
spot represent the face of kaina well

982
00:49:12,650 --> 00:49:09,180
you can see on the moon spots whatever

983
00:49:13,970 --> 00:49:12,660
you like but so that was the question

984
00:49:15,650 --> 00:49:13,980
and

985
00:49:20,829 --> 00:49:15,660
so

986
00:49:27,650 --> 00:49:24,770
Smiles a bit

987
00:49:30,650 --> 00:49:27,660
now be careful when we reach our Smiles

988
00:49:34,190 --> 00:49:30,660

there is something important happening

989

00:49:36,530 --> 00:49:34,200

and and then Matthew goes on well

990

00:49:39,609 --> 00:49:36,540

beticia tries to answer and and the

991

00:49:42,349 --> 00:49:39,619

first thing she says is well be careful

992

00:49:46,430 --> 00:49:42,359

uh the first thing that comes to your

993

00:49:48,589 --> 00:49:46,440

mind is not necessarily the

994

00:49:51,290 --> 00:49:48,599

um the right one

995

00:49:55,309 --> 00:49:51,300

and then beat she does something that we

996

00:49:59,990 --> 00:49:55,319

all very much used to it because uh we

997

00:50:02,630 --> 00:50:00,000

all uh we've all been pupil some of us

998

00:50:05,109 --> 00:50:02,640

have been teacher you know when uh when

999

00:50:08,990 --> 00:50:05,119

a student asks his teacher a question

1000

00:50:11,210 --> 00:50:09,000

uh well often the teacher reverses the

1001
00:50:14,450 --> 00:50:11,220
the question to the to to the student

1002
00:50:15,650 --> 00:50:14,460
and so this is what what be a teacher

1003
00:50:25,870 --> 00:50:15,660
does

1004
00:50:32,030 --> 00:50:28,490
he has to say something

1005
00:50:35,089 --> 00:50:32,040
another says well

1006
00:50:38,870 --> 00:50:35,099
he says well I think that

1007
00:50:41,270 --> 00:50:38,880
what the the the the spots are the fact

1008
00:50:46,970 --> 00:50:41,280
that there are different densities

1009
00:50:55,370 --> 00:50:51,170
uh well this idea

1010
00:50:58,750 --> 00:50:55,380
is is an old idea so don't we first one

1011
00:51:02,329 --> 00:50:58,760
here over there is which was accepted by

1012
00:51:06,430 --> 00:51:02,339
Albert the Great and he also talks about

1013
00:51:09,770 --> 00:51:06,440

it in the convivio you see it is

1014

00:51:12,170 --> 00:51:09,780

means little density which which is

1015

00:51:15,530 --> 00:51:12,180

causing the the the

1016

00:51:17,210 --> 00:51:15,540

the spots in the Moon

1017

00:51:19,609 --> 00:51:17,220

well

1018

00:51:24,530 --> 00:51:19,619

and then he starts

1019

00:51:30,290 --> 00:51:28,309

and British starts by saying well

1020

00:51:35,210 --> 00:51:30,300

you long

1021

00:51:39,950 --> 00:51:35,220

telling you

1022

00:51:43,250 --> 00:51:41,510

uh

1023

00:51:48,410 --> 00:51:43,260

the first thing we are teacher does to

1024

00:51:52,370 --> 00:51:48,420

confuse the refute Dante's idea

1025

00:51:54,410 --> 00:51:52,380

is this she she refers to the the eight

1026
00:51:56,809 --> 00:51:54,420
sphere the eight sphere is the sphere

1027
00:52:00,290 --> 00:51:56,819
the fixed stars in fact she said the

1028
00:52:02,089 --> 00:52:00,300
eight sphere it shows you many lines

1029
00:52:04,130 --> 00:52:02,099
many stars

1030
00:52:05,510 --> 00:52:04,140
and in fact she says well

1031
00:52:08,089 --> 00:52:05,520
you know

1032
00:52:10,130 --> 00:52:08,099
the different stars in in the eight

1033
00:52:12,650 --> 00:52:10,140
sphere in

1034
00:52:14,569 --> 00:52:12,660
um have different brightness

1035
00:52:18,589 --> 00:52:14,579
now

1036
00:52:21,829 --> 00:52:18,599
if the different brightness of the Stars

1037
00:52:23,510 --> 00:52:21,839
were due to a different density as you

1038
00:52:27,349 --> 00:52:23,520

say for the moon spawns

1039

00:52:30,650 --> 00:52:27,359

then the Stars would have only one

1040

00:52:33,049 --> 00:52:30,660

quality one virtue

1041

00:52:36,470 --> 00:52:33,059

which is density

1042

00:52:40,130 --> 00:52:36,480

and this cannot be because every Star

1043

00:52:45,170 --> 00:52:40,140

has its own virtue which is transferred

1044

00:52:47,870 --> 00:52:45,180

from God to to humans

1045

00:52:51,230 --> 00:52:47,880

well of course this is an argument which

1046

00:52:54,290 --> 00:52:51,240

is theological philosophical but this is

1047

00:52:58,130 --> 00:52:54,300

the first argument that beat uses but

1048

00:53:02,809 --> 00:52:58,140

then she goes on and I invite you to to

1049

00:53:05,329 --> 00:53:02,819

read this whole Canto uh

1050

00:53:08,450 --> 00:53:05,339

because it's very interesting

1051
00:53:15,530 --> 00:53:11,270
Beatrice then

1052
00:53:18,950 --> 00:53:15,540
says the following thing

1053
00:53:22,849 --> 00:53:18,960
well if there are

1054
00:53:24,829 --> 00:53:22,859
dense region and less dense regions in

1055
00:53:29,990 --> 00:53:24,839
the moon and these are causing the moon

1056
00:53:33,950 --> 00:53:31,430
either

1057
00:53:37,930 --> 00:53:33,960
the dense regions

1058
00:53:41,390 --> 00:53:37,940
do not cover the whole face of the moon

1059
00:53:43,190 --> 00:53:41,400
or they cover it well that's quite

1060
00:53:46,790 --> 00:53:43,200
obvious

1061
00:53:50,450 --> 00:53:46,800
and then he said well the first case

1062
00:53:54,170 --> 00:53:50,460
that the dense regions do not cover the

1063
00:53:58,730 --> 00:53:54,180

whole face of the moon is not possible

1064

00:54:01,309 --> 00:53:58,740

because during an eclipse

1065

00:54:04,069 --> 00:54:01,319

um a solar eclipse you know in which in

1066

00:54:05,630 --> 00:54:04,079

which the the moon gets in front of the

1067

00:54:07,010 --> 00:54:05,640

Sun

1068

00:54:09,710 --> 00:54:07,020

uh

1069

00:54:12,410 --> 00:54:09,720

you would you would see the light of the

1070

00:54:14,150 --> 00:54:12,420

Sun going through this less dense

1071

00:54:15,710 --> 00:54:14,160

regions of the Moon that do not cover

1072

00:54:19,549 --> 00:54:15,720

the whole face

1073

00:54:23,030 --> 00:54:19,559

so it is not possible that the

1074

00:54:24,710 --> 00:54:23,040

less than three the the dense region do

1075

00:54:26,569 --> 00:54:24,720

not cover the whole face of the Moon the

1076
00:54:29,390 --> 00:54:26,579
dense region must cover the whole face

1077
00:54:31,670 --> 00:54:29,400
of the Moon that's clear

1078
00:54:33,770 --> 00:54:31,680
but then we are teacher says well you

1079
00:54:36,710 --> 00:54:33,780
you could think that

1080
00:54:38,930 --> 00:54:36,720
still the moon spots are caused by the

1081
00:54:42,710 --> 00:54:38,940
fact that the

1082
00:54:46,609 --> 00:54:42,720
the dense regions are different depths

1083
00:54:50,930 --> 00:54:46,619
inside the moon and that could cause the

1084
00:54:53,210 --> 00:54:50,940
um the moon spots in order to refute

1085
00:55:00,069 --> 00:54:53,220
even these other hypothesis so

1086
00:55:00,079 --> 00:55:05,049
does a thought experiment

1087
00:55:09,849 --> 00:55:08,569
experiment you know Einstein did the

1088
00:55:13,270 --> 00:55:09,859

same

1089

00:55:16,430 --> 00:55:13,280

centuries later in order to

1090

00:55:21,530 --> 00:55:16,440

explain his theories

1091

00:55:23,870 --> 00:55:21,540

so the third experiment that uh that

1092

00:55:30,230 --> 00:55:23,880

Beatrice is talking about is the

1093

00:55:36,049 --> 00:55:33,230

take three mirrors

1094

00:55:38,210 --> 00:55:36,059

you place two of those mirrors in front

1095

00:55:40,730 --> 00:55:38,220

of you at some distance

1096

00:55:44,270 --> 00:55:40,740

and

1097

00:55:48,710 --> 00:55:44,280

the third one you place it further

1098

00:55:50,809 --> 00:55:48,720

between the first two so at the larger

1099

00:55:53,750 --> 00:55:50,819

distance between the first two

1100

00:55:55,609 --> 00:55:53,760

and then you put a light

1101
00:55:57,950 --> 00:55:55,619
on your back

1102
00:55:59,569 --> 00:55:57,960
like a fire

1103
00:56:03,349 --> 00:55:59,579
um

1104
00:56:07,730 --> 00:56:03,359
a light something so that you can see

1105
00:56:13,430 --> 00:56:10,069
uh

1106
00:56:17,650 --> 00:56:13,440
and then in the end you see

1107
00:56:22,490 --> 00:56:17,660
in the end here she says well although

1108
00:56:26,569 --> 00:56:22,500
the image which you see reflected in in

1109
00:56:30,470 --> 00:56:26,579
the father mirror is smaller in size

1110
00:56:32,329 --> 00:56:30,480
than those that you see Factory into the

1111
00:56:37,069 --> 00:56:32,339
other two

1112
00:56:41,630 --> 00:56:37,079
still you will see shine in the same way

1113
00:56:48,109 --> 00:56:45,770

so this is for us astronomers is is is a

1114

00:56:49,849 --> 00:56:48,119

very clear thing it's the is the fact

1115

00:56:53,450 --> 00:56:49,859

that the

1116

00:56:56,150 --> 00:56:53,460

surface blindness of a of an object in

1117

00:56:58,430 --> 00:56:56,160

the sky does not depend on its distance

1118

00:57:01,609 --> 00:56:58,440

it's very clear the surface brightness

1119

00:57:03,530 --> 00:57:01,619

is the ratio between the Luminosity or

1120

00:57:06,650 --> 00:57:03,540

the total Luminosity of the object and

1121

00:57:08,930 --> 00:57:06,660

the solid angles obtained by the object

1122

00:57:11,329 --> 00:57:08,940

and since it's the ratio between these

1123

00:57:14,630 --> 00:57:11,339

two things and since both things

1124

00:57:17,870 --> 00:57:14,640

uh very uh inversely as a square root of

1125

00:57:22,069 --> 00:57:17,880

the distance the ratio is constant with

1126

00:57:27,710 --> 00:57:24,349

uh

1127

00:57:32,089 --> 00:57:29,870

there's something really wonderful

1128

00:57:34,849 --> 00:57:32,099

Happening Here something really

1129

00:57:39,170 --> 00:57:37,069

first

1130

00:57:41,210 --> 00:57:39,180

Dante

1131

00:57:44,809 --> 00:57:41,220

chooses

1132

00:57:47,390 --> 00:57:44,819

as his scientific Master a woman

1133

00:57:49,250 --> 00:57:47,400

beatricia

1134

00:57:53,630 --> 00:57:49,260

it will take

1135

00:57:55,970 --> 00:57:53,640

many centuries before a woman would be

1136

00:57:58,609 --> 00:57:55,980

accepted in science

1137

00:58:02,990 --> 00:57:58,619

you know maybe Marie Curie where you

1138

00:58:05,809 --> 00:58:03,000

tell me well Dante had already done it

1139

00:58:09,109 --> 00:58:05,819

second thing

1140

00:58:10,069 --> 00:58:09,119

Beatrice but it's it's Dante Who Lies Of

1141

00:58:13,609 --> 00:58:10,079

course

1142

00:58:17,329 --> 00:58:13,619

uses a gedanke experiments

1143

00:58:18,589 --> 00:58:17,339

in order to confute an idea

1144

00:58:20,569 --> 00:58:18,599

hmm

1145

00:58:22,490 --> 00:58:20,579

Einstein did the same many centuries

1146

00:58:27,120 --> 00:58:22,500

later

1147

00:58:32,809 --> 00:58:28,849

[Music]

1148

00:58:35,690 --> 00:58:32,819

talks about the constants of surface

1149

00:58:37,430 --> 00:58:35,700

brightness with distance

1150

00:58:41,089 --> 00:58:37,440

well

1151

00:58:42,650 --> 00:58:41,099

I think we can give Dante a PhD in

1152

00:58:46,250 --> 00:58:42,660

physics

1153

00:58:49,390 --> 00:58:46,260

well it's not a Nobel Prize

1154

00:58:57,289 --> 00:58:53,170

uh well this is an image of the thought

1155

00:58:59,930 --> 00:58:57,299

experiments you see the Observer the

1156

00:59:03,289 --> 00:58:59,940

three mirrors and the lamp in the back

1157

00:59:07,549 --> 00:59:03,299

well the light in the back

1158

00:59:10,130 --> 00:59:07,559

okay uh let's get on to my last

1159

00:59:12,470 --> 00:59:10,140

argument for tonight

1160

00:59:14,630 --> 00:59:12,480

it's about the whole structure of the

1161

00:59:17,030 --> 00:59:14,640

universe of Dante's universe

1162

00:59:19,609 --> 00:59:17,040

well we know the structure of Dante's

1163

00:59:22,370 --> 00:59:19,619

Universe starts from the polymeric

1164

00:59:25,190 --> 00:59:22,380

system we already said that the Earth is

1165

00:59:26,589 --> 00:59:25,200

at the center of the universe and then

1166

00:59:29,690 --> 00:59:26,599

there are

1167

00:59:33,950 --> 00:59:29,700

nine spheres above the Earth

1168

00:59:37,250 --> 00:59:33,960

the moon Mercury Venus the sun Mars

1169

00:59:41,210 --> 00:59:37,260

Jupiter Saturn the fixed stars and the

1170

00:59:44,870 --> 00:59:41,220

Primo mobile the prime mover

1171

00:59:46,490 --> 00:59:44,880

um which is you know all these

1172

00:59:49,430 --> 00:59:46,500

um

1173

00:59:51,470 --> 00:59:49,440

spheres around the Earth are turning

1174

00:59:53,630 --> 00:59:51,480

faster and faster

1175

00:59:55,430 --> 00:59:53,640

and the Primo mobile is the fastest

1176

00:59:58,250 --> 00:59:55,440

turning one and in fact it was called

1177

01:00:01,010 --> 00:59:58,260

prime mover because it was thought that

1178

01:00:02,510 --> 01:00:01,020

he would give the movement to all the

1179

01:00:03,890 --> 01:00:02,520

others

1180

01:00:05,770 --> 01:00:03,900

then

1181

01:00:09,710 --> 01:00:05,780

at the

1182

01:00:12,950 --> 01:00:09,720

end of the 27th Canto of the paradise

1183

01:00:15,890 --> 01:00:12,960

Dante and Beatrice get to this

1184

01:00:16,849 --> 01:00:15,900

Primo mobilities prime mover and they

1185

01:00:23,390 --> 01:00:16,859

look

1186

01:00:24,609 --> 01:00:23,400

and they see something symmetric

1187

01:00:29,450 --> 01:00:24,619

another

1188

01:00:31,549 --> 01:00:29,460

nine spheres the the Angelic circles

1189

01:00:33,829 --> 01:00:31,559

actually spheres

1190

01:00:36,230 --> 01:00:33,839

and at the center of one inside the

1191

01:00:40,970 --> 01:00:36,240

other and at the center of them there is

1192

01:00:40,980 --> 01:00:45,170

well

1193

01:00:49,670 --> 01:00:47,690

this structure

1194

01:00:52,730 --> 01:00:49,680

it made

1195

01:00:57,170 --> 01:00:54,170

uh

1196

01:01:00,890 --> 01:00:57,180

think that this structure is very

1197

01:01:03,829 --> 01:01:00,900

similar to Einstein's hydrosphere you

1198

01:01:06,130 --> 01:01:03,839

know I say I just see is the

1199

01:01:08,990 --> 01:01:06,140

is the way

1200

01:01:12,230 --> 01:01:09,000

that the universe is structured in

1201

01:01:17,530 --> 01:01:14,870

um the first person to think about it

1202

01:01:19,069 --> 01:01:17,540

was a Swiss guy

1203

01:01:23,150 --> 01:01:19,079

mathematician and physicist

1204

01:01:25,910 --> 01:01:23,160

mathematician Andreas paiser in 1925 he

1205

01:01:28,069 --> 01:01:25,920

wrote about this about the similarity of

1206

01:01:30,710 --> 01:01:28,079

the structure of Tantis Universe with

1207

01:01:35,650 --> 01:01:30,720

the with high side atmosphere

1208

01:01:37,309 --> 01:01:35,660

you know not many years after

1209

01:01:39,530 --> 01:01:37,319

Einstein's

1210

01:01:43,010 --> 01:01:39,540

general relativity

1211

01:01:46,789 --> 01:01:43,020

but there is a very beautiful article

1212

01:01:49,450 --> 01:01:46,799

which I recommend you to read by Mark

1213

01:01:51,829 --> 01:01:49,460

Peterson an American

1214

01:01:54,230 --> 01:01:51,839

mathematician and physicist

1215

01:01:57,770 --> 01:01:54,240

the this article is in the American

1216

01:02:00,410 --> 01:01:57,780

Journal of physics in in use with me he

1217

01:02:03,170 --> 01:02:00,420

was published in 1979

1218

01:02:06,109 --> 01:02:03,180

and this figure actually comes from that

1219

01:02:08,210 --> 01:02:06,119

article you see this is the Ptolemy

1220

01:02:12,109 --> 01:02:08,220

Universe with the Earth at the center

1221

01:02:14,690 --> 01:02:12,119

and the nine spheres around it

1222

01:02:18,890 --> 01:02:14,700

and he is a symmetric

1223

01:02:20,630 --> 01:02:18,900

thing which is which is beyond the prime

1224

01:02:23,690 --> 01:02:20,640

mover

1225

01:02:26,510 --> 01:02:23,700

you see it's very symmetric

1226

01:02:29,089 --> 01:02:26,520

actually this point p

1227

01:02:32,210 --> 01:02:29,099

is the point where

1228

01:02:33,589 --> 01:02:32,220

Dante and Beatrice get to the Primo

1229

01:02:37,549 --> 01:02:33,599

mobile

1230

01:02:39,049 --> 01:02:37,559

and at the end of the 27th scant of the

1231

01:02:41,390 --> 01:02:39,059

paradise

1232

01:02:43,490 --> 01:02:41,400

Dante says

1233

01:02:47,510 --> 01:02:43,500

about this point

1234

01:02:52,670 --> 01:02:47,520

he says I cannot tell you

1235

01:02:56,690 --> 01:02:52,680

which place Beatrice choosed

1236

01:03:01,130 --> 01:02:56,700

for us so this point

1237

01:03:03,289 --> 01:03:01,140

so it doesn't matter where they got to

1238

01:03:04,970 --> 01:03:03,299

the Prima Mobility

1239

01:03:08,870 --> 01:03:04,980

what they would see on the other side

1240

01:03:14,150 --> 01:03:10,849

uh

1241

01:03:20,890 --> 01:03:15,950

you see the question on the top how

1242

01:03:26,030 --> 01:03:23,809

this is a question that we would like to

1243

01:03:28,910 --> 01:03:26,040

understand I think it's an important

1244

01:03:34,130 --> 01:03:31,670

how could he think something that is

1245

01:03:36,410 --> 01:03:34,140

similar to an atmosphere

1246

01:03:39,049 --> 01:03:36,420

and I think that the

1247

01:03:41,750 --> 01:03:39,059

the answer to this

1248

01:03:44,809 --> 01:03:41,760

deals with the fact that

1249

01:03:47,750 --> 01:03:44,819

uh spherical geometry at the times of

1250

01:03:51,230 --> 01:03:47,760

Dante was very well known

1251
01:03:54,349 --> 01:03:51,240
was even maybe better known that than

1252
01:03:57,349 --> 01:03:54,359
euclidean geometry

1253
01:03:58,490 --> 01:03:57,359
uh you know you clean a geometry deals

1254
01:04:00,829 --> 01:03:58,500
about

1255
01:04:02,589 --> 01:04:00,839
uh

1256
01:04:09,309 --> 01:04:02,599
um parallels

1257
01:04:12,109 --> 01:04:09,319
deals with the square angles deals with

1258
01:04:14,150 --> 01:04:12,119
Pythagoras trm

1259
01:04:16,190 --> 01:04:14,160
and so on

1260
01:04:17,210 --> 01:04:16,200
spherical geometry is completely

1261
01:04:21,670 --> 01:04:17,220
different

1262
01:04:24,890 --> 01:04:21,680
geometries for example is the geometry

1263
01:04:27,770 --> 01:04:24,900

on the surface of a sphere now on the

1264

01:04:30,410 --> 01:04:27,780

surface of a sphere uh

1265

01:04:31,609 --> 01:04:30,420

you don't have parallels there are no

1266

01:04:34,010 --> 01:04:31,619

parallels

1267

01:04:36,530 --> 01:04:34,020

uh

1268

01:04:40,730 --> 01:04:36,540

um full circles

1269

01:04:43,670 --> 01:04:40,740

always have two points in common so

1270

01:04:46,549 --> 01:04:43,680

there are no parallels the Pythagorean

1271

01:04:47,809 --> 01:04:46,559

theorem does not hold on the surface of

1272

01:04:49,430 --> 01:04:47,819

the sphere so it's a completely

1273

01:04:52,910 --> 01:04:49,440

different geometry

1274

01:04:55,430 --> 01:04:52,920

and it was well known at the time was

1275

01:05:00,109 --> 01:04:55,440

done because they knew

1276

01:05:03,370 --> 01:05:00,119

that sphere is where we live is where we

1277

01:05:09,230 --> 01:05:03,380

travel is where we build

1278

01:05:09,770 --> 01:05:09,240

so it was important because of this more

1279

01:05:12,490 --> 01:05:09,780

um

1280

01:05:17,270 --> 01:05:12,500

so also

1281

01:05:19,549 --> 01:05:17,280

Dante had as a master Brunetto latini

1282

01:05:22,849 --> 01:05:19,559

Brit latini was it was a teacher of

1283

01:05:26,690 --> 01:05:22,859

Dante and he had written a book

1284

01:05:28,970 --> 01:05:26,700

uh the the treasure this book had been

1285

01:05:30,230 --> 01:05:28,980

written both in Italian and in old

1286

01:05:32,809 --> 01:05:30,240

French

1287

01:05:35,569 --> 01:05:32,819

and it's a sort of an encyclopedic book

1288

01:05:38,870 --> 01:05:35,579

it deals with many different things and

1289

01:05:41,569 --> 01:05:38,880

it also deals with spherical geometry

1290

01:05:44,870 --> 01:05:41,579

now how does he deal with it

1291

01:05:48,049 --> 01:05:44,880

he deals with it not by looking at a

1292

01:05:50,750 --> 01:05:48,059

sphere from outside but by being on a

1293

01:05:55,549 --> 01:05:50,760

sphere which is what we do every day and

1294

01:05:58,250 --> 01:05:55,559

he says well take two Riders on a horse

1295

01:06:01,309 --> 01:05:58,260

starting from the same point of a

1296

01:06:02,210 --> 01:06:01,319

spherical or surface of a sphere say the

1297

01:06:05,510 --> 01:06:02,220

Earth

1298

01:06:07,730 --> 01:06:05,520

and they they start from same point into

1299

01:06:11,030 --> 01:06:07,740

different directions

1300

01:06:12,950 --> 01:06:11,040

so what happens is that they

1301

01:06:15,589 --> 01:06:12,960

travel they travel they travel forget

1302

01:06:17,930 --> 01:06:15,599

about mountains and seas doesn't matter

1303

01:06:21,109 --> 01:06:17,940

they travel travel and then they meet

1304

01:06:23,030 --> 01:06:21,119

again on the opposite side of the earth

1305

01:06:25,730 --> 01:06:23,040

if they travel

1306

01:06:27,170 --> 01:06:25,740

father they would meet again at the

1307

01:06:30,289 --> 01:06:27,180

starting point

1308

01:06:32,150 --> 01:06:30,299

so this is something very simple the

1309

01:06:35,630 --> 01:06:32,160

Dante could very well understand

1310

01:06:38,630 --> 01:06:35,640

Brunetto latini and explain this to

1311

01:06:43,190 --> 01:06:38,640

Dante it's very easy to understand now

1312

01:06:46,910 --> 01:06:43,200

let's take this other example let's take

1313

01:06:48,349 --> 01:06:46,920

two Riders two men two aunts whatever

1314

01:06:53,210 --> 01:06:48,359

you like

1315

01:06:55,490 --> 01:06:53,220

leaving from the South Pole of the Earth

1316

01:06:57,190 --> 01:06:55,500

from a sample

1317

01:07:01,430 --> 01:06:57,200

well

1318

01:07:03,910 --> 01:07:01,440

whichever direction he he lives

1319

01:07:07,549 --> 01:07:03,920

he would go north he can only go north

1320

01:07:11,109 --> 01:07:07,559

and what happens when he goes north

1321

01:07:15,950 --> 01:07:14,210

Circles of increasing sign you know

1322

01:07:19,970 --> 01:07:15,960

parallels

1323

01:07:23,150 --> 01:07:19,980

of increasing size until he reaches the

1324

01:07:27,410 --> 01:07:23,160

largest one which is the equator

1325

01:07:29,150 --> 01:07:27,420

now if you put a parallel every 10

1326

01:07:31,250 --> 01:07:29,160

degrees

1327

01:07:32,089 --> 01:07:31,260

from a South Pole to the equator you

1328

01:07:33,890 --> 01:07:32,099

would have

1329

01:07:36,170 --> 01:07:33,900

you cross

1330

01:07:39,349 --> 01:07:36,180

nine parallels

1331

01:07:43,849 --> 01:07:39,359

just like the nine Skies that the

1332

01:07:45,770 --> 01:07:43,859

Dante close to which the primobita

1333

01:07:47,390 --> 01:07:45,780

going further

1334

01:07:50,650 --> 01:07:47,400

from the equator

1335

01:07:55,789 --> 01:07:50,660

The Traveler would cross

1336

01:07:59,930 --> 01:07:55,799

Circles of decreasing size until he gets

1337

01:08:01,849 --> 01:07:59,940

to one point the North Pole hmm

1338

01:08:04,609 --> 01:08:01,859

so

1339

01:08:07,430 --> 01:08:04,619

what I'm telling you is very easy very

1340

01:08:10,730 --> 01:08:07,440

simple Dante could very well understand

1341

01:08:14,150 --> 01:08:10,740

this no problem

1342

01:08:16,130 --> 01:08:14,160

so what Dante has done to think about

1343

01:08:20,749 --> 01:08:16,140

the structure of his Universe he has

1344

01:08:25,550 --> 01:08:20,759

used the same example the same thing

1345

01:08:29,749 --> 01:08:25,560

by increasing it by one dimension

1346

01:08:32,390 --> 01:08:29,759

so he starts from

1347

01:08:34,669 --> 01:08:32,400

from the Earth

1348

01:08:37,189 --> 01:08:34,679

crosses

1349

01:08:39,470 --> 01:08:37,199

not Nine Circles nine spheres because

1350

01:08:41,390 --> 01:08:39,480

there is one additional Dimension until

1351

01:08:43,370 --> 01:08:41,400

the largest one

1352

01:08:45,829 --> 01:08:43,380

the Prima mobile

1353

01:08:47,630 --> 01:08:45,839

and after that there are other nine

1354

01:08:51,349 --> 01:08:47,640

spheres

1355

01:08:52,910 --> 01:08:51,359

smaller one inside the other

1356

01:08:54,349 --> 01:08:52,920

until

1357

01:08:56,829 --> 01:08:54,359

the point

1358

01:08:59,930 --> 01:08:56,839

luminous point which is God

1359

01:09:02,930 --> 01:08:59,940

so you see the way

1360

01:09:05,090 --> 01:09:02,940

I'm telling you this

1361

01:09:07,249 --> 01:09:05,100

is quite clear

1362

01:09:09,950 --> 01:09:07,259

that Dante could do it and he has done

1363

01:09:11,090 --> 01:09:09,960

it this is what Dante has done it has

1364

01:09:14,510 --> 01:09:11,100

done

1365

01:09:17,209 --> 01:09:14,520

of course he could not know and he did

1366

01:09:19,970 --> 01:09:17,219

not know that this would be

1367

01:09:23,269 --> 01:09:19,980

would become Einstein's hypersphere no

1368

01:09:25,930 --> 01:09:23,279

he didn't know that he doesn't tell him

1369

01:09:29,090 --> 01:09:25,940

of course he only

1370

01:09:31,550 --> 01:09:29,100

centuries later we couldn't we could

1371

01:09:34,070 --> 01:09:31,560

guess about the similarities but that's

1372

01:09:36,410 --> 01:09:34,080

not important but Dante could do it and

1373

01:09:38,209 --> 01:09:36,420

he has done it

1374

01:09:41,870 --> 01:09:38,219

okay

1375

01:09:46,070 --> 01:09:41,880

um well some details

1376

01:09:50,209 --> 01:09:46,080

uh the article by Mark Peterson about

1377

01:09:53,030 --> 01:09:50,219

the similarity of Einstein Dante

1378

01:09:54,350 --> 01:09:53,040

Universe structure and Einstein office

1379

01:09:57,229 --> 01:09:54,360

here

1380

01:10:00,110 --> 01:09:57,239

well starts by saying poetry and physics

1381

01:10:02,510 --> 01:10:00,120

are similar in the universe of course

1382

01:10:05,930 --> 01:10:02,520

then there is the there is the equation

1383

01:10:08,870 --> 01:10:05,940

of the atmosphere who have known the ABC

1384

01:10:10,790 --> 01:10:08,880

is a is a is a three-dimensional sphere

1385

01:10:12,470 --> 01:10:10,800

in a four-dimensional space and the

1386

01:10:14,110 --> 01:10:12,480

equation is like this it's like the

1387

01:10:17,150 --> 01:10:14,120

equation of a sphere with an additional

1388

01:10:18,770 --> 01:10:17,160

with an additional item there is there

1389

01:10:21,470 --> 01:10:18,780

is a fourth dimension

1390

01:10:24,050 --> 01:10:21,480

in that case the fourth dimension is

1391

01:10:29,350 --> 01:10:24,060

rotation velocity

1392

01:10:32,450 --> 01:10:29,360

because in Einsteins this is time

1393

01:10:33,310 --> 01:10:32,460

multiplied by the velocity of light is a

1394

01:10:42,050 --> 01:10:33,320

is

1395

01:10:43,490 --> 01:10:42,060

ad does not talk about time but he has a

1396

01:10:47,450 --> 01:10:43,500

fourth dimension which is rotation

1397

01:10:48,910 --> 01:10:47,460

velocity in fact the Earth is standing

1398

01:10:53,990 --> 01:10:48,920

still

1399

01:10:56,830 --> 01:10:54,000

all the nine sky teleman sky is above

1400

01:10:59,870 --> 01:10:56,840

it they turn around it faster and faster

1401

01:11:03,530 --> 01:10:59,880

and the

1402

01:11:05,870 --> 01:11:03,540

the uh the Angelic circles the Angelic

1403

01:11:08,630 --> 01:11:05,880

spheres they keep turning faster and

1404

01:11:10,430 --> 01:11:08,640

faster so the the rotation velocity is a

1405

01:11:12,350 --> 01:11:10,440

coordinate which increases from the

1406

01:11:17,090 --> 01:11:12,360

Earth to to God

1407

01:11:20,149 --> 01:11:17,100

uniformly so that dances four dimension

1408

01:11:24,350 --> 01:11:20,159

uh well let's skip this if you want you

1409

01:11:28,729 --> 01:11:24,360

you can read it in in in Matt Peterson

1410

01:11:30,950 --> 01:11:28,739

paper yeah I want to end this by telling

1411

01:11:34,910 --> 01:11:33,169

a few things

1412

01:11:38,510 --> 01:11:34,920

well

1413

01:11:40,610 --> 01:11:38,520

the structure of Dante's Universe solves

1414

01:11:42,350 --> 01:11:40,620

quite a few problems that were quite

1415

01:11:44,270 --> 01:11:42,360

severe at the time

1416

01:11:45,830 --> 01:11:44,280

well one of these problems was the fact

1417

01:11:47,810 --> 01:11:45,840

that the

1418

01:11:50,209 --> 01:11:47,820

Dolomite universe

1419

01:11:53,090 --> 01:11:50,219

at the Earth at the center of the

1420

01:11:56,930 --> 01:11:53,100

universe and you know at the end at the

1421

01:12:01,130 --> 01:11:56,940

center of the earth you have Lucifer

1422

01:12:04,070 --> 01:12:01,140

so having a universe which has a the

1423

01:12:06,169 --> 01:12:04,080

center Lucifer is not something that

1424

01:12:09,950 --> 01:12:06,179

they liked

1425

01:12:12,709 --> 01:12:09,960

uh in that structure at least well the

1426

01:12:14,810 --> 01:12:12,719

universe has two centers

1427

01:12:17,330 --> 01:12:14,820

on one side there's the Earth with

1428

01:12:18,470 --> 01:12:17,340

Lucifer but at the other side there is a

1429

01:12:20,930 --> 01:12:18,480

black spot

1430

01:12:24,110 --> 01:12:20,940

which is God

1431

01:12:27,470 --> 01:12:24,120

so that was a problem an important

1432

01:12:29,270 --> 01:12:27,480

problem solved by Dante's Universe

1433

01:12:30,169 --> 01:12:29,280

structure

1434

01:12:33,050 --> 01:12:30,179

um

1435

01:12:35,450 --> 01:12:33,060

the other thing you know they you would

1436

01:12:41,209 --> 01:12:35,460

people at the time were asking questions

1437

01:12:43,370 --> 01:12:41,219

well like well is God inside or outside

1438

01:12:52,669 --> 01:12:43,380

the universe

1439

01:12:54,050 --> 01:12:52,679

you know these are quite important

1440

01:12:57,709 --> 01:12:54,060

questions

1441

01:13:00,770 --> 01:12:57,719

well Dante has sold it

1442

01:13:02,590 --> 01:13:00,780

because clearly God is inside the

1443

01:13:06,830 --> 01:13:02,600

universe

1444

01:13:09,290 --> 01:13:06,840

he gets there

1445

01:13:10,669 --> 01:13:09,300

so the God is inside the universe and

1446

01:13:13,729 --> 01:13:10,679

what is outside

1447

01:13:15,790 --> 01:13:13,739

well there's nothing nothing outside the

1448

01:13:22,250 --> 01:13:15,800

universe

1449

01:13:25,810 --> 01:13:22,260

well um I can explain this to you well

1450

01:13:29,750 --> 01:13:25,820

I tried to do it in two ways well first

1451

01:13:34,430 --> 01:13:29,760

let's get one dimension back

1452

01:13:37,610 --> 01:13:34,440

think that we are two-dimensional beings

1453

01:13:39,470 --> 01:13:37,620

living in a two-dimensional world and

1454

01:13:43,010 --> 01:13:39,480

our two-dimensional world is the surface

1455

01:13:47,570 --> 01:13:44,770

now

1456

01:13:49,310 --> 01:13:47,580

uh our word

1457

01:13:51,709 --> 01:13:49,320

is clearly

1458

01:13:54,470 --> 01:13:51,719

Unlimited

1459

01:13:58,130 --> 01:13:54,480

because we can travel

1460

01:14:00,110 --> 01:13:58,140

through it without finding any limits

1461

01:14:01,550 --> 01:14:00,120

we can go on traveling and there is no

1462

01:14:04,910 --> 01:14:01,560

limit

1463

01:14:07,790 --> 01:14:04,920

but it's finite because the surface of a

1464

01:14:10,189 --> 01:14:07,800

sphere is a certain

1465

01:14:13,490 --> 01:14:10,199

finite surface

1466

01:14:15,410 --> 01:14:13,500

so unlimited and finite

1467

01:14:18,050 --> 01:14:15,420

and what's outside it there's nothing

1468

01:14:19,910 --> 01:14:18,060

because we are two-dimensional this is

1469

01:14:24,110 --> 01:14:19,920

our two-dimensional world and outside

1470

01:14:30,890 --> 01:14:26,689

um you know

1471

01:14:35,209 --> 01:14:30,900

our view of the universe

1472

01:14:41,590 --> 01:14:35,219

is that our universe started

1473

01:14:45,290 --> 01:14:41,600

in a singularity which happened 30

1474

01:14:48,050 --> 01:14:45,300

13.6 billion years ago

1475

01:14:50,270 --> 01:14:48,060

uh some people call it Big Bang but it's

1476

01:14:51,770 --> 01:14:50,280

not a bang it's not an explosion it's a

1477

01:14:55,189 --> 01:14:51,780

singularity

1478

01:14:56,590 --> 01:14:55,199

space and time started at that point and

1479

01:15:01,130 --> 01:14:56,600

at that time

1480

01:15:05,630 --> 01:15:01,140

and then the universe expanded and you

1481

01:15:10,310 --> 01:15:05,640

know you get uh Stars galaxies Etc

1482

01:15:14,510 --> 01:15:13,189

and we're outside there's nothing I mean

1483

01:15:17,390 --> 01:15:14,520

if you

1484

01:15:18,910 --> 01:15:17,400

uh

1485

01:15:24,830 --> 01:15:18,920

the

1486

01:15:26,470 --> 01:15:24,840

so if you take a sphere

1487

01:15:28,970 --> 01:15:26,480

which is

1488

01:15:32,270 --> 01:15:28,980

13.6 billion

1489

01:15:36,470 --> 01:15:32,280

light years large

1490

01:15:43,189 --> 01:15:41,630

well there can be nothing outside that

1491

01:15:45,050 --> 01:15:43,199

okay

1492

01:15:47,990 --> 01:15:45,060

um

1493

01:15:51,110 --> 01:15:48,000

I think I learned here uh just by

1494

01:15:54,890 --> 01:15:51,120

telling you that the astronomical

1495

01:15:58,390 --> 01:15:54,900

arguments that I have told you in

1496

01:16:00,110 --> 01:15:58,400

Dante's Divine Comedy only a few of them

1497

01:16:00,850 --> 01:16:00,120

uh

1498

01:16:04,189 --> 01:16:00,860

um

1499

01:16:07,970 --> 01:16:04,199

about one and a half years ago I wrote a

1500

01:16:12,050 --> 01:16:07,980

book with Massimo capacioli about

1501
01:16:15,709 --> 01:16:12,060
trying to deal about all these arguments

1502
01:16:19,669 --> 01:16:15,719
it's in Italian but then we wrote an

1503
01:16:22,850 --> 01:16:19,679
English version of of the book which is

1504
01:16:24,010 --> 01:16:22,860
which you can see here created by word

1505
01:16:27,410 --> 01:16:24,020
scientific

1506
01:16:29,930 --> 01:16:27,420
and so if you are interested in knowing

1507
01:16:32,990 --> 01:16:29,940
about the other Atomic arguments The

1508
01:16:36,350 --> 01:16:33,000
Divine Comedy you can read them here

1509
01:16:38,169 --> 01:16:36,360
and I want to end by the last verse of

1510
01:16:43,070 --> 01:16:38,179
the Divine Comedy Lamour

1511
01:16:48,709 --> 01:16:46,250
thank you thank you so much spirulo

1512
01:16:50,930 --> 01:16:48,719
um that was

1513
01:16:54,590 --> 01:16:50,940

for someone who has not

1514

01:16:59,870 --> 01:16:54,600

um gone into uh The Divine Comedy as

1515

01:17:02,270 --> 01:16:59,880

deeply uh quite enlightening from uh the

1516

01:17:05,149 --> 01:17:02,280

um I don't know the the the the journey

1517

01:17:07,010 --> 01:17:05,159

that starts out is going

1518

01:17:09,050 --> 01:17:07,020

um I don't know kind of like Jules Verne

1519

01:17:12,470 --> 01:17:09,060

Journey to the Center of the Earth but

1520

01:17:14,990 --> 01:17:12,480

then transforms into a journey across

1521

01:17:17,570 --> 01:17:15,000

the uh Across the Universe and such

1522

01:17:20,330 --> 01:17:17,580

um that um you know certainly opened my

1523

01:17:21,410 --> 01:17:20,340

eyes to to what um what we're seeing

1524

01:17:24,010 --> 01:17:21,420

here

1525

01:17:26,630 --> 01:17:24,020

mm-hmm thank you

1526

01:17:29,209 --> 01:17:26,640

I don't know if if you foresee that

1527

01:17:31,729 --> 01:17:29,219

there could be questions or

1528

01:17:34,209 --> 01:17:31,739

we expect there will be questions I

1529

01:17:37,130 --> 01:17:34,219

always ask the first question

1530

01:17:39,709 --> 01:17:37,140

and so my first question

1531

01:17:42,950 --> 01:17:39,719

um I have to deal with um yeah actually

1532

01:17:45,590 --> 01:17:42,960

the variety of the

1533

01:17:46,910 --> 01:17:45,600

um things that that I I sort of sparked

1534

01:17:49,550 --> 01:17:46,920

on

1535

01:17:53,090 --> 01:17:49,560

um in terms of things because you talk

1536

01:17:54,649 --> 01:17:53,100

about uh in this is a 12th century book

1537

01:17:56,209 --> 01:17:54,659

um but he's talking about uh you're

1538

01:17:57,890 --> 01:17:56,219

mentioning the Earth as a sphere and

1539

01:18:00,770 --> 01:17:57,900

sort of accepting the idea that the

1540

01:18:03,590 --> 01:18:00,780

Earth is a sphere when you know in in

1541

01:18:06,590 --> 01:18:03,600

history we sort of think that

1542

01:18:09,770 --> 01:18:06,600

um as being a

1543

01:18:11,570 --> 01:18:09,780

something that uh happened much later

1544

01:18:13,910 --> 01:18:11,580

during the Renaissance

1545

01:18:16,669 --> 01:18:13,920

um so it sort of has allegories as I

1546

01:18:20,930 --> 01:18:16,679

said Jules Verne earlier but also to uh

1547

01:18:22,370 --> 01:18:20,940

Galileo uh in touch and it it when you

1548

01:18:23,930 --> 01:18:22,380

think of it when you mentioned him as a

1549

01:18:26,149 --> 01:18:23,940

genius it really

1550

01:18:28,850 --> 01:18:26,159

um the parallels across history were

1551

01:18:30,169 --> 01:18:28,860

were extremely strong to me

1552

01:18:32,050 --> 01:18:30,179

um and I was just wondering what your

1553

01:18:36,590 --> 01:18:32,060

thoughts are on that

1554

01:18:40,729 --> 01:18:36,600

well the the fact that the the Earth is

1555

01:18:42,410 --> 01:18:40,739

a sphere actually was known uh by the

1556

01:18:43,250 --> 01:18:42,420

Greeks

1557

01:18:45,709 --> 01:18:43,260

um

1558

01:18:48,590 --> 01:18:45,719

I think

1559

01:18:53,390 --> 01:18:48,600

I may be wrong but it was

1560

01:18:55,430 --> 01:18:53,400

maybe parcos or or a Greek guy who

1561

01:19:00,290 --> 01:18:55,440

measured actually measured the the

1562

01:19:04,910 --> 01:19:00,300

radius of the Earth by noticing that the

1563

01:19:09,590 --> 01:19:04,920

that in in the same day like the um some

1564

01:19:13,310 --> 01:19:09,600

Equinox the the sun would get to the

1565

01:19:14,770 --> 01:19:13,320

bottom of uh of a well in Aswan in the

1566

01:19:20,030 --> 01:19:14,780

southern Egypt

1567

01:19:23,330 --> 01:19:20,040

and would actually uh not be vertical in

1568

01:19:27,050 --> 01:19:23,340

in in the northern part of Egypt or in

1569

01:19:29,750 --> 01:19:27,060

Greece and by uh by the different in

1570

01:19:31,970 --> 01:19:29,760

angle of the Sun to the surface of the

1571

01:19:34,010 --> 01:19:31,980

Earth and the distance of the two points

1572

01:19:36,470 --> 01:19:34,020

he could measure the the radius of the

1573

01:19:38,570 --> 01:19:36,480

Earth quite accurately actually so it

1574

01:19:41,990 --> 01:19:38,580

was well known that the Earth was ground

1575

01:19:44,870 --> 01:19:42,000

what else did you say a lot of that

1576

01:19:48,590 --> 01:19:44,880

knowledge was lost well into the Middle

1577

01:19:50,570 --> 01:19:48,600

Ages so no no well

1578

01:19:52,610 --> 01:19:50,580

it's yeah

1579

01:19:56,510 --> 01:19:52,620

some of that knowledge was lost

1580

01:19:59,689 --> 01:19:56,520

definitely uh the when when the Library

1581

01:20:02,630 --> 01:19:59,699

of Alexandria burn and uh after that but

1582

01:20:05,390 --> 01:20:02,640

he went back to Europe through the Arabs

1583

01:20:06,410 --> 01:20:05,400

and but I'm sure that the actually the

1584

01:20:09,050 --> 01:20:06,420

knowledge

1585

01:20:11,570 --> 01:20:09,060

of the Earth being round was never

1586

01:20:14,209 --> 01:20:11,580

really lost even in the west what what

1587

01:20:17,270 --> 01:20:14,219

they didn't know and what Galileo

1588

01:20:20,330 --> 01:20:17,280

and others Kepler

1589

01:20:21,770 --> 01:20:20,340

um dealt with was was the fact that the

1590

01:20:23,930 --> 01:20:21,780

Earth is not at the center of the

1591

01:20:25,850 --> 01:20:23,940

universe there was the Sun so that

1592

01:20:28,689 --> 01:20:25,860

that's but that's another another

1593

01:20:31,490 --> 01:20:28,699

argument and the the

1594

01:20:35,030 --> 01:20:31,500

sphericity of the Earth was known

1595

01:20:37,310 --> 01:20:35,040

okay well also the um the variations of

1596

01:20:40,550 --> 01:20:37,320

the moon is uh striking with uh the

1597

01:20:42,530 --> 01:20:40,560

Galileo observations that uh uh of the

1598

01:20:44,390 --> 01:20:42,540

Luna Mare and the variations of the Moon

1599

01:20:48,290 --> 01:20:44,400

that was another one of the parallels

1600

01:20:51,590 --> 01:20:48,300

that I I had seen on this

1601

01:20:53,870 --> 01:20:51,600

um let's see uh Grant has been

1602

01:20:55,250 --> 01:20:53,880

monitoring the chat more closely than I

1603

01:20:56,209 --> 01:20:55,260

have

1604

01:20:58,729 --> 01:20:56,219

um

1605

01:21:00,050 --> 01:20:58,739

can we Grant and do you want to turn on

1606

01:21:02,750 --> 01:21:00,060

your video and see if we have any

1607

01:21:03,950 --> 01:21:02,760

questions from our YouTube chat yeah

1608

01:21:06,290 --> 01:21:03,960

absolutely

1609

01:21:08,990 --> 01:21:06,300

um I've got one to start us off which I

1610

01:21:10,790 --> 01:21:09,000

like which is uh especially in the time

1611

01:21:12,169 --> 01:21:10,800

of Dante there are a lot of things that

1612

01:21:13,910 --> 01:21:12,179

he was thinking about Frank kind of

1613

01:21:17,870 --> 01:21:13,920

mentioned that we kind of take for

1614

01:21:20,709 --> 01:21:17,880

granted what kind of Technology would he

1615

01:21:26,810 --> 01:21:20,719

have had to have these sort of

1616

01:21:31,090 --> 01:21:28,669

what

1617

01:21:38,410 --> 01:21:34,070

very little technology would be none in

1618

01:21:42,110 --> 01:21:38,420

the sense that uh in terms of

1619

01:21:44,810 --> 01:21:42,120

aids to the eye there was none so they

1620

01:21:48,169 --> 01:21:44,820

they would look at the stars of the

1621

01:21:50,630 --> 01:21:48,179

planets yeah the Sky by the naked eye

1622

01:21:53,810 --> 01:21:50,640

there was no way out of that it would

1623

01:21:55,930 --> 01:21:53,820

take only uh quite I mean a few

1624

01:22:06,010 --> 01:21:55,940

centuries three four centuries before

1625

01:22:13,430 --> 01:22:08,570

telescope to the sky

1626

01:22:17,390 --> 01:22:13,440

uh so 1609 was much later and and as you

1627

01:22:19,490 --> 01:22:17,400

know as soon as Galileo did look at the

1628

01:22:22,370 --> 01:22:19,500

sky not by naked eye but with some

1629

01:22:25,669 --> 01:22:22,380

instrument he he made uh incredible

1630

01:22:29,570 --> 01:22:25,679

discoveries like the mountains of the

1631

01:22:32,649 --> 01:22:29,580

moon like the satellites of Jupiter the

1632

01:22:36,229 --> 01:22:32,659

faces of Venus

1633

01:22:39,530 --> 01:22:36,239

and so on and they were published in the

1634

01:22:41,630 --> 01:22:39,540

in the cedaris lunches in uh just a year

1635

01:22:46,669 --> 01:22:41,640

later in 1610

1636

01:22:49,070 --> 01:22:46,679

uh but that was long after Dante

1637

01:22:50,990 --> 01:22:49,080

uh spirilla would you mind stopping your

1638

01:22:54,110 --> 01:22:51,000

screen share real quick so that the

1639

01:22:56,810 --> 01:22:54,120

audience can see all of us yes

1640

01:23:06,350 --> 01:22:56,820

thank you okay

1641

01:23:12,229 --> 01:23:08,390

so do you have uh another question there

1642

01:23:14,209 --> 01:23:12,239

there Grant or I can try and mine

1643

01:23:15,770 --> 01:23:14,219

through my things that I've got I've got

1644

01:23:18,649 --> 01:23:15,780

so many notes

1645

01:23:22,189 --> 01:23:18,659

um in particular the

1646

01:23:23,750 --> 01:23:22,199

the relevance of the Aristotelian view

1647

01:23:29,209 --> 01:23:23,760

of the

1648

01:23:32,149 --> 01:23:29,219

and such and the sort of parallels to

1649

01:23:35,330 --> 01:23:32,159

the um the nine spheres and then the

1650

01:23:38,090 --> 01:23:35,340

nine other spheres that um uh you

1651
01:23:40,370 --> 01:23:38,100
mentioned for for Dante's Universe

1652
01:23:43,130 --> 01:23:40,380
um how much I mean what sort correlation

1653
01:23:47,270 --> 01:23:43,140
is there between the Aristotelian view

1654
01:23:49,850 --> 01:23:47,280
um and and Dante's Dante's presentation

1655
01:23:54,410 --> 01:23:49,860
well

1656
01:23:59,209 --> 01:23:54,420
done it definitely had a very uh big

1657
01:24:01,490 --> 01:23:59,219
admiration for Aristotle but mostly as a

1658
01:24:04,030 --> 01:24:01,500
philosopher

1659
01:24:10,610 --> 01:24:06,590
also in a sense the view of the universe

1660
01:24:13,330 --> 01:24:10,620
but they I thought they did not have his

1661
01:24:18,610 --> 01:24:13,340
own view of the universe he was

1662
01:24:21,470 --> 01:24:18,620
helped by astronomers I mean by parkos

1663
01:24:23,689 --> 01:24:21,480

so these were the astronomers who

1664

01:24:26,689 --> 01:24:23,699

actually had built

1665

01:24:30,229 --> 01:24:26,699

the view of the universe at the Dante's

1666

01:24:33,050 --> 01:24:30,239

time is totally uh did not do that but

1667

01:24:37,250 --> 01:24:33,060

still uh Dante was a great admirer

1668

01:24:38,870 --> 01:24:37,260

because of his philosophy and his logic

1669

01:24:41,870 --> 01:24:38,880

and yeah

1670

01:24:44,330 --> 01:24:41,880

yeah and you uh were spot on when you

1671

01:24:46,130 --> 01:24:44,340

mentioned how um back in those days

1672

01:24:47,930 --> 01:24:46,140

being a philosopher meant you could

1673

01:24:49,610 --> 01:24:47,940

study all difference of what all

1674

01:24:52,669 --> 01:24:49,620

different types of Sciences that we

1675

01:24:54,050 --> 01:24:52,679

consider totally disparate today and I

1676

01:24:56,209 --> 01:24:54,060

absolutely agree with you I'm totally

1677

01:24:59,209 --> 01:24:56,219

jealous of uh folks who lived in that

1678

01:25:02,870 --> 01:24:59,219

time for at least that aspect you know

1679

01:25:04,310 --> 01:25:02,880

being able to uh be an expert in many

1680

01:25:07,850 --> 01:25:04,320

different Sciences which is totally

1681

01:25:11,090 --> 01:25:07,860

impossible today it is it is in fact uh

1682

01:25:15,250 --> 01:25:11,100

let me tell you a little story about

1683

01:25:19,010 --> 01:25:15,260

about this you know in in uh in in

1684

01:25:21,229 --> 01:25:19,020

2021 was the 700th anniversary of

1685

01:25:23,510 --> 01:25:21,239

Dante's death so there were big

1686

01:25:26,689 --> 01:25:23,520

celebrations in Italy and also elsewhere

1687

01:25:29,450 --> 01:25:26,699

in the world and because of that I gave

1688

01:25:31,729 --> 01:25:29,460

several conferences about Dante's

1689

01:25:35,330 --> 01:25:31,739

cosmography

1690

01:25:37,970 --> 01:25:35,340

um any in one of them uh after I'd

1691

01:25:41,330 --> 01:25:37,980

finished my talk uh somebody came to me

1692

01:25:44,990 --> 01:25:41,340

and they said well I am a teacher in

1693

01:25:47,390 --> 01:25:45,000

high school and I teach Dante you know

1694

01:25:51,590 --> 01:25:47,400

in Italy uh Dante study in high school

1695

01:25:54,410 --> 01:25:51,600

in the last three years and in each one

1696

01:25:58,310 --> 01:25:54,420

of the of the last two years one reads

1697

01:26:02,030 --> 01:25:58,320

at high school Inferno purgatory and

1698

01:26:03,229 --> 01:26:02,040

Paradise and so I I read this all to my

1699

01:26:07,850 --> 01:26:03,239

students

1700

01:26:11,030 --> 01:26:07,860

but when I get to the second Kanto of

1701

01:26:12,709 --> 01:26:11,040

paradise I skip it because I don't know

1702

01:26:14,870 --> 01:26:12,719

how to explain it

1703

01:26:17,209 --> 01:26:14,880

you know the second kind of paradise the

1704

01:26:19,550 --> 01:26:17,219

one I thought uh talked about it's about

1705

01:26:24,110 --> 01:26:19,560

the the moon spots and of course

1706

01:26:25,250 --> 01:26:24,120

somebody who does not know about the

1707

01:26:26,930 --> 01:26:25,260

um

1708

01:26:29,330 --> 01:26:26,940

the fact that the surface brightness

1709

01:26:33,470 --> 01:26:29,340

does not depend on distance

1710

01:26:36,790 --> 01:26:33,480

how can he explain the Canto so he told

1711

01:26:40,669 --> 01:26:36,800

me I can and actually this is

1712

01:26:43,250 --> 01:26:40,679

this is reinforces my idea that you you

1713

01:26:44,570 --> 01:26:43,260

cannot just listen to one person if you

1714

01:26:48,050 --> 01:26:44,580

want to understand that you have to

1715

01:26:52,669 --> 01:26:51,530

uh yes so it sounds like many faceted uh

1716

01:26:54,290 --> 01:26:52,679

presentation

1717

01:26:56,750 --> 01:26:54,300

um I think I saw another question in the

1718

01:26:58,910 --> 01:26:56,760

chat there Grant can do

1719

01:27:03,229 --> 01:26:58,920

yeah absolutely

1720

01:27:05,390 --> 01:27:03,239

um so uh does Dante try to tell us how

1721

01:27:08,450 --> 01:27:05,400

the Earth shifted uh this person makes

1722

01:27:11,570 --> 01:27:08,460

reference to the circles and stones for

1723

01:27:14,689 --> 01:27:11,580

calculating positions after the 13 000

1724

01:27:19,970 --> 01:27:17,990

oh I I'm sorry I do not understand this

1725

01:27:21,470 --> 01:27:19,980

question yeah I wasn't sure what this

1726

01:27:23,510 --> 01:27:21,480

question was referring to either

1727

01:27:27,169 --> 01:27:23,520

with the 13 000 year disaster what that

1728

01:27:29,090 --> 01:27:27,179

meant okay 13 000 years is just half of

1729

01:27:32,030 --> 01:27:29,100

the period of the procession of the

1730

01:27:35,090 --> 01:27:32,040

equinoxes but

1731

01:27:36,590 --> 01:27:35,100

this is the only team I can say

1732

01:27:39,530 --> 01:27:36,600

it's okay

1733

01:27:43,610 --> 01:27:39,540

um did Dante use Virgil and Homer to

1734

01:27:49,810 --> 01:27:46,010

ah Ah that's an interesting question

1735

01:27:52,250 --> 01:27:49,820

well definitely

1736

01:27:54,290 --> 01:27:52,260

yes but there are interesting things to

1737

01:27:59,390 --> 01:27:54,300

say about this

1738

01:28:02,830 --> 01:27:59,400

uh of course Virgil was very much loved

1739

01:28:05,930 --> 01:28:02,840

by Dante and admired by Dante and and

1740

01:28:09,050 --> 01:28:05,940

this is demonstrated definitely by the

1741

01:28:12,410 --> 01:28:09,060

fact that virgin is Dante's leader

1742

01:28:14,930 --> 01:28:12,420

through our hell and Paradise you know

1743

01:28:17,750 --> 01:28:14,940

this is very it means that he was very

1744

01:28:21,770 --> 01:28:17,760

important for Dante

1745

01:28:25,070 --> 01:28:21,780

but about Homer it's it's different well

1746

01:28:28,729 --> 01:28:25,080

first of all Dante could not read Greeks

1747

01:28:33,169 --> 01:28:28,739

Greek ancient Greek he could not read it

1748

01:28:35,149 --> 01:28:33,179

so he had uh heard about

1749

01:28:39,169 --> 01:28:35,159

Uma definitely

1750

01:28:43,490 --> 01:28:39,179

but probably only through translations

1751

01:28:46,370 --> 01:28:43,500

in in in in Latin

1752

01:28:49,010 --> 01:28:46,380

um and in fact it's it's very

1753

01:28:52,850 --> 01:28:49,020

interesting that when he talks about

1754

01:28:59,390 --> 01:28:52,860

Ulysses which of course the the the main

1755

01:29:04,729 --> 01:29:02,870

um well he does not refer to what

1756

01:29:06,490 --> 01:29:04,739

almost wrote

1757

01:29:09,970 --> 01:29:06,500

but he he

1758

01:29:13,330 --> 01:29:09,980

tells a new story a completely new story

1759

01:29:16,490 --> 01:29:13,340

uh which is the story of the last

1760

01:29:20,270 --> 01:29:16,500

journey of Lisa's

1761

01:29:22,850 --> 01:29:20,280

uh trying to discover the the the Earth

1762

01:29:25,070 --> 01:29:22,860

outside the Gibraltar outside the limits

1763

01:29:30,910 --> 01:29:25,080

made by Hercules

1764

01:29:36,110 --> 01:29:34,370

it's hard to actually I've read

1765

01:29:40,209 --> 01:29:36,120

something about this people do not

1766

01:29:43,610 --> 01:29:40,219

really know how much Dante knew about

1767

01:29:50,110 --> 01:29:43,620

homeless Works he probably had heard

1768

01:29:55,189 --> 01:29:53,750

all right so we have another good one

1769

01:29:56,629 --> 01:29:55,199

um this will be the last one because

1770

01:29:59,629 --> 01:29:56,639

we're getting to time

1771

01:30:03,229 --> 01:30:00,890

okay

1772

01:30:04,729 --> 01:30:03,239

um did Dante travel to other regions or

1773

01:30:08,870 --> 01:30:04,739

did he spend most of his time in

1774

01:30:14,229 --> 01:30:08,880

Florence no no no no no no no Dante

1775

01:30:15,790 --> 01:30:14,239

um was exiled from Florence by on in

1776

01:30:21,550 --> 01:30:15,800

1301

1777

01:30:24,530 --> 01:30:21,560

and when he was uh 35 years old

1778

01:30:28,189 --> 01:30:24,540

uh and it's not by chance that actually

1779

01:30:31,689 --> 01:30:28,199

the the the divine's comedy trip is is

1780

01:30:34,910 --> 01:30:31,699

imagined to be right on that year 1301.

1781

01:30:36,590 --> 01:30:34,920

uh but then since he was exiled he could

1782

01:30:40,610 --> 01:30:36,600

not go back to Florence although he

1783

01:30:44,030 --> 01:30:40,620

wanted to he so he traveled around Italy

1784

01:30:48,290 --> 01:30:44,040

in in many different places

1785

01:30:52,490 --> 01:30:48,300

um he spent he spent a lot of time uh in

1786

01:30:55,970 --> 01:30:52,500

Verona uh Verona is is a town in in the

1787

01:31:00,050 --> 01:30:55,980

northeast of Italy and and that town was

1788

01:31:01,610 --> 01:31:00,060

ruled by a family called De La Scala and

1789

01:31:03,950 --> 01:31:01,620

he spent quite a lot of time there

1790

01:31:09,590 --> 01:31:03,960

actually

1791

01:31:11,390 --> 01:31:09,600

um his son Pietro uh also lived there

1792

01:31:15,830 --> 01:31:11,400

and his son

1793

01:31:21,830 --> 01:31:15,840

in in 1353 actually the 28th of April of

1794

01:31:23,930 --> 01:31:21,840

1353 bought a land near Verona in in in

1795

01:31:27,470 --> 01:31:23,940

a region where they make good wine

1796

01:31:30,830 --> 01:31:27,480

valpolice Verona and that piece of land

1797

01:31:33,709 --> 01:31:30,840

is still owned by my family

1798

01:31:36,790 --> 01:31:33,719

uh then Dante

1799

01:31:40,850 --> 01:31:36,800

lived also quite a few years in Ravenna

1800

01:31:43,010 --> 01:31:40,860

you know in the on near near the

1801

01:31:47,270 --> 01:31:43,020

Atlantic coast where he actually died

1802

01:31:52,850 --> 01:31:49,790

so he traveled he traveled around Italy

1803

01:31:56,270 --> 01:31:52,860

quite a lot but although if you go

1804

01:31:58,550 --> 01:31:56,280

around Italy in in many towns you see

1805

01:32:00,169 --> 01:31:58,560

Stones which says yeah Dante has been

1806

01:32:05,030 --> 01:32:00,179

here yeah

1807

01:32:08,870 --> 01:32:05,040

well uh be careful because actually the

1808

01:32:12,310 --> 01:32:08,880

the presence of Dante is documented by

1809

01:32:16,070 --> 01:32:12,320

documents of the time only in Florence

1810

01:32:18,950 --> 01:32:16,080

Verona Ravina and there is another town

1811

01:32:22,970 --> 01:32:18,960

which is called sarzana sadhana is a

1812

01:32:26,050 --> 01:32:22,980

town uh in in the north of Tuscany

1813

01:32:28,850 --> 01:32:26,060

um near liguria near near La special

1814

01:32:33,530 --> 01:32:28,860

Dante has been there because there is a

1815

01:32:35,510 --> 01:32:33,540

document made by a lawyer uh document of

1816

01:32:38,209 --> 01:32:35,520

the time which says that Dante was there

1817

01:32:39,890 --> 01:32:38,219

and he actually had testified for some

1818

01:32:42,770 --> 01:32:39,900

reasons there

1819

01:32:44,050 --> 01:32:42,780

so be careful the people tell that has

1820

01:32:49,250 --> 01:32:44,060

been here then there's been here yeah

1821

01:32:53,090 --> 01:32:51,169

yeah sort of in the U.S we have the

1822

01:32:55,070 --> 01:32:53,100

George Washington slept here type thing

1823

01:32:56,930 --> 01:32:55,080

uh how are people always claiming that

1824

01:33:00,169 --> 01:32:56,940

you know famous people had come through

1825

01:33:02,810 --> 01:33:00,179

there all right well thank you so much

1826

01:33:05,209 --> 01:33:02,820

um this really uh transforms the story

1827

01:33:07,430 --> 01:33:05,219

or gives a totally new aspect to the

1828

01:33:09,830 --> 01:33:07,440

story uh for this

1829

01:33:13,070 --> 01:33:09,840

um I will say that next month is

1830

01:33:16,310 --> 01:33:13,080

November 1st uh black holes how do we

1831

01:33:18,770 --> 01:33:16,320

see that which gives off no light we

1832

01:33:21,229 --> 01:33:18,780

hope to see all of you there uh thank

1833

01:33:23,629 --> 01:33:21,239

you very much again sparello and we will