

1
00:00:04,009 --> 00:00:09,089
hello everybody welcome back for this

2
00:00:07,019 --> 00:00:10,678
week's Hubble hang out my name is Tony

3
00:00:09,089 --> 00:00:12,058
Darnell and I think we've got another

4
00:00:10,679 --> 00:00:13,849
great hangout planned for you this week

5
00:00:12,058 --> 00:00:18,509
we're going to be talking about data and

6
00:00:13,849 --> 00:00:20,189
analyzing the universe and so we we've

7
00:00:18,510 --> 00:00:21,359
got all kinds of new stuff to show you

8
00:00:20,189 --> 00:00:24,059
some new data sets that are available

9
00:00:21,359 --> 00:00:25,500
not only just for astronomers and people

10
00:00:24,059 --> 00:00:28,108
doing research but also to the general

11
00:00:25,500 --> 00:00:30,028
public and so we're going to show you

12
00:00:28,109 --> 00:00:31,050
some of these tools we're going to talk

13
00:00:30,028 --> 00:00:32,488
about some of the data and some of the

14
00:00:31,050 --> 00:00:34,710
things you can learn from them and how

15
00:00:32,488 --> 00:00:36,209
you can access them as well but before I

16
00:00:34,710 --> 00:00:40,009
get into all of that I have to introduce

17
00:00:36,210 --> 00:00:40,009
I don't have to but I guess I should

18
00:00:40,460 --> 00:00:46,679
introduce my co-host dr. carol christian

19
00:00:44,250 --> 00:00:48,000
she is the HST outreach project

20
00:00:46,679 --> 00:00:51,750
scientist see i can read i'm reading

21
00:00:48,000 --> 00:00:54,000
your little lower third prize hello

22
00:00:51,750 --> 00:00:55,890
everybody i have new skills i've just

23
00:00:54,000 --> 00:00:58,920
got mad skills and also joining me is

24
00:00:55,890 --> 00:01:01,948
scott lewis the online outreach what's

25
00:00:58,920 --> 00:01:05,609
that word specialist i am just special

26
00:01:01,948 --> 00:01:07,618
just put special no botanist yeah you

27
00:01:05,609 --> 00:01:09,688
know Scott our little a little meme of

28
00:01:07,618 --> 00:01:11,700
mo bigger mo better didn't catch on last

29

00:01:09,688 --> 00:01:14,158
week you know there's a I'd be as I

30
00:01:11,700 --> 00:01:17,129
didn't see it well I'll work on that

31
00:01:14,159 --> 00:01:18,868
yeah mo mo bigger mo bigger well today

32
00:01:17,129 --> 00:01:20,548
we're talking about mo better we r mo

33
00:01:18,868 --> 00:01:22,228
better today because we are going to be

34
00:01:20,549 --> 00:01:24,540
talking about some data that are coming

35
00:01:22,228 --> 00:01:27,868
from the Hubble Space Telescope and is

36
00:01:24,540 --> 00:01:29,850
being archived on that on the Mikulski

37
00:01:27,868 --> 00:01:31,500
archive for space telescopes now one of

38
00:01:29,849 --> 00:01:32,938
the things that you may not realize

39
00:01:31,500 --> 00:01:35,459
about what the Institute does in

40
00:01:32,938 --> 00:01:37,228
addition to operating the Hubble on a

41
00:01:35,459 --> 00:01:38,969
day to day basis it employs great many

42
00:01:37,228 --> 00:01:41,938
astronomers who do science with it also

43
00:01:38,969 --> 00:01:46,228

on a daily basis and but we also handle

44

00:01:41,938 --> 00:01:47,969

and distribute and serve the data that

45

00:01:46,228 --> 00:01:49,709

comes off of not just humble but a lot

46

00:01:47,969 --> 00:01:51,030

of different instruments and we're going

47

00:01:49,709 --> 00:01:52,169

to talk about that today with some of

48

00:01:51,030 --> 00:01:54,420

the people who were working on and

49

00:01:52,170 --> 00:01:59,368

joining me today is dr. Molly peoples

50

00:01:54,420 --> 00:02:00,990

estranha Molly ok and add she's gonna

51

00:01:59,368 --> 00:02:02,519

here to tell us about it she's been in

52

00:02:00,989 --> 00:02:05,009

hangouts before welcome back Polly it's

53

00:02:02,519 --> 00:02:06,840

good to see you again we're also to

54

00:02:05,009 --> 00:02:08,250

explain the archive with us dr. Jason

55

00:02:06,840 --> 00:02:13,110

Tomlinson he's been on these before he

56

00:02:08,250 --> 00:02:13,710

is not on Twitter as his as the has in

57

00:02:13,110 --> 00:02:15,480

his

58
00:02:13,710 --> 00:02:18,870
heard everybody says I'm getting a lot

59
00:02:15,479 --> 00:02:21,269
of sweet Lonnie yeah so welcome Jason

60
00:02:18,870 --> 00:02:25,590
good glad notice a note on Twitter okay

61
00:02:21,270 --> 00:02:27,420
I get it no no tundra not on Twitter yes

62
00:02:25,590 --> 00:02:29,460
and so everybody says eating a lot of

63
00:02:27,419 --> 00:02:31,469
glare from my glasses so I should

64
00:02:29,460 --> 00:02:34,590
probably back up I'll do this then okay

65
00:02:31,469 --> 00:02:37,080
so there we go sorry I can't do it it's

66
00:02:34,590 --> 00:02:40,289
still there yeah that's okay I'll dirt

67
00:02:37,080 --> 00:02:42,990
yeah that's good that's good how about I

68
00:02:40,289 --> 00:02:45,239
can look up like this yeah so can we do

69
00:02:42,990 --> 00:02:47,370
spectroscopy and what's being reflected

70
00:02:45,240 --> 00:02:49,080
the dresser you can watch me surf the

71
00:02:47,370 --> 00:02:51,659
internet while I'm gonna doing to hang

72
00:02:49,080 --> 00:02:54,180
out I got I guess I better keep it clean

73
00:02:51,659 --> 00:02:55,949
huh okay so we we want you guys to

74
00:02:54,180 --> 00:02:58,980
interact with us and ask us questions

75
00:02:55,949 --> 00:03:00,689
and talk to us about these the the

76
00:02:58,979 --> 00:03:01,739
babies we're going to be showing you as

77
00:03:00,689 --> 00:03:03,719
well as any questions you might have

78
00:03:01,740 --> 00:03:05,719
regarding Hubble or some of the science

79
00:03:03,719 --> 00:03:07,650
that can be done with this with this

80
00:03:05,719 --> 00:03:09,270
data that we're going to be showing you

81
00:03:07,650 --> 00:03:11,760
but before we do we should tell you how

82
00:03:09,270 --> 00:03:13,950
to do it now one of a there's a hint

83
00:03:11,759 --> 00:03:16,049
right there on my lower third I am on

84
00:03:13,949 --> 00:03:17,579
Twitter but I'm also looking for that

85
00:03:16,050 --> 00:03:19,350
and I'm gonna have Scott tell you how to

86

00:03:17,580 --> 00:03:20,940
do it Scotty that's right i mean it kind

87
00:03:19,349 --> 00:03:23,069
of helps if we show you how we can do

88
00:03:20,939 --> 00:03:24,780
that so he bests the way since you're

89
00:03:23,069 --> 00:03:26,459
watching it's live right now hopefully

90
00:03:24,780 --> 00:03:27,719
I'm if you're not we'll we'll give you

91
00:03:26,460 --> 00:03:29,099
those other things later but as I'm

92
00:03:27,719 --> 00:03:30,629
seeing here we have a bunch of people in

93
00:03:29,099 --> 00:03:32,879
our live chat so we're up on YouTube

94
00:03:30,629 --> 00:03:35,069
right now i'm using a youtube live event

95
00:03:32,879 --> 00:03:37,139
and so i'm seeing a bunch of people

96
00:03:35,069 --> 00:03:40,500
already commenting so hello everyone in

97
00:03:37,139 --> 00:03:42,869
the youtube live chat hello is Tony had

98
00:03:40,500 --> 00:03:44,490
mentioned we are on Twitter she will be

99
00:03:42,870 --> 00:03:46,379
live tweeting this event ins as far as

100
00:03:44,490 --> 00:03:47,760

any pictures and links that are going on

101

00:03:46,379 --> 00:03:49,379

with it and we'll be using the hashtag

102

00:03:47,759 --> 00:03:51,689

Hubble hang out so if you have any

103

00:03:49,379 --> 00:03:54,150

questions or comments about spectroscopy

104

00:03:51,689 --> 00:03:56,729

and the topics that will be hitting

105

00:03:54,150 --> 00:03:59,129

today please use that hashtag hub will

106

00:03:56,729 --> 00:04:00,209

hang out and I'm also monitoring the the

107

00:03:59,129 --> 00:04:02,099

comments that are being put up on her

108

00:04:00,210 --> 00:04:03,689

Facebook and Google+ events so if you

109

00:04:02,099 --> 00:04:05,729

have anything like that I will try to

110

00:04:03,689 --> 00:04:07,319

get to them but the best and most

111

00:04:05,729 --> 00:04:10,649

efficient way is the YouTube live chat

112

00:04:07,319 --> 00:04:12,930

and on Twitter okay so someone just

113

00:04:10,650 --> 00:04:15,120

joined who is this John yeah this is

114

00:04:12,930 --> 00:04:18,060

John okay hi John you want to reduce

115
00:04:15,120 --> 00:04:19,319
yourself yeah I'm John O'Mara from st.

116
00:04:18,060 --> 00:04:21,600
Michael's College in the great state of

117
00:04:19,319 --> 00:04:22,740
Vermont frequent Hubble user oh cool

118
00:04:21,600 --> 00:04:24,510
alright so you're here to tell us about

119
00:04:22,740 --> 00:04:26,460
the spectral archive as well you're

120
00:04:24,509 --> 00:04:27,670
awesome great well we're getting started

121
00:04:26,459 --> 00:04:29,229
just now so welcome

122
00:04:27,670 --> 00:04:30,400
uh we would like to have you have a

123
00:04:29,230 --> 00:04:31,750
lower third but we don't have time to

124
00:04:30,399 --> 00:04:34,179
get into that right now so we'll just go

125
00:04:31,750 --> 00:04:36,100
ahead and get started so as I mentioned

126
00:04:34,180 --> 00:04:39,340
at the start of this we are we're

127
00:04:36,100 --> 00:04:41,410
talking about the Hubble uh the Hubble

128
00:04:39,339 --> 00:04:44,919
spectral archive now we in the past

129
00:04:41,410 --> 00:04:46,720
we've given you hangouts on the Hubble

130
00:04:44,920 --> 00:04:48,490
legacy archive which has to do with old

131
00:04:46,720 --> 00:04:50,260
the older data that the hubble hubble

132
00:04:48,490 --> 00:04:52,480
spin around for 25 years folks so we've

133
00:04:50,259 --> 00:04:53,620
got a lot of data to serve and from all

134
00:04:52,480 --> 00:04:56,340
kinds of different instruments there's

135
00:04:53,620 --> 00:04:58,720
also the mast archive in general which

136
00:04:56,339 --> 00:05:00,789
hosts not just data from Hubble but

137
00:04:58,720 --> 00:05:02,800
carol can you give us a brief background

138
00:05:00,790 --> 00:05:05,590
what are some of the other instruments

139
00:05:02,800 --> 00:05:10,060
that we're serving data from in the in

140
00:05:05,589 --> 00:05:13,079
the archive oh my god well it's a lot

141
00:05:10,060 --> 00:05:16,149
right there's no yo yes all the Hubble

142
00:05:13,079 --> 00:05:19,689
and people are most familiar with the

143

00:05:16,149 --> 00:05:21,129
imagery from the old cameras you know we

144
00:05:19,689 --> 00:05:23,860
still we have all the imagery from the

145
00:05:21,129 --> 00:05:26,399
old cameras that were removed like with

146
00:05:23,860 --> 00:05:30,310
pick and pick two and things like that

147
00:05:26,399 --> 00:05:33,009
we had wide field camera 3 advanced

148
00:05:30,310 --> 00:05:35,350
camera for surveys etc and then the

149
00:05:33,009 --> 00:05:38,170
spectrographs this dis and call cost as

150
00:05:35,350 --> 00:05:43,360
they're called but we have something

151
00:05:38,170 --> 00:05:46,920
like 13 missions in the archive and the

152
00:05:43,360 --> 00:05:50,259
great thing is that with those data now

153
00:05:46,920 --> 00:05:53,500
you don't have to select each mission

154
00:05:50,259 --> 00:05:55,329
and look for your favorite object you

155
00:05:53,500 --> 00:05:58,269
can go to something called the portal

156
00:05:55,329 --> 00:06:02,529
and you enter the name or the

157
00:05:58,269 --> 00:06:04,419

coordinates of the object and it will go

158

00:06:02,529 --> 00:06:06,639

out and depending on what you have

159

00:06:04,420 --> 00:06:08,710

specified if you specify nothing it's it

160

00:06:06,639 --> 00:06:12,669

searches for everything if you specify

161

00:06:08,709 --> 00:06:15,219

like a oval or spitzer or genre or other

162

00:06:12,670 --> 00:06:17,080

other archives it will tell you what

163

00:06:15,220 --> 00:06:20,800

data it has and then if you want that

164

00:06:17,079 --> 00:06:23,399

data to analyze you can get it and

165

00:06:20,800 --> 00:06:26,050

download it and use your favorite

166

00:06:23,399 --> 00:06:30,489

reduction technique the idea what the

167

00:06:26,050 --> 00:06:32,530

spectra is well imagery it's true for

168

00:06:30,490 --> 00:06:35,019

imagery to is that that one of the ideas

169

00:06:32,529 --> 00:06:37,359

of the hubble legacy archive was that

170

00:06:35,019 --> 00:06:40,919

you don't want to just astronomers are

171

00:06:37,360 --> 00:06:42,689

tired of downloading all of the raw

172
00:06:40,920 --> 00:06:44,910
before they can even see what they're

173
00:06:42,689 --> 00:06:47,779
going to get so the idea of the Hubble

174
00:06:44,910 --> 00:06:50,010
legacy archive was to process the data

175
00:06:47,779 --> 00:06:51,869
calibrate it to an astronomer can take

176
00:06:50,009 --> 00:06:53,730
the data and say wow that's what I have

177
00:06:51,870 --> 00:06:56,160
yes that's what I want now I'm going to

178
00:06:53,730 --> 00:06:58,560
do some analysis on it so the spectral

179
00:06:56,160 --> 00:07:00,660
archive we haven't had that and so the

180
00:06:58,560 --> 00:07:02,639
idea it's a it's a lot of work to put it

181
00:07:00,660 --> 00:07:06,540
together and you have to be careful that

182
00:07:02,639 --> 00:07:08,759
the calibration is right and collect as

183
00:07:06,540 --> 00:07:11,340
much of the specter as possible and now

184
00:07:08,759 --> 00:07:12,629
people will be able to you know get the

185
00:07:11,339 --> 00:07:16,409
spectra so we're going to learn all

186
00:07:12,629 --> 00:07:17,819
about that because astronomers hey they

187
00:07:16,410 --> 00:07:19,770
would like to look at the data as its

188
00:07:17,819 --> 00:07:22,050
process apiece some of us are lazy and

189
00:07:19,769 --> 00:07:24,269
we just like to have the observatory do

190
00:07:22,050 --> 00:07:26,639
that calibration for us and at least get

191
00:07:24,269 --> 00:07:28,649
a first hint of the kind of astrophysics

192
00:07:26,639 --> 00:07:33,149
that we can do with that so it's pretty

193
00:07:28,649 --> 00:07:36,750
cool it's not just laziness it's also

194
00:07:33,149 --> 00:07:39,120
okay on my part I said like me well it's

195
00:07:36,750 --> 00:07:41,879
also you know 10 years from now 15 years

196
00:07:39,120 --> 00:07:43,829
from now when these instruments haven't

197
00:07:41,879 --> 00:07:45,810
forbid or no longer active we want the

198
00:07:43,829 --> 00:07:48,649
data to still be useful and they will

199
00:07:45,810 --> 00:07:51,540
still be useful um but as the expertise

200

00:07:48,649 --> 00:07:54,079
moves on to other things and the people

201
00:07:51,540 --> 00:07:56,040
who are actively maintaining the

202
00:07:54,079 --> 00:07:58,519
calibration and integrity of the

203
00:07:56,040 --> 00:08:01,319
instruments are not doing that anymore

204
00:07:58,519 --> 00:08:04,439
we want to leave behind a strong legacy

205
00:08:01,319 --> 00:08:06,629
of data for future generations of people

206
00:08:04,439 --> 00:08:08,910
to still be able to use and discover new

207
00:08:06,629 --> 00:08:10,680
things from okay so let's go ahead and

208
00:08:08,910 --> 00:08:12,960
get to this particular archive there now

209
00:08:10,680 --> 00:08:14,670
the over the years this this interface

210
00:08:12,959 --> 00:08:16,289
has undergone quite a quite a bit of

211
00:08:14,670 --> 00:08:18,300
quite a few changes it's gotten a lot

212
00:08:16,290 --> 00:08:19,560
easier to use for scientists oh look I'm

213
00:08:18,300 --> 00:08:21,389
going to do this now so people don't

214
00:08:19,560 --> 00:08:24,000

have to would be with that people have

215

00:08:21,389 --> 00:08:25,949

gotten it's gotten a lot more easier to

216

00:08:24,000 --> 00:08:29,220

use over the years but Jason can you

217

00:08:25,949 --> 00:08:30,659

give us some background on what the what

218

00:08:29,220 --> 00:08:31,890

we're talking about today the spectral

219

00:08:30,660 --> 00:08:34,680

archive itself give us some background

220

00:08:31,889 --> 00:08:36,360

on why why has just been set up and have

221

00:08:34,679 --> 00:08:37,679

the data always been there and it's just

222

00:08:36,360 --> 00:08:39,539

recently become available through this

223

00:08:37,679 --> 00:08:41,639

yeah or give us a background on this

224

00:08:39,539 --> 00:08:44,360

yeah so it's funny you say that the

225

00:08:41,639 --> 00:08:47,370

interface has changed all over the years

226

00:08:44,360 --> 00:08:50,850

you know I like to think I'm still pre

227

00:08:47,370 --> 00:08:53,490

mid career so I'm not that old that I

228

00:08:50,850 --> 00:08:55,019

remember when you got used to get your

229

00:08:53,490 --> 00:09:01,889

hair is a lot less greater than

230

00:08:55,019 --> 00:09:04,379

fine in fact I don't see any hahahaha I

231

00:09:01,889 --> 00:09:05,730

remember the days back in the 90s when

232

00:09:04,379 --> 00:09:07,080

we were working with the instrument

233

00:09:05,730 --> 00:09:09,060

called the faint object spectrograph

234

00:09:07,080 --> 00:09:11,040

that was the first generation instrument

235

00:09:09,059 --> 00:09:13,109

on Hubble and you would get your data

236

00:09:11,039 --> 00:09:14,730

mailed to you on these little magnetic

237

00:09:13,110 --> 00:09:17,430

tapes that were about as big as a

238

00:09:14,730 --> 00:09:19,259

playing card sort of like maybes big the

239

00:09:17,429 --> 00:09:21,239

business card and you would put that in

240

00:09:19,259 --> 00:09:22,950

your machine and you would issue lots of

241

00:09:21,240 --> 00:09:26,039

obscure commands to read your day off

242

00:09:22,950 --> 00:09:28,890

with a deal T tapes ordeal tease exabyte

243
00:09:26,039 --> 00:09:30,689
was what I had X of my tonight and we

244
00:09:28,889 --> 00:09:36,870
had to carry the stacks of them through

245
00:09:30,690 --> 00:09:39,030
the snow remember I better punch cards

246
00:09:36,870 --> 00:09:41,519
in floppy disks okay I'm to the old mag

247
00:09:39,029 --> 00:09:44,399
day and remember though is Jason's to

248
00:09:41,519 --> 00:09:46,049
you Irene was Kirk was a tape into your

249
00:09:44,399 --> 00:09:48,240
machine you then had to shovel work hole

250
00:09:46,049 --> 00:09:51,689
into the machine to read the tape I know

251
00:09:48,240 --> 00:09:53,820
or and pray it was based on videotape

252
00:09:51,690 --> 00:09:55,950
technology so was amazing the stuff ran

253
00:09:53,820 --> 00:09:57,629
at all and you're always like oh god I

254
00:09:55,950 --> 00:10:00,780
hope I can rehash data back off again

255
00:09:57,629 --> 00:10:02,340
yeah yeah those days you is a huge deal

256
00:10:00,779 --> 00:10:05,549
when you started being able to get your

257

00:10:02,340 --> 00:10:06,720
data from Hubble over the internet

258
00:10:05,549 --> 00:10:08,459
because then you could get it within a

259
00:10:06,720 --> 00:10:11,759
matter of you know weeks instead of

260
00:10:08,460 --> 00:10:14,300
months and it's now down to the point

261
00:10:11,759 --> 00:10:16,529
because the archive has that

262
00:10:14,299 --> 00:10:19,049
continuously improve this technology

263
00:10:16,529 --> 00:10:20,759
it's now down to the point where you can

264
00:10:19,049 --> 00:10:22,799
get your data sometimes within hours of

265
00:10:20,759 --> 00:10:25,860
the telescope taking your data my

266
00:10:22,799 --> 00:10:28,469
personal record a program i did a few

267
00:10:25,860 --> 00:10:30,990
years ago with Hubble the data made it

268
00:10:28,470 --> 00:10:33,330
from the instrument costs to the

269
00:10:30,990 --> 00:10:35,340
computers on the observatory down

270
00:10:33,330 --> 00:10:36,750
through the TDRs satellites that NASA

271
00:10:35,340 --> 00:10:39,120

operates to communicate with the

272

00:10:36,750 --> 00:10:40,470

satellite in orbit through White Sands

273

00:10:39,120 --> 00:10:42,029

Missile Range through goddard space

274

00:10:40,470 --> 00:10:45,960

flight center and here to the Institute

275

00:10:42,029 --> 00:10:47,699

in two and a half hours so you know two

276

00:10:45,960 --> 00:10:50,070

and a half hours from the data being

277

00:10:47,700 --> 00:10:51,720

taken by Hubble we had it on my postdocs

278

00:10:50,070 --> 00:10:54,840

laptop and we were dancing a little you

279

00:10:51,720 --> 00:10:57,540

know Jacob haha and what one was a paper

280

00:10:54,840 --> 00:11:01,830

written uh about a year and a half later

281

00:10:57,539 --> 00:11:04,579

oh so that little okay so I make it

282

00:11:01,830 --> 00:11:04,580

short period of time

283

00:11:04,590 --> 00:11:08,590

well we've talked about data quite a few

284

00:11:07,360 --> 00:11:10,028

quite a bit here on these on these

285

00:11:08,590 --> 00:11:11,410

hangouts where the Hubble data the

286
00:11:10,028 --> 00:11:13,720
process for getting in the fact that

287
00:11:11,409 --> 00:11:16,389
because Hubble is run by NASA and as a

288
00:11:13,720 --> 00:11:19,778
taxpayer funded program everybody

289
00:11:16,389 --> 00:11:21,669
ultimately gets access to the data but

290
00:11:19,778 --> 00:11:22,778
the scientists the ones who and carol

291
00:11:21,669 --> 00:11:24,069
has told us about this before with the

292
00:11:22,778 --> 00:11:25,899
time allocation committee and things

293
00:11:24,070 --> 00:11:28,420
like that where when you get time on

294
00:11:25,899 --> 00:11:31,059
hubble and you take your data you're

295
00:11:28,419 --> 00:11:33,519
given the first usually the first shot

296
00:11:31,059 --> 00:11:36,399
at that data it's something called one

297
00:11:33,519 --> 00:11:37,990
bar going proprietary period for well

298
00:11:36,399 --> 00:11:40,269
usually it's less about a year unless

299
00:11:37,990 --> 00:11:41,589
something special is arranged or unless

300
00:11:40,269 --> 00:11:43,210
there's it's done with double the

301
00:11:41,589 --> 00:11:44,560
director discretionary time in which

302
00:11:43,210 --> 00:11:47,139
case the data become available to the

303
00:11:44,559 --> 00:11:51,299
public right away for everybody and this

304
00:11:47,139 --> 00:11:54,009
so somali this stuff here this this uh

305
00:11:51,299 --> 00:11:56,799
spectral data that we've got it does it

306
00:11:54,009 --> 00:11:58,509
fall under the same kind of umbrella as

307
00:11:56,799 --> 00:12:00,278
the other visual data my goods are

308
00:11:58,509 --> 00:12:02,019
proprietary period does it take is there

309
00:12:00,278 --> 00:12:04,028
a delay between when it's taken and when

310
00:12:02,019 --> 00:12:08,319
it's available the we're talking about

311
00:12:04,028 --> 00:12:10,779
today are the the actual data is the

312
00:12:08,320 --> 00:12:12,129
exact same data that if you went into

313
00:12:10,779 --> 00:12:16,209
the mass portal that carol was

314

00:12:12,129 --> 00:12:19,870
describing and searched for what is

315
00:12:16,210 --> 00:12:22,450
publicly available data that cost has

316
00:12:19,870 --> 00:12:24,639
looked at in the far ultraviolet and you

317
00:12:22,450 --> 00:12:26,110
just downloaded all of that which is

318
00:12:24,639 --> 00:12:29,259
what we did a few weeks ago when

319
00:12:26,110 --> 00:12:31,269
preparing the final release uh that's

320
00:12:29,259 --> 00:12:35,769
the data that we're talking about today

321
00:12:31,269 --> 00:12:39,189
um but the extra value that we've given

322
00:12:35,769 --> 00:12:40,600
to that is uh when the data are taken

323
00:12:39,190 --> 00:12:43,630
they're taken in lots of different

324
00:12:40,600 --> 00:12:45,730
exposures that in order to actually do

325
00:12:43,629 --> 00:12:47,500
science on you want to add up the

326
00:12:45,730 --> 00:12:51,100
different exposures to get a deeper

327
00:12:47,500 --> 00:12:54,909
higher signal-to-noise spectrum the same

328
00:12:51,100 --> 00:12:56,769

way that with images you take a bunch of

329

00:12:54,909 --> 00:13:00,250

images and then you combine them to get

330

00:12:56,769 --> 00:13:03,970

a higher resolution deeper image and

331

00:13:00,250 --> 00:13:06,820

that combining of images has been

332

00:13:03,970 --> 00:13:10,420

available in the archive for users for

333

00:13:06,820 --> 00:13:12,240

decades but has not yet been available

334

00:13:10,419 --> 00:13:15,750

at the level we are delivered

335

00:13:12,240 --> 00:13:17,580

in this archive now for spectra yeah I

336

00:13:15,750 --> 00:13:20,879

would say the analogy I would use is

337

00:13:17,580 --> 00:13:23,520

that you know imagine you're going to do

338

00:13:20,879 --> 00:13:25,889

research on a paper you're writing it

339

00:13:23,519 --> 00:13:27,569

most people wrote their term papers in

340

00:13:25,889 --> 00:13:28,860

there with college and let's say you're

341

00:13:27,570 --> 00:13:31,170

going to do research and you went to the

342

00:13:28,860 --> 00:13:35,190

library and the librarian handed you a

343
00:13:31,169 --> 00:13:37,229
stack of pages instead of a book and you

344
00:13:35,190 --> 00:13:38,459
had to figure out what paid what or the

345
00:13:37,230 --> 00:13:40,860
pages should be in before you can even

346
00:13:38,458 --> 00:13:42,028
get started on on your research that's

347
00:13:40,860 --> 00:13:44,820
kind of where we've been with our

348
00:13:42,028 --> 00:13:47,309
spectroscopy for years and years we gave

349
00:13:44,820 --> 00:13:49,290
people the individual exposures but we

350
00:13:47,309 --> 00:13:51,269
weren't putting them together into that

351
00:13:49,289 --> 00:13:53,189
fully combined way that would allow them

352
00:13:51,269 --> 00:13:54,870
to do their science from day one Scott

353
00:13:53,190 --> 00:13:57,390
could you float that flow chart what

354
00:13:54,870 --> 00:13:59,879
hang on hang on just a sec so while you

355
00:13:57,389 --> 00:14:01,620
while you are looking at the data or

356
00:13:59,879 --> 00:14:03,629
you're going through the data in this

357
00:14:01,620 --> 00:14:06,450
sort of difficult format you were

358
00:14:03,629 --> 00:14:08,519
talking about Jason doing the science on

359
00:14:06,450 --> 00:14:10,770
it has been somewhat difficult now most

360
00:14:08,519 --> 00:14:12,778
people who use Hubble data like to use

361
00:14:10,769 --> 00:14:14,639
the images they most Hubble huggers that

362
00:14:12,778 --> 00:14:16,259
I know of in the pub general public we

363
00:14:14,639 --> 00:14:19,470
care about the images but molly was just

364
00:14:16,259 --> 00:14:21,689
mentioning before before we started that

365
00:14:19,470 --> 00:14:23,459
real science is done with the spectrum

366
00:14:21,690 --> 00:14:24,899
so let's go ahead and start and then

367
00:14:23,458 --> 00:14:26,609
we'll put up the the flowchart that

368
00:14:24,899 --> 00:14:27,958
Molly talking about but list I want to

369
00:14:26,610 --> 00:14:29,879
take a look at the archive so Scott if

370
00:14:27,958 --> 00:14:32,099
you'll put that up let's let's take a

371

00:14:29,879 --> 00:14:35,759
look at what what we're talking about

372
00:14:32,100 --> 00:14:38,399
here this is available this is there it

373
00:14:35,759 --> 00:14:40,970
is so this is based off of the Mikulski

374
00:14:38,399 --> 00:14:44,669
archive for space telescopes masked and

375
00:14:40,970 --> 00:14:47,610
this so tell us a little bit about what

376
00:14:44,669 --> 00:14:49,110
we're looking at here Molly um well

377
00:14:47,610 --> 00:14:51,990
right now what's slipping through or

378
00:14:49,110 --> 00:14:55,339
just some images of what you get if you

379
00:14:51,990 --> 00:14:58,560
click through the individual portal um

380
00:14:55,339 --> 00:15:01,740
which will will do in a bit if you

381
00:14:58,559 --> 00:15:03,359
wanted to go back to this question of

382
00:15:01,740 --> 00:15:04,709
what what is the science that you're

383
00:15:03,360 --> 00:15:09,000
able to do with spectra that you just

384
00:15:04,708 --> 00:15:13,500
simply aren't able to get with regular

385
00:15:09,000 --> 00:15:15,299

images um the traditional way I mean so

386

00:15:13,500 --> 00:15:17,429

one way to think of it is these images

387

00:15:15,299 --> 00:15:20,240

keep keep flipping through is you see

388

00:15:17,429 --> 00:15:24,169

all these squiggly lines on here um

389

00:15:20,240 --> 00:15:26,149

that's not noise that's where the

390

00:15:24,169 --> 00:15:28,639

information is so in these where you see

391

00:15:26,149 --> 00:15:30,708

these bright emission lines the lights

392

00:15:28,639 --> 00:15:32,570

going up a lot of these absorption lines

393

00:15:30,708 --> 00:15:33,919

where you see little divots in the light

394

00:15:32,570 --> 00:15:37,910

or like you know this one that's this

395

00:15:33,919 --> 00:15:42,289

big comb of lines or this one um there

396

00:15:37,909 --> 00:15:45,889

those correspond to individual elements

397

00:15:42,289 --> 00:15:49,039

have different quantum signatures that

398

00:15:45,889 --> 00:15:53,720

respond to light differently and as it

399

00:15:49,039 --> 00:15:56,659

turns out um most of the gas in the

400
00:15:53,720 --> 00:15:59,778
universe um is that temperatures and

401
00:15:56,659 --> 00:16:01,669
densities such that the wavelengths of

402
00:15:59,778 --> 00:16:04,278
light that it most interacts with are in

403
00:16:01,669 --> 00:16:06,049
the ultraviolet um and so you have to go

404
00:16:04,278 --> 00:16:09,049
to space in order to see this light

405
00:16:06,049 --> 00:16:12,319
which is why this Hubble spectryx Copic

406
00:16:09,049 --> 00:16:14,359
archive is so powerful um and eat the

407
00:16:12,320 --> 00:16:16,610
location of each of these lines and the

408
00:16:14,360 --> 00:16:20,480
patterns tell you about the physical

409
00:16:16,610 --> 00:16:22,789
conditions of what's causing either the

410
00:16:20,480 --> 00:16:24,980
submission or absorption which can

411
00:16:22,789 --> 00:16:29,659
really get at what what is the physics

412
00:16:24,980 --> 00:16:32,778
of this star or this diffuse gas around

413
00:16:29,659 --> 00:16:34,698
this galaxy or the atmosphere of this

414
00:16:32,778 --> 00:16:37,850
planet that's passing in front of front

415
00:16:34,698 --> 00:16:39,620
of most are so I wanted to interject

416
00:16:37,850 --> 00:16:43,909
that as people are looking at the

417
00:16:39,620 --> 00:16:46,549
spectra when you see the big dips that's

418
00:16:43,909 --> 00:16:50,569
where an element or a molecule has

419
00:16:46,549 --> 00:16:52,609
absorbed the light so for example we see

420
00:16:50,570 --> 00:16:55,490
this in the Sun as well so you have the

421
00:16:52,610 --> 00:16:57,500
light that comes from the Sun and then

422
00:16:55,490 --> 00:17:00,769
in the outer atmosphere or there are

423
00:16:57,500 --> 00:17:03,620
elements that absorb in other cases

424
00:17:00,769 --> 00:17:08,150
there might the the absorption might be

425
00:17:03,620 --> 00:17:10,548
done at the store or it might be

426
00:17:08,150 --> 00:17:12,890
intervening material sometimes we use

427
00:17:10,548 --> 00:17:15,078
the parent star and the light that goes

428

00:17:12,890 --> 00:17:17,000
through the atmosphere of a planet if it

429
00:17:15,078 --> 00:17:19,240
happens to pass in front of it and we

430
00:17:17,000 --> 00:17:22,548
can look at what molecule or chem

431
00:17:19,240 --> 00:17:24,349
chemical is absorbing in other cases in

432
00:17:22,548 --> 00:17:27,349
some of these things you're seeing when

433
00:17:24,349 --> 00:17:30,319
you see these spikes that go up that's

434
00:17:27,349 --> 00:17:33,408
when a particular chemical element is

435
00:17:30,319 --> 00:17:35,779
emitting and then you can also determine

436
00:17:33,409 --> 00:17:38,000
not only that the chemical is there but

437
00:17:35,779 --> 00:17:42,470
as Molly said what's the temp

438
00:17:38,000 --> 00:17:44,539
what the conditions are that create an

439
00:17:42,470 --> 00:17:46,370
environment for the chemical and so you

440
00:17:44,539 --> 00:17:48,980
don't look at just one chemical you look

441
00:17:46,369 --> 00:17:50,179
at all of them so that you can and

442
00:17:48,980 --> 00:17:52,579

that's why it's astrophysics you're

443

00:17:50,180 --> 00:17:55,490

looking at the physical conditions in

444

00:17:52,579 --> 00:17:58,189

which caused either the absorption the

445

00:17:55,490 --> 00:18:01,309

emission or sometimes you get both and

446

00:17:58,190 --> 00:18:03,890

in an object right and so as we've

447

00:18:01,309 --> 00:18:07,009

pointed out before with past data

448

00:18:03,890 --> 00:18:08,690

archive hangouts the images that we see

449

00:18:07,009 --> 00:18:10,670

from Hubble usually come from things

450

00:18:08,690 --> 00:18:12,140

like wide field camera 3 the whip c3

451

00:18:10,670 --> 00:18:14,240

they also in the past have come through

452

00:18:12,140 --> 00:18:15,620

over the 25 years Hubble has been up

453

00:18:14,240 --> 00:18:17,690

there it has had a lot of different

454

00:18:15,619 --> 00:18:20,029

cameras they take really amazing

455

00:18:17,690 --> 00:18:22,250

pictures we've all seen that but as both

456

00:18:20,029 --> 00:18:24,319

both Molly and Carol just pointed out

457

00:18:22,250 --> 00:18:26,720

these are these are the kinds of data

458

00:18:24,319 --> 00:18:28,970

that you can get different information

459

00:18:26,720 --> 00:18:32,690

from remember last week when we told you

460

00:18:28,970 --> 00:18:35,150

that we told you about exactly Alex this

461

00:18:32,690 --> 00:18:36,620

most distant galaxies and the end they

462

00:18:35,150 --> 00:18:38,150

were looking at it through through

463

00:18:36,619 --> 00:18:39,439

different filters and they can kind of

464

00:18:38,150 --> 00:18:41,870

get a sense because of how bright it

465

00:18:39,440 --> 00:18:43,460

wasn't a filter where how far away that

466

00:18:41,869 --> 00:18:46,099

galaxy was that's called a photometric

467

00:18:43,460 --> 00:18:47,870

redshift is nowhere near is accurate as

468

00:18:46,099 --> 00:18:49,399

what we're talking about here by looking

469

00:18:47,869 --> 00:18:51,859

at that galaxy through getting its

470

00:18:49,400 --> 00:18:53,180

spectra you can actually see the red

471
00:18:51,859 --> 00:18:55,909
shift and Molly was alluding to the fact

472
00:18:53,180 --> 00:18:58,039
that this is where the meat the the meat

473
00:18:55,910 --> 00:18:59,810
potatoes are where the tire the the

474
00:18:58,039 --> 00:19:03,470
rubber hits the road whether analogy can

475
00:18:59,809 --> 00:19:06,950
I hit it's like this is gonna make the

476
00:19:03,470 --> 00:19:08,930
same check yeah it's just a very wise

477
00:19:06,950 --> 00:19:11,150
man once said the astronomer of

478
00:19:08,930 --> 00:19:15,820
spectroscopy somebody help train me said

479
00:19:11,150 --> 00:19:17,960
a spectrum is worth a thousand pictures

480
00:19:15,819 --> 00:19:21,490
spectrum is worth a thousand pictures so

481
00:19:17,960 --> 00:19:23,660
there you go and with with the with the

482
00:19:21,490 --> 00:19:25,279
two int there's two instruments on

483
00:19:23,660 --> 00:19:27,320
hubble right now that from which this

484
00:19:25,279 --> 00:19:28,879
data are well maybe there's more Molly

485

00:19:27,319 --> 00:19:30,679
and you guys can tell me know but this

486
00:19:28,880 --> 00:19:33,020
is the cosmic origins spectrograph and

487
00:19:30,680 --> 00:19:34,820
the spectrograph which I don't remember

488
00:19:33,019 --> 00:19:37,549
what that stands for its telescope

489
00:19:34,819 --> 00:19:40,069
imaging spectrograph oh there you go and

490
00:19:37,549 --> 00:19:42,289
these were mostly everything as it turns

491
00:19:40,069 --> 00:19:45,259
out it has a imaging camera it has a

492
00:19:42,289 --> 00:19:47,119
spectrograph and has a coronagraph it

493
00:19:45,259 --> 00:19:49,069
can you know make your coffee in the

494
00:19:47,119 --> 00:19:50,750
morning it does basically everything

495
00:19:49,069 --> 00:19:52,250
doesn't do back rubs cuz that would be

496
00:19:50,750 --> 00:19:55,130
okay well that's great so

497
00:19:52,250 --> 00:19:56,869
so and at and as we've talked about in

498
00:19:55,130 --> 00:19:58,100
his curls and both Molly have said in

499
00:19:56,869 --> 00:20:00,769

this this hangout this is it these are

500

00:19:58,099 --> 00:20:02,029

give you wavelengths that you have to

501

00:20:00,769 --> 00:20:04,519

get out into space to see the

502

00:20:02,029 --> 00:20:06,200

ultraviolet and help us Hubble's the

503

00:20:04,519 --> 00:20:09,559

only one in town the only game in town

504

00:20:06,200 --> 00:20:11,390

for this wavelength right guys so so the

505

00:20:09,559 --> 00:20:14,329

interesting thing about this is that you

506

00:20:11,390 --> 00:20:16,390

know the reason we can't see these

507

00:20:14,329 --> 00:20:18,980

wavelengths from the ground is that the

508

00:20:16,390 --> 00:20:21,440

atmosphere and particularly the ozone in

509

00:20:18,980 --> 00:20:22,970

the atmosphere very efficiently blocks

510

00:20:21,440 --> 00:20:24,769

these wavelengths these are the

511

00:20:22,970 --> 00:20:26,809

wavelengths in the ultraviolet that

512

00:20:24,769 --> 00:20:28,789

would give you a very very bad suntan

513

00:20:26,809 --> 00:20:31,129

right so it's a good thing you're right

514
00:20:28,789 --> 00:20:33,200
okay I like to stay you can either have

515
00:20:31,130 --> 00:20:35,240
UV astronomy from the ground or you can

516
00:20:33,200 --> 00:20:40,430
have all life on Earth but you can't

517
00:20:35,240 --> 00:20:44,329
have both choose wisely so since we

518
00:20:40,430 --> 00:20:45,920
decided it was no UV astronomy and well

519
00:20:44,329 --> 00:20:48,049
you know there's a few of us already

520
00:20:45,920 --> 00:20:50,180
burst into flames when I'm outside as is

521
00:20:48,049 --> 00:20:53,029
so if that happened to where if not

522
00:20:50,180 --> 00:20:54,680
being absorbed by we're I'm just faced

523
00:20:53,029 --> 00:20:58,279
and do your duty astronomy from the

524
00:20:54,680 --> 00:21:00,320
ground but anyway uh yeah so that's it

525
00:20:58,279 --> 00:21:03,200
that's the chief reason why we had to

526
00:21:00,319 --> 00:21:04,609
move our observatories into space it's

527
00:21:03,200 --> 00:21:06,890
not only the blurring of the atmosphere

528
00:21:04,609 --> 00:21:08,869
that makes the stars twinkle it's the

529
00:21:06,890 --> 00:21:09,950
fact that there are some some colors of

530
00:21:08,869 --> 00:21:11,899
lighter some wavelengths of light you

531
00:21:09,950 --> 00:21:15,350
simply can't see from the ground at all

532
00:21:11,900 --> 00:21:16,940
oh my gosh I think I'm gonna have to

533
00:21:15,349 --> 00:21:18,919
read this Scott just posted it in the

534
00:21:16,940 --> 00:21:20,660
chat room so Michael jobin this up this

535
00:21:18,920 --> 00:21:24,350
is terrible but Scott you're the one

536
00:21:20,660 --> 00:21:27,560
responsible no I love punter storms oh I

537
00:21:24,349 --> 00:21:30,919
think his comment is I think Molly knows

538
00:21:27,559 --> 00:21:36,259
something about molecules let's but I

539
00:21:30,920 --> 00:21:38,570
mean ah ok so never heard that before

540
00:21:36,259 --> 00:21:40,670
alright so let's guess I because of data

541
00:21:38,569 --> 00:21:42,019
here help us I want to get some data

542

00:21:40,670 --> 00:21:44,029
from this a Scott's been showing this

543
00:21:42,019 --> 00:21:45,470
thing flash madness so help us get some

544
00:21:44,029 --> 00:21:48,500
data Molly out and tell me what to do

545
00:21:45,470 --> 00:21:50,799
though um the other unique thing that

546
00:21:48,500 --> 00:21:56,480
we've done about this it done with this

547
00:21:50,799 --> 00:21:58,309
archive is the way that you normally

548
00:21:56,480 --> 00:22:01,549
would get data from the art so for

549
00:21:58,309 --> 00:22:03,440
example if both Jason and I work on

550
00:22:01,549 --> 00:22:04,609
quasar absorption lines and so if you

551
00:22:03,440 --> 00:22:07,970
wanted to get a

552
00:22:04,609 --> 00:22:10,548
sample of all the quasars that Hubble

553
00:22:07,970 --> 00:22:12,289
has looked at before this archaic away

554
00:22:10,548 --> 00:22:14,539
you would do that if you would say well

555
00:22:12,289 --> 00:22:16,369
that Tomlinson guys sure looked at a

556
00:22:14,539 --> 00:22:18,048

bunch you'd go search for Tomlinson in

557

00:22:16,369 --> 00:22:21,259

the archive and download all of his data

558

00:22:18,048 --> 00:22:23,269

and then you'd be like uh uh Markarian

559

00:22:21,259 --> 00:22:24,650

509 that's a good place are maybe

560

00:22:23,269 --> 00:22:26,058

somebody's looked at that one and see

561

00:22:24,650 --> 00:22:30,080

look you try to kind of hodgepodge

562

00:22:26,058 --> 00:22:32,058

things together that way um but one of

563

00:22:30,079 --> 00:22:35,058

the kind of breakthroughs we had when

564

00:22:32,058 --> 00:22:39,918

constructing this archive is despite all

565

00:22:35,058 --> 00:22:42,589

of its power and high popularity on the

566

00:22:39,919 --> 00:22:47,179

observatory cost has only been around

567

00:22:42,589 --> 00:22:48,829

since 2009 and they're actually hasn't

568

00:22:47,179 --> 00:22:51,590

really been that much data taken with it

569

00:22:48,829 --> 00:22:54,980

only about 1200 objects or so we've been

570

00:22:51,589 --> 00:22:56,928

looked at with cost um which in terms of

571
00:22:54,980 --> 00:22:59,058
scientific potential is enormous but in

572
00:22:56,929 --> 00:23:00,980
terms of data volume really isn't that

573
00:22:59,058 --> 00:23:04,359
much it actually all fits all the data

574
00:23:00,980 --> 00:23:06,589
about to show you fit onto one of these

575
00:23:04,359 --> 00:23:09,798
so you can just put in your pocket and

576
00:23:06,589 --> 00:23:11,720
you know download what's on here and use

577
00:23:09,798 --> 00:23:15,019
I don't everyone around with me just for

578
00:23:11,720 --> 00:23:16,548
some just in case you know um spectral

579
00:23:15,019 --> 00:23:18,410
so you say spectral data doesn't take up

580
00:23:16,548 --> 00:23:20,569
as much room as a as I guess that image

581
00:23:18,410 --> 00:23:21,740
would that reduced yeah you know it's

582
00:23:20,569 --> 00:23:23,359
one-dimensional instead of

583
00:23:21,740 --> 00:23:25,789
two-dimensional just row in numbers

584
00:23:23,359 --> 00:23:27,409
awesome okay yeah all the bits that came

585
00:23:25,789 --> 00:23:28,700
off the telescope is quite a bit because

586
00:23:27,410 --> 00:23:31,100
it is a true device that street

587
00:23:28,700 --> 00:23:32,298
dimensional and sexually i think though

588
00:23:31,099 --> 00:23:34,129
if i pulled the whole thing it would be

589
00:23:32,298 --> 00:23:35,418
five terabytes but when you used like

590
00:23:34,130 --> 00:23:37,429
the reduced data and then you combine it

591
00:23:35,419 --> 00:23:40,910
exactly it works out i think our whole

592
00:23:37,429 --> 00:23:43,669
18 gigabyte good yeah wish got Scrolls

593
00:23:40,910 --> 00:23:45,980
down there's actually a link on here you

594
00:23:43,669 --> 00:23:47,419
can just download the entire thing want

595
00:23:45,980 --> 00:23:50,509
the entire thing it's just like right

596
00:23:47,419 --> 00:23:51,950
there don't don't do it it'll get oh i

597
00:23:50,509 --> 00:23:57,500
have the bandwidth but i'm not going to

598
00:23:51,950 --> 00:24:00,590
do highest was that the 1200 ish objects

599

00:23:57,500 --> 00:24:03,019
means that we could just go in and sort

600
00:24:00,589 --> 00:24:04,699
them into well which ones are galaxies

601
00:24:03,019 --> 00:24:06,710
which ones are quasars which ones are

602
00:24:04,700 --> 00:24:07,910
stars okay i want to get i want to get

603
00:24:06,710 --> 00:24:09,259
to that in a minute but now i want to

604
00:24:07,910 --> 00:24:11,240
get some data so show us how to do it

605
00:24:09,259 --> 00:24:14,390
that's what we're doing so scroll down

606
00:24:11,240 --> 00:24:16,750
go down so click on pre-sorted target

607
00:24:14,390 --> 00:24:16,750
tables

608
00:24:17,339 --> 00:24:21,869
and that's what this is so the top we

609
00:24:19,380 --> 00:24:25,200
have all the data um which you can

610
00:24:21,869 --> 00:24:27,209
download from up there and then we have

611
00:24:25,200 --> 00:24:28,890
things sorted by you know what's in the

612
00:24:27,210 --> 00:24:30,960
solar system what are galaxies and

613
00:24:28,890 --> 00:24:33,360

clusters what kind of you know what

614

00:24:30,960 --> 00:24:34,740

what's your favorite kind of star oh so

615

00:24:33,359 --> 00:24:36,449

wait wait a minute wait a minute I don't

616

00:24:34,740 --> 00:24:38,910

have to query this thing at all then

617

00:24:36,450 --> 00:24:40,890

you've got it already so what up great

618

00:24:38,910 --> 00:24:45,180

things if you just want to download all

619

00:24:40,890 --> 00:24:46,650

of the you know every extrasolar planet

620

00:24:45,180 --> 00:24:49,650

that's been looked at with costs that we

621

00:24:46,650 --> 00:24:51,180

can identify or scroll down um yeah

622

00:24:49,650 --> 00:24:54,150

Scott if you click the targets link

623

00:24:51,180 --> 00:24:56,250

there yeah so actually so too yeah

624

00:24:54,150 --> 00:24:58,890

that's a good one I think that n n dash

625

00:24:56,250 --> 00:25:02,309

14 means what that there's only for the

626

00:24:58,890 --> 00:25:04,770

tell me draw two targets and so now you

627

00:25:02,309 --> 00:25:06,269

can get an idea well what data exists we

628
00:25:04,769 --> 00:25:09,029
have the names with the location on the

629
00:25:06,269 --> 00:25:14,119
sky how many individual exposures the

630
00:25:09,029 --> 00:25:16,980
target description that the person who

631
00:25:14,119 --> 00:25:18,839
asked for the data gave it a the

632
00:25:16,980 --> 00:25:22,500
alternative name which is often the

633
00:25:18,839 --> 00:25:26,069
official name and either of the Ned

634
00:25:22,500 --> 00:25:27,900
which is the kind of official extra

635
00:25:26,069 --> 00:25:31,169
galactic database of objects or Sinbad

636
00:25:27,900 --> 00:25:33,120
which is the same thing for stars the

637
00:25:31,170 --> 00:25:34,350
link to the mast portal which is what

638
00:25:33,119 --> 00:25:37,679
you would normally get for one of these

639
00:25:34,349 --> 00:25:39,539
if you just click on one this is

640
00:25:37,680 --> 00:25:42,259
normally if you would search for this

641
00:25:39,539 --> 00:25:44,460
target and mast and this is what um

642
00:25:42,259 --> 00:25:47,759
carol was talking about earlier this is

643
00:25:44,460 --> 00:25:50,220
what it shows up you get all the images

644
00:25:47,759 --> 00:25:53,609
and spectra of this target that have

645
00:25:50,220 --> 00:25:56,160
been taken with different observatories

646
00:25:53,609 --> 00:25:57,750
so for example Swift has looked at this

647
00:25:56,160 --> 00:26:00,450
one you can see what they on the left

648
00:25:57,750 --> 00:26:06,420
the galaxy's looked at it so if you

649
00:26:00,450 --> 00:26:11,789
click the back button well you we have

650
00:26:06,420 --> 00:26:13,440
uh okay okay hang on you're going you're

651
00:26:11,789 --> 00:26:16,259
going really fast here so what I want to

652
00:26:13,440 --> 00:26:19,110
stay here for a sec so I've got this I'm

653
00:26:16,259 --> 00:26:22,230
looking at a lot of stuff on the left

654
00:26:19,109 --> 00:26:23,819
the left column I'm seeing us but this

655
00:26:22,230 --> 00:26:25,470
is the mass portal that carol was

656

00:26:23,819 --> 00:26:27,960
talking about earlier if normally if you

657
00:26:25,470 --> 00:26:30,120
have a target that you have a name or a

658
00:26:27,960 --> 00:26:30,630
location on the sky and you search and

659
00:26:30,119 --> 00:26:34,879
you want to know

660
00:26:30,630 --> 00:26:37,380
Oh what data exists on this target you

661
00:26:34,880 --> 00:26:39,120
this is what you get you get here all

662
00:26:37,380 --> 00:26:40,260
the images here all the spectra here are

663
00:26:39,119 --> 00:26:42,779
different missions that have looked at

664
00:26:40,259 --> 00:26:46,890
it different instruments on the right is

665
00:26:42,779 --> 00:26:48,599
an overlay of wear on the sky the

666
00:26:46,890 --> 00:26:50,400
different footprints are so the big

667
00:26:48,599 --> 00:26:52,169
squares are going to be your images and

668
00:26:50,400 --> 00:26:54,000
then those little circles down right at

669
00:26:52,170 --> 00:26:56,730
where the star is that that's cost

670
00:26:54,000 --> 00:26:58,529

that's the cost aperture okay so that's

671

00:26:56,730 --> 00:27:00,450

the spectrum there so I can see that

672

00:26:58,529 --> 00:27:02,009

with this there's lots of there's three

673

00:27:00,450 --> 00:27:03,930

different missions that have seen it HST

674

00:27:02,009 --> 00:27:05,400

GALEX and Swift and there's lots of

675

00:27:03,930 --> 00:27:07,890

instruments that have seen it that's the

676

00:27:05,400 --> 00:27:09,980

ones below and in the middle column

677

00:27:07,890 --> 00:27:13,320

these are the actual observations with a

678

00:27:09,980 --> 00:27:14,640

thumbnail when avail all of what it is

679

00:27:13,319 --> 00:27:16,289

we're looking at of course there's an

680

00:27:14,640 --> 00:27:17,490

entire footprint off to the side there

681

00:27:16,289 --> 00:27:19,109

there there's some day there's some

682

00:27:17,490 --> 00:27:22,079

there's some squiggly lines right there

683

00:27:19,109 --> 00:27:23,669

so this is this data right here now John

684

00:27:22,079 --> 00:27:26,129

let me give let me get you into this

685
00:27:23,670 --> 00:27:27,750
just a little bit John oh no I just

686
00:27:26,130 --> 00:27:30,750
looked at your handle are you really a

687
00:27:27,750 --> 00:27:33,210
strong amira what I need to I need to

688
00:27:30,750 --> 00:27:36,119
get the best I need to get an M name now

689
00:27:33,210 --> 00:27:37,140
I call my daughter on a Darnell I got

690
00:27:36,119 --> 00:27:40,769
you i feel that strong a Molly

691
00:27:37,140 --> 00:27:42,090
astronomer photo/tony I have to I have

692
00:27:40,769 --> 00:27:44,609
to give credit where credit to do I

693
00:27:42,089 --> 00:27:48,419
stole that idea from from Molly's oh did

694
00:27:44,609 --> 00:27:51,779
you okay all right very create a strong

695
00:27:48,420 --> 00:27:54,150
at o'neill's oh you use this stuff

696
00:27:51,779 --> 00:27:55,769
you're a user of this data is this how

697
00:27:54,150 --> 00:27:58,110
you is this how you do it is this how

698
00:27:55,769 --> 00:28:00,089
you get it well I think traditionally

699
00:27:58,109 --> 00:28:02,639
how I would have done it in the past is

700
00:28:00,089 --> 00:28:04,799
is to go through your directly through

701
00:28:02,640 --> 00:28:07,230
mast after going after one hour one

702
00:28:04,799 --> 00:28:09,930
target in mind or 11 specific

703
00:28:07,230 --> 00:28:12,390
observation in mind but the really nice

704
00:28:09,930 --> 00:28:14,430
thing about having having it packaged up

705
00:28:12,390 --> 00:28:17,160
the way that they have now in the new

706
00:28:14,430 --> 00:28:19,529
archive is that it really facilitates

707
00:28:17,160 --> 00:28:21,480
discovery pates places for for people

708
00:28:19,529 --> 00:28:22,920
who don't have really good spectral kung

709
00:28:21,480 --> 00:28:24,779
fu and how to manipulate the data

710
00:28:22,920 --> 00:28:26,490
because when you take any individual

711
00:28:24,779 --> 00:28:29,029
frame and you're trying to get something

712
00:28:26,490 --> 00:28:31,019
out of it you may not completely

713

00:28:29,029 --> 00:28:33,089
understand what you're looking at a

714
00:28:31,019 --> 00:28:34,650
hundred percent whereas if you have an

715
00:28:33,089 --> 00:28:36,449
archive which has gone and taken all the

716
00:28:34,650 --> 00:28:38,009
exposures of something and put them

717
00:28:36,450 --> 00:28:40,380
together for you you can immediately

718
00:28:38,009 --> 00:28:43,109
start doing science with it so you

719
00:28:40,380 --> 00:28:44,340
either know astronomy yes a stroll

720
00:28:43,109 --> 00:28:46,500
astronomy no but no

721
00:28:44,339 --> 00:28:48,629
astronomy guess all you get squish like

722
00:28:46,500 --> 00:28:51,089
grape right see that you have you did

723
00:28:48,630 --> 00:28:52,799
you you did it you started with the with

724
00:28:51,089 --> 00:28:56,970
the spectral kunku I had to bring mr.

725
00:28:52,798 --> 00:28:58,769
Miyagi into it yeah well sir and and and

726
00:28:56,970 --> 00:29:00,659
i think what what's exciting about

727
00:28:58,769 --> 00:29:02,668

archives like this especially sort of

728

00:29:00,659 --> 00:29:05,370

refined data product archives like this

729

00:29:02,669 --> 00:29:06,870

is that it's going to open up a lot more

730

00:29:05,369 --> 00:29:09,329

people to to doing what's called

731

00:29:06,869 --> 00:29:10,829

archival proposals that's another type

732

00:29:09,329 --> 00:29:12,509

of proposals that have that happened

733

00:29:10,829 --> 00:29:13,829

with Space Telescope and it's and it's

734

00:29:12,509 --> 00:29:16,169

the way that I think that Hubble is

735

00:29:13,829 --> 00:29:17,369

really going to be a century telescope

736

00:29:16,169 --> 00:29:19,559

it's going to be a telescope people are

737

00:29:17,369 --> 00:29:21,658

using data from for a hundred years and

738

00:29:19,558 --> 00:29:24,329

that you know you can really mind this

739

00:29:21,659 --> 00:29:26,909

archive without having to do a lot of

740

00:29:24,329 --> 00:29:28,740

the work that takes a lot of time and

741

00:29:26,909 --> 00:29:30,840

preparing the data to go from something

742
00:29:28,740 --> 00:29:32,370
like that thumbnail on the mast portal

743
00:29:30,839 --> 00:29:34,648
that you have right now to something you

744
00:29:32,369 --> 00:29:35,939
can actually use to do science and if

745
00:29:34,648 --> 00:29:37,558
you can spend more of your time trying

746
00:29:35,940 --> 00:29:39,600
to do the science with the data and not

747
00:29:37,558 --> 00:29:41,519
trying to finesse the data that that

748
00:29:39,599 --> 00:29:43,408
really opens up a lot of possibilities

749
00:29:41,519 --> 00:29:45,629
and it opens up possibilities for people

750
00:29:43,409 --> 00:29:47,039
who may not always be safe quasar

751
00:29:45,630 --> 00:29:49,679
absorption like people but who are

752
00:29:47,038 --> 00:29:52,230
galaxies people and they can just go

753
00:29:49,679 --> 00:29:54,778
straight to a specific question in data

754
00:29:52,230 --> 00:29:56,460
that's ready for them to use yeah that

755
00:29:54,778 --> 00:29:59,819
was a pic to your point the fact that

756
00:29:56,460 --> 00:30:01,980
this group the fact that you may have a

757
00:29:59,819 --> 00:30:04,319
particular object that's a starburst

758
00:30:01,980 --> 00:30:05,970
galaxy or something like that and if you

759
00:30:04,319 --> 00:30:07,619
go here and you find the spectra then

760
00:30:05,970 --> 00:30:09,419
you can see the other objects like it

761
00:30:07,619 --> 00:30:11,459
you go oh I didn't realize that there

762
00:30:09,419 --> 00:30:13,590
was an observation of my other favorite

763
00:30:11,460 --> 00:30:15,179
off you know object can come ova and

764
00:30:13,589 --> 00:30:18,148
then you can look at that data as well

765
00:30:15,179 --> 00:30:20,548
so that the comfortable groupings are

766
00:30:18,148 --> 00:30:22,949
really really useful when you're trying

767
00:30:20,548 --> 00:30:25,528
to look at a class of object that you're

768
00:30:22,950 --> 00:30:30,950
interested in exactly and so Scott if

769
00:30:25,528 --> 00:30:34,980
you go back to light the samples page um

770

00:30:30,950 --> 00:30:36,929
go let's go to one that has more data

771
00:30:34,980 --> 00:30:40,409
one of the galaxy or quasar once or

772
00:30:36,929 --> 00:30:43,288
white dwarfs if you go back piano lab I

773
00:30:40,409 --> 00:30:45,750
think desert so I'm looking at um there

774
00:30:43,288 --> 00:30:47,908
we are yeah so just scroll down and pick

775
00:30:45,750 --> 00:30:51,659
one that has like a lot of objects in it

776
00:30:47,909 --> 00:30:54,179
all stars for instance um yeah Our Stars

777
00:30:51,659 --> 00:30:55,409
has a lot white chocolate why you are so

778
00:30:54,179 --> 00:30:56,870
nice because they're very bright in the

779
00:30:55,409 --> 00:30:59,330
UV and see a very high

780
00:30:56,869 --> 00:31:03,799
single story is nice um so one of the

781
00:30:59,329 --> 00:31:06,319
nice things about this one is that so

782
00:31:03,799 --> 00:31:07,730
for example um carol is mentioning if

783
00:31:06,319 --> 00:31:10,549
you have your favorite target if you

784
00:31:07,730 --> 00:31:12,799

scroll to the top and you know the name

785

00:31:10,549 --> 00:31:14,869

of the target you're looking for you can

786

00:31:12,799 --> 00:31:16,789

type it into the little search bar so

787

00:31:14,869 --> 00:31:18,799

for example type WD there are a lot of

788

00:31:16,789 --> 00:31:21,109

white dwarfs names that start with WD

789

00:31:18,799 --> 00:31:29,240

and they're all just going to pop up

790

00:31:21,109 --> 00:31:31,819

here sorry sorry um WD 0 um because it's

791

00:31:29,240 --> 00:31:33,410

also searching yeah so here are but you

792

00:31:31,819 --> 00:31:38,629

know a bunch of ones that start like

793

00:31:33,410 --> 00:31:40,100

that um and so now if you click uh you

794

00:31:38,630 --> 00:31:43,520

can also be all these tables are also

795

00:31:40,099 --> 00:31:47,209

sortable so if you click to erase your

796

00:31:43,519 --> 00:31:51,139

search bar this is just an example so

797

00:31:47,210 --> 00:31:52,940

click on number of exposures yep and

798

00:31:51,140 --> 00:31:55,610

click on it again so it's sort of

799

00:31:52,940 --> 00:31:56,929
reverse sort yeah so these first few

800

00:31:55,609 --> 00:31:58,219
ones or ones that we use to calibrate

801

00:31:56,929 --> 00:32:01,160
the instrument is why there's an

802

00:31:58,220 --> 00:32:04,179
insanely large number of exposures but

803

00:32:01,160 --> 00:32:08,660
if you just click on one like maybe they

804

00:32:04,179 --> 00:32:09,769
will be a good one the WD 1654 i'm

805

00:32:08,660 --> 00:32:11,390
pointing at the screen as if you can

806

00:32:09,769 --> 00:32:16,339
tell where I'm pointing down near the

807

00:32:11,390 --> 00:32:18,620
bottom yeah that one it's your telepathy

808

00:32:16,339 --> 00:32:20,329
is pretty good yeah we're cross country

809

00:32:18,619 --> 00:32:23,779
we're getting it going yeah so this is

810

00:32:20,329 --> 00:32:27,079
just an example of if you want to then

811

00:32:23,779 --> 00:32:31,250
see what data exists for this object the

812

00:32:27,079 --> 00:32:33,139
top gives these histograms and I random

813
00:32:31,250 --> 00:32:35,869
example isn't very good give sort of the

814
00:32:33,140 --> 00:32:37,490
demographics of what what configurations

815
00:32:35,869 --> 00:32:40,449
where the instrument was the instrument

816
00:32:37,490 --> 00:32:44,150
in when the different data were taken um

817
00:32:40,450 --> 00:32:46,330
and then as you scroll down the first

818
00:32:44,150 --> 00:32:49,490
thing that shows up is the full

819
00:32:46,329 --> 00:32:51,409
combination of all the spectrum and it

820
00:32:49,490 --> 00:32:52,880
looks very nice and then as you scroll

821
00:32:51,410 --> 00:32:54,620
down which you can see are the

822
00:32:52,880 --> 00:32:57,620
individual exposures which will look a

823
00:32:54,619 --> 00:32:59,269
little bit right here but then the idea

824
00:32:57,619 --> 00:33:01,308
is that once they were combined very

825
00:32:59,269 --> 00:33:07,069
there's a lot more single there that can

826
00:33:01,308 --> 00:33:08,809
be used for science okay well so I got a

827

00:33:07,069 --> 00:33:10,220
comment here from the nebulous mistress

828
00:33:08,809 --> 00:33:10,639
which brings up the next point I want to

829
00:33:10,220 --> 00:33:13,039
break

830
00:33:10,640 --> 00:33:15,560
bring up and I'm assuming it so she says

831
00:33:13,039 --> 00:33:18,829
man i wish this database was online when

832
00:33:15,559 --> 00:33:21,589
i wrote my thesis hayes hope to hear

833
00:33:18,829 --> 00:33:22,819
that so let me add so let me tell this

834
00:33:21,589 --> 00:33:24,589
talk about that a little bit are you

835
00:33:22,819 --> 00:33:26,779
hoping and one of the reed what about

836
00:33:24,589 --> 00:33:29,149
new astronomers coming up with these

837
00:33:26,779 --> 00:33:31,309
tools are they do you think in a better

838
00:33:29,150 --> 00:33:34,190
position to ask science questions of

839
00:33:31,309 --> 00:33:35,509
this data then you guys Lucas jason said

840
00:33:34,190 --> 00:33:36,920
something earlier about we go to the

841
00:33:35,509 --> 00:33:39,019

library and get just to pay a bunch of

842

00:33:36,920 --> 00:33:41,390

pages in a book and you're expected to

843

00:33:39,019 --> 00:33:44,000

sort through them yourself now I did my

844

00:33:41,390 --> 00:33:46,910

thesis in the very late 90s in the early

845

00:33:44,000 --> 00:33:48,829

aughts and we had you know massed in

846

00:33:46,910 --> 00:33:50,690

those days you went you basically got

847

00:33:48,829 --> 00:33:52,490

one object at a time so the library

848

00:33:50,690 --> 00:33:53,779

analogy you checked out one book at a

849

00:33:52,490 --> 00:33:56,390

time and took it home and you wait and

850

00:33:53,779 --> 00:33:58,160

check out another one and and and

851

00:33:56,390 --> 00:34:00,050

remember it was in the forum where the

852

00:33:58,160 --> 00:34:02,269

book wasn't bound it was just a set of

853

00:34:00,049 --> 00:34:04,700

pages right because it was we didn't

854

00:34:02,269 --> 00:34:07,430

combine the exposures into a single

855

00:34:04,700 --> 00:34:11,480

spectrum for each target so you got one

856
00:34:07,430 --> 00:34:14,659
pile of pages at a time now we're in a

857
00:34:11,480 --> 00:34:16,099
situation where we hope that the users

858
00:34:14,659 --> 00:34:17,990
can go to the library and just get the

859
00:34:16,099 --> 00:34:19,039
pile of books they want and go off and

860
00:34:17,989 --> 00:34:20,809
do the research you know they're not

861
00:34:19,039 --> 00:34:23,059
they're not having to wade through the

862
00:34:20,809 --> 00:34:25,429
card catalog and figure anybody remember

863
00:34:23,059 --> 00:34:27,259
what card catalog is yeah I mean a way

864
00:34:25,429 --> 00:34:29,720
through the catalog and figure out you

865
00:34:27,260 --> 00:34:31,280
know it's sort of like you know the old

866
00:34:29,719 --> 00:34:34,668
days you if you don't watch ghostbusters

867
00:34:31,280 --> 00:34:36,890
the opening scene right haha it's like

868
00:34:34,668 --> 00:34:38,418
us know that he always managed to make

869
00:34:36,889 --> 00:34:40,908
me feel old in these things why do you

870
00:34:38,418 --> 00:34:43,579
always just cuz it's like if you are

871
00:34:40,909 --> 00:34:45,919
needed to know the name where you run in

872
00:34:43,579 --> 00:34:48,159
yeah and now you can go and you just say

873
00:34:45,918 --> 00:34:51,859
give me all the books you have on

874
00:34:48,159 --> 00:34:54,530
ectoplasm and there is okay but to be

875
00:34:51,860 --> 00:34:57,650
fair back in the day there weren't that

876
00:34:54,530 --> 00:34:59,420
many books to look at okay we were

877
00:34:57,650 --> 00:35:02,210
looking in cuneiform to be fair you'll

878
00:34:59,420 --> 00:35:03,889
have to know their names and know where

879
00:35:02,210 --> 00:35:05,750
to find them and then once you do have

880
00:35:03,889 --> 00:35:08,289
the data you had to spend all of your

881
00:35:05,750 --> 00:35:10,429
time reinventing the same data reduction

882
00:35:08,289 --> 00:35:12,619
techniques that everybody else was

883
00:35:10,429 --> 00:35:15,319
spending our time ya doing and to be

884

00:35:12,619 --> 00:35:17,869
fair you still can download even from

885
00:35:15,320 --> 00:35:20,890
these portals or all the individual

886
00:35:17,869 --> 00:35:23,409
exposures and if what you really

887
00:35:20,889 --> 00:35:26,199
I do is combine them in some way that's

888
00:35:23,409 --> 00:35:28,358
specific to you that's not the choices

889
00:35:26,199 --> 00:35:30,879
that we did you can still do that you

890
00:35:28,358 --> 00:35:32,828
can stop for most science purposes time

891
00:35:30,880 --> 00:35:35,309
is better spent actually doing science

892
00:35:32,829 --> 00:35:38,109
on the reduced to data rather than

893
00:35:35,309 --> 00:35:41,500
trying to figure out the data's phone

894
00:35:38,108 --> 00:35:43,480
number and how to dial it ok well the

895
00:35:41,500 --> 00:35:44,849
Venice library analogy still has legs

896
00:35:43,480 --> 00:35:48,068
but I'm going to use it one more time

897
00:35:44,849 --> 00:35:51,400
wait when you're using a bubble like

898
00:35:48,068 --> 00:35:53,079

like me or Molly or John you might have

899

00:35:51,400 --> 00:35:54,309

created a few data sets and you're

900

00:35:53,079 --> 00:35:55,690

interested in going to get your data

901

00:35:54,309 --> 00:35:58,089

sets out of the archive that's like you

902

00:35:55,690 --> 00:35:59,980

go check out a book you wrote right but

903

00:35:58,088 --> 00:36:01,449

you also when you write that paper or do

904

00:35:59,980 --> 00:36:03,039

a research project you'd like to read

905

00:36:01,449 --> 00:36:05,199

the same the books that everybody else

906

00:36:03,039 --> 00:36:06,940

wrote on that topic and the reason this

907

00:36:05,199 --> 00:36:08,949

is really really enabling is that it

908

00:36:06,940 --> 00:36:11,679

makes it very very easy for you to go

909

00:36:08,949 --> 00:36:13,629

and quickly grab your data plus every

910

00:36:11,679 --> 00:36:15,460

other kind of data every other data set

911

00:36:13,630 --> 00:36:18,220

on that same kind of object that

912

00:36:15,460 --> 00:36:20,108

everybody else is created so you get the

913
00:36:18,219 --> 00:36:22,268
force multiplier effect of having all of

914
00:36:20,108 --> 00:36:23,558
it in one place well that brings up the

915
00:36:22,268 --> 00:36:25,179
next question I wanted to ask both of

916
00:36:23,559 --> 00:36:26,650
you so that's perfect point to make

917
00:36:25,179 --> 00:36:28,210
right this moment Jason because this is

918
00:36:26,650 --> 00:36:30,490
for all of you and Carol you can even

919
00:36:28,210 --> 00:36:32,259
client chime in if you'd like to but

920
00:36:30,489 --> 00:36:33,758
this day and in this day and age you see

921
00:36:32,259 --> 00:36:35,440
a lot of papers being published a lot of

922
00:36:33,759 --> 00:36:36,849
science being done on the data and

923
00:36:35,440 --> 00:36:38,920
they're saying from the data I have

924
00:36:36,849 --> 00:36:41,920
asked this question and reached this

925
00:36:38,920 --> 00:36:44,409
conclusion and it's important now isn't

926
00:36:41,920 --> 00:36:46,869
it in in science especially using these

927
00:36:44,409 --> 00:36:49,328
archives and using the data that is now

928
00:36:46,869 --> 00:36:52,509
we're calling big data to be able to

929
00:36:49,329 --> 00:36:55,900
reproduce those results effectively and

930
00:36:52,509 --> 00:36:57,490
so does an archive like this lets you do

931
00:36:55,900 --> 00:36:59,289
that better if I read a paper let's say

932
00:36:57,489 --> 00:37:00,788
Jason puts out a paper using this data

933
00:36:59,289 --> 00:37:03,278
and i want to say well i'm not sure he's

934
00:37:00,789 --> 00:37:06,069
right let me try it myself and see if i

935
00:37:03,278 --> 00:37:07,568
can get the same answer this helps it a

936
00:37:06,068 --> 00:37:09,369
lot more than say back in the day when

937
00:37:07,568 --> 00:37:11,558
you only have the card catalog right so

938
00:37:09,369 --> 00:37:15,519
way back in the day when when these

939
00:37:11,559 --> 00:37:17,890
these people were children I was working

940
00:37:15,518 --> 00:37:19,750
on on cluster star clusters and in

941

00:37:17,889 --> 00:37:22,750
particular globular clusters and there

942
00:37:19,750 --> 00:37:25,659
was a discrepancy and a number of people

943
00:37:22,750 --> 00:37:29,170
were researching the chemistry of those

944
00:37:25,659 --> 00:37:30,969
clusters using spectra and so but in

945
00:37:29,170 --> 00:37:33,220
those days and age you went and you've

946
00:37:30,969 --> 00:37:34,750
got the spectra and it was your data and

947
00:37:33,219 --> 00:37:37,149
so we had a

948
00:37:34,750 --> 00:37:39,639
conference where everybody come by

949
00:37:37,150 --> 00:37:41,410
agreed to exchange the data store they

950
00:37:39,639 --> 00:37:43,210
had to format the data and they sent

951
00:37:41,409 --> 00:37:45,519
tapes back and forth and all this stuff

952
00:37:43,210 --> 00:37:47,500
and then and then everybody would

953
00:37:45,519 --> 00:37:49,329
analyze each other's data that those

954
00:37:47,500 --> 00:37:51,280
days are over you just go get the data

955
00:37:49,329 --> 00:37:53,259

and you analyze it you say well why did

956

00:37:51,280 --> 00:37:56,170

this person get this and will my

957

00:37:53,260 --> 00:37:59,530

algorithm work the same way so I get

958

00:37:56,170 --> 00:38:01,539

Jason spectra and I use my model or

959

00:37:59,530 --> 00:38:03,580

whatever and then I say oh this is how

960

00:38:01,539 --> 00:38:05,230

it's different so this this really

961

00:38:03,579 --> 00:38:09,159

chained and you get those answers very

962

00:38:05,230 --> 00:38:10,719

quickly and so it doesn't take like a

963

00:38:09,159 --> 00:38:12,579

year do you have to have another

964

00:38:10,719 --> 00:38:15,339

conference a year later oh we all did

965

00:38:12,579 --> 00:38:16,659

you know it was painful good i would say

966

00:38:15,340 --> 00:38:19,030

that des archives have really

967

00:38:16,659 --> 00:38:20,710

strengthened the overall ethic of

968

00:38:19,030 --> 00:38:23,860

reproducibility which is an important

969

00:38:20,710 --> 00:38:26,670

part absolutely no comparability about

970
00:38:23,860 --> 00:38:28,930
different people analyze information

971
00:38:26,670 --> 00:38:31,900
over after which we shouldn't overlook

972
00:38:28,929 --> 00:38:35,079
is that these these these data are from

973
00:38:31,900 --> 00:38:38,500
missions that that the public paid for

974
00:38:35,079 --> 00:38:40,989
so you know we need to make sure that

975
00:38:38,500 --> 00:38:43,989
whatever we're generating is accessible

976
00:38:40,989 --> 00:38:45,879
and intelligible and useful because it

977
00:38:43,989 --> 00:38:47,500
really belongs just like Hubble itself

978
00:38:45,880 --> 00:38:49,740
it all had eight applause all of us and

979
00:38:47,500 --> 00:38:52,510
one of the things about these different

980
00:38:49,739 --> 00:38:54,369
samples that we've put together that you

981
00:38:52,510 --> 00:38:58,650
know has been fascinating just for us

982
00:38:54,369 --> 00:39:00,460
going through and I'm sure certain

983
00:38:58,650 --> 00:39:02,139
members of the public with certain

984
00:39:00,460 --> 00:39:06,070
dispositions but also find fascinating

985
00:39:02,139 --> 00:39:08,829
to go through is you know I had never

986
00:39:06,070 --> 00:39:12,550
seen a UV spectrum of a supernova before

987
00:39:08,829 --> 00:39:14,349
and now I can just go to the Superdome a

988
00:39:12,550 --> 00:39:16,810
sample and click through if you like wow

989
00:39:14,349 --> 00:39:22,150
what's going on there and look at that

990
00:39:16,809 --> 00:39:23,500
and um you know I have gotten a lot

991
00:39:22,150 --> 00:39:25,180
better because I've just been looking or

992
00:39:23,500 --> 00:39:27,280
I don't work on white horse I can now

993
00:39:25,179 --> 00:39:29,859
kind of go through white dwarfs and be

994
00:39:27,280 --> 00:39:32,200
like oh you look really like you've just

995
00:39:29,860 --> 00:39:33,670
got hydrogen home oh you you look like

996
00:39:32,199 --> 00:39:36,189
you've got some metal line absorption

997
00:39:33,670 --> 00:39:38,829
that's interesting like I you it's just

998

00:39:36,190 --> 00:39:40,119
once you have the full database that you

999
00:39:38,829 --> 00:39:42,730
can go through instead of just

1000
00:39:40,119 --> 00:39:44,889
individual objects there's just a lot of

1001
00:39:42,730 --> 00:39:47,110
fascinating stuff that you can just kind

1002
00:39:44,889 --> 00:39:48,338
of pick up by I ok now here but here's

1003
00:39:47,110 --> 00:39:50,079
what worries me about this and

1004
00:39:48,338 --> 00:39:52,119
it's not just about this archive but all

1005
00:39:50,079 --> 00:39:54,249
archives where you're getting already

1006
00:39:52,119 --> 00:39:57,548
analyzed or processed data in some way

1007
00:39:54,248 --> 00:40:00,038
are we introducing biases and are we how

1008
00:39:57,548 --> 00:40:02,759
careful are we that we are that

1009
00:40:00,039 --> 00:40:05,170
everybody is starting with and the right

1010
00:40:02,759 --> 00:40:06,699
foundation to ask their questions

1011
00:40:05,170 --> 00:40:09,009
because what worries me is if somebody

1012
00:40:06,699 --> 00:40:10,989

gets a wrong processing step line and

1013

00:40:09,009 --> 00:40:13,059

everybody's paper is based on this let

1014

00:40:10,989 --> 00:40:15,068

down the road how susceptible or a week

1015

00:40:13,059 --> 00:40:17,650

to that that was a big concern of ours

1016

00:40:15,068 --> 00:40:20,048

because we are we are all users of this

1017

00:40:17,650 --> 00:40:22,900

kind of stuff ourselves and we know how

1018

00:40:20,048 --> 00:40:24,699

difficult it can be to perform those

1019

00:40:22,900 --> 00:40:27,450

reduction steps to get the analysis

1020

00:40:24,699 --> 00:40:29,348

right we also know that different

1021

00:40:27,449 --> 00:40:30,879

scientists who've been trained to do

1022

00:40:29,349 --> 00:40:33,519

this kind of thing make different

1023

00:40:30,880 --> 00:40:35,019

judgments a lot of the steps you do come

1024

00:40:33,518 --> 00:40:37,389

down to judgment calls about whether

1025

00:40:35,018 --> 00:40:39,038

you're willing to do this or that step

1026

00:40:37,389 --> 00:40:41,768

which may be computationally intensive

1027
00:40:39,039 --> 00:40:43,960
you know there's never a single unique

1028
00:40:41,768 --> 00:40:45,459
answer for every step in the process so

1029
00:40:43,960 --> 00:40:46,900
you have to when you're doing it for

1030
00:40:45,460 --> 00:40:48,759
yourself you have to make choices and

1031
00:40:46,900 --> 00:40:51,068
you're doing it for everybody like we

1032
00:40:48,759 --> 00:40:52,478
did you have to often you have to make

1033
00:40:51,068 --> 00:40:53,889
those same choices so we actually

1034
00:40:52,478 --> 00:40:56,679
brought in a group of experts from

1035
00:40:53,889 --> 00:40:59,679
outside the Institute side Space

1036
00:40:56,679 --> 00:41:01,509
Telescope and some people from inside we

1037
00:40:59,679 --> 00:41:04,929
all got together over a period of a few

1038
00:41:01,509 --> 00:41:07,449
months and these are some of the best

1039
00:41:04,929 --> 00:41:09,159
people yeah you can you could you could

1040
00:41:07,449 --> 00:41:10,899
possibly get whoever done spectroscopy

1041
00:41:09,159 --> 00:41:12,879
including people have been doing it you

1042
00:41:10,900 --> 00:41:14,829
know for the entire lifetime with Hubble

1043
00:41:12,880 --> 00:41:16,568
and even before that entire lifetime me

1044
00:41:14,829 --> 00:41:18,999
and then we here we got it we got them

1045
00:41:16,568 --> 00:41:21,429
together we talked about how to make

1046
00:41:18,998 --> 00:41:24,098
these choices and we tried we know we

1047
00:41:21,429 --> 00:41:25,899
can't produce data sets that are going

1048
00:41:24,099 --> 00:41:29,259
to be perfect for every purpose it's

1049
00:41:25,900 --> 00:41:31,630
just not possible but we know we can

1050
00:41:29,259 --> 00:41:34,420
write we thought and we turned up to be

1051
00:41:31,630 --> 00:41:35,619
right that we could produce data sets

1052
00:41:34,420 --> 00:41:37,269
that would be you know ninety percent

1053
00:41:35,619 --> 00:41:39,519
useful to ninety percent of the science

1054
00:41:37,268 --> 00:41:42,338
cases by making the broadest possible

1055

00:41:39,518 --> 00:41:44,528
set of choices and as we go along one of

1056
00:41:42,338 --> 00:41:46,179
the reasons where we've kind of arranged

1057
00:41:44,528 --> 00:41:48,009
things this way we have an email address

1058
00:41:46,179 --> 00:41:50,139
for people to send us feedback if

1059
00:41:48,009 --> 00:41:52,900
website we're doing this hangout we want

1060
00:41:50,139 --> 00:41:54,909
people to tell us what the data could do

1061
00:41:52,900 --> 00:41:57,099
for them that it's not doing and then

1062
00:41:54,909 --> 00:41:58,568
over time the Institute will continue to

1063
00:41:57,099 --> 00:42:02,170
support this and it will evolve and

1064
00:41:58,568 --> 00:42:04,480
we're hoping to make it even more useful

1065
00:42:02,170 --> 00:42:06,159
in in that way so you know Tony you're

1066
00:42:04,480 --> 00:42:07,480
okay Bo but wait a minute that that

1067
00:42:06,159 --> 00:42:09,879
that's that bothers me a little bit

1068
00:42:07,480 --> 00:42:11,409
Jason only because how can i if I call

1069
00:42:09,880 --> 00:42:13,420

you and tell you well the datas I'm not

1070

00:42:11,409 --> 00:42:16,149

you're not what you're not saying I hope

1071

00:42:13,420 --> 00:42:17,559

is that while the data is not doing what

1072

00:42:16,150 --> 00:42:19,329

it needs to be doing for me I need you

1073

00:42:17,559 --> 00:42:20,679

to change it I mean isn't it this is

1074

00:42:19,329 --> 00:42:23,860

objective thing these are measurements

1075

00:42:20,679 --> 00:42:26,500

that were taken I want to serve oh well

1076

00:42:23,860 --> 00:42:29,380

so to rephrase your question if you know

1077

00:42:26,500 --> 00:42:32,860

we get an email that's saying oh it

1078

00:42:29,380 --> 00:42:35,559

looks like you know you've got some

1079

00:42:32,860 --> 00:42:37,870

weird you know error property is

1080

00:42:35,559 --> 00:42:39,639

happening when you're combining the edge

1081

00:42:37,869 --> 00:42:41,920

of this one segment with the edge of

1082

00:42:39,639 --> 00:42:43,539

this other segments and let me show you

1083

00:42:41,920 --> 00:42:45,010

this example case where something's

1084
00:42:43,539 --> 00:42:47,529
clearly don't clearly going we were like

1085
00:42:45,010 --> 00:42:50,230
oh okay we need to look at that that

1086
00:42:47,530 --> 00:42:53,019
didn't show up in our tests it you know

1087
00:42:50,230 --> 00:42:55,059
okay um but at some point there is an

1088
00:42:53,019 --> 00:42:57,400
objective high weight low fish the

1089
00:42:55,059 --> 00:42:59,049
question that I had kept asking when we

1090
00:42:57,400 --> 00:43:00,579
were trying to decide okay are we ready

1091
00:42:59,050 --> 00:43:02,110
to release this product the question

1092
00:43:00,579 --> 00:43:04,150
that I kept asking Jason and other

1093
00:43:02,110 --> 00:43:06,220
people the team is you know well you

1094
00:43:04,150 --> 00:43:08,440
know we know that there are always ways

1095
00:43:06,219 --> 00:43:10,659
to improve the data product and the

1096
00:43:08,440 --> 00:43:12,159
question was well you know you're

1097
00:43:10,659 --> 00:43:14,829
someone who does spectroscopy for a

1098
00:43:12,159 --> 00:43:16,690
living would you use this site you know

1099
00:43:14,829 --> 00:43:18,730
do you use this data product to be your

1100
00:43:16,690 --> 00:43:22,570
own science and once the answer was well

1101
00:43:18,730 --> 00:43:25,119
yeah that's when we were like okay we're

1102
00:43:22,570 --> 00:43:28,620
not and and I also want to point

1103
00:43:25,119 --> 00:43:31,359
something out there are other notable

1104
00:43:28,619 --> 00:43:34,389
fields of science not all but there are

1105
00:43:31,360 --> 00:43:36,490
some where the research is done behind

1106
00:43:34,389 --> 00:43:38,889
closed doors and paid for by commercial

1107
00:43:36,489 --> 00:43:42,729
companies and you don't get to see the

1108
00:43:38,889 --> 00:43:44,980
data this is a completely open class you

1109
00:43:42,730 --> 00:43:47,199
can look at the data reduction code you

1110
00:43:44,980 --> 00:43:49,750
can modify the data reduction code you

1111
00:43:47,199 --> 00:43:51,429
can start from Ground Zero and get every

1112

00:43:49,750 --> 00:43:54,809
little bit that came down from the

1113
00:43:51,429 --> 00:43:58,359
telescope you can it's a good points or

1114
00:43:54,809 --> 00:44:00,699
integrate a complete open process it's

1115
00:43:58,360 --> 00:44:02,800
open source there till we see every step

1116
00:44:00,699 --> 00:44:03,879
that was taken not just oh you're just

1117
00:44:02,800 --> 00:44:05,410
gonna take it because this is what we're

1118
00:44:03,880 --> 00:44:08,050
getting it and the way that we're

1119
00:44:05,409 --> 00:44:11,049
delivering these data is the individual

1120
00:44:08,050 --> 00:44:13,480
exposures that went into the final

1121
00:44:11,050 --> 00:44:16,360
edition that we're delivering are

1122
00:44:13,480 --> 00:44:16,599
delivered along with that co edition so

1123
00:44:16,360 --> 00:44:18,190
you

1124
00:44:16,599 --> 00:44:19,750
you look at the individual exposures and

1125
00:44:18,190 --> 00:44:21,940
look at the final project can be like

1126
00:44:19,750 --> 00:44:23,230

yeah okay that makes sense or but that's

1127

00:44:21,940 --> 00:44:25,090

where I was hoping to get to because

1128

00:44:23,230 --> 00:44:27,730

there is some there's some check or some

1129

00:44:25,090 --> 00:44:30,400

objective storing let me reassure you

1130

00:44:27,730 --> 00:44:32,740

that although astronomers are not the

1131

00:44:30,400 --> 00:44:35,829

dominant science in this country we are

1132

00:44:32,739 --> 00:44:37,929

filled with skeptics and you know and

1133

00:44:35,829 --> 00:44:40,059

our colleagues are skeptics and they

1134

00:44:37,929 --> 00:44:43,329

will go through all this and reassure

1135

00:44:40,059 --> 00:44:45,489

themselves that that the data is correct

1136

00:44:43,329 --> 00:44:47,710

which is not like astronomers like oh

1137

00:44:45,489 --> 00:44:50,529

yay Jason and reduced my data for me so

1138

00:44:47,710 --> 00:44:52,780

I'll just use that you know we're more

1139

00:44:50,530 --> 00:44:55,690

community of skeptics we've been showing

1140

00:44:52,780 --> 00:44:58,470

and demonstrating these data products to

1141
00:44:55,690 --> 00:45:01,119
our colleagues and other astronomers

1142
00:44:58,469 --> 00:45:03,279
since the SS mean the American National

1143
00:45:01,119 --> 00:45:05,230
slightly meeting January and I've had a

1144
00:45:03,280 --> 00:45:07,990
couple people tell me that based on what

1145
00:45:05,230 --> 00:45:09,699
they've seen it doesn't meet their very

1146
00:45:07,989 --> 00:45:11,769
very strict requirements for this or

1147
00:45:09,699 --> 00:45:13,239
that reason and I say well sorry but

1148
00:45:11,769 --> 00:45:15,579
we'll try to you know we can try to

1149
00:45:13,239 --> 00:45:17,439
incorporate that in the future but I've

1150
00:45:15,579 --> 00:45:19,000
had you know 20 times as many people

1151
00:45:17,440 --> 00:45:20,440
tell me boy you just saved me a year's

1152
00:45:19,000 --> 00:45:22,539
worth of effort trolling the earth and

1153
00:45:20,440 --> 00:45:24,070
adding all this stuff over I wish I had

1154
00:45:22,539 --> 00:45:26,739
this when I was bred or my favorite

1155
00:45:24,070 --> 00:45:33,010
responses oh my grad students be really

1156
00:45:26,739 --> 00:45:35,019
upset just yeah yeah I'm very I'm very

1157
00:45:33,010 --> 00:45:36,700
impressed by the searchability of this

1158
00:45:35,019 --> 00:45:38,170
data set and how you can look at a

1159
00:45:36,699 --> 00:45:40,419
variety of different objects and things

1160
00:45:38,170 --> 00:45:42,909
you get you have made it I think is a is

1161
00:45:40,420 --> 00:45:46,030
extremely easy to ask science questions

1162
00:45:42,909 --> 00:45:48,549
of this data will vanderheide up hi woh

1163
00:45:46,030 --> 00:45:51,130
tis good to see you again is asking he's

1164
00:45:48,550 --> 00:45:53,950
from well I shouldn't say is the entire

1165
00:45:51,130 --> 00:45:56,320
library accessible for non-us citizens

1166
00:45:53,949 --> 00:45:58,569
because i'd like to have NASA benefits

1167
00:45:56,320 --> 00:46:01,240
tags for it yeah yeah just click on that

1168
00:45:58,570 --> 00:46:03,039
download all the data link and later a

1169

00:46:01,239 --> 00:46:05,829
little bit yeah so anybody in the world

1170
00:46:03,039 --> 00:46:08,079
can get access to act yes and wealth of

1171
00:46:05,829 --> 00:46:15,719
fury there from Europe or Canada it's

1172
00:46:08,079 --> 00:46:18,009
not text can anyone pick up a good point

1173
00:46:15,719 --> 00:46:20,949
melissa is a collaboration with you

1174
00:46:18,010 --> 00:46:24,100
hello that's right that's right okay

1175
00:46:20,949 --> 00:46:25,779
well that's very good and so the I want

1176
00:46:24,099 --> 00:46:27,819
to talk a little bit about well first of

1177
00:46:25,780 --> 00:46:29,560
all let me ask you Molly and Jason have

1178
00:46:27,820 --> 00:46:30,550
I have you shown everything you wanted

1179
00:46:29,559 --> 00:46:31,690
to see is or something

1180
00:46:30,550 --> 00:46:33,160
that we should be showing that we have

1181
00:46:31,690 --> 00:46:36,039
it yet we had a couple of interesting

1182
00:46:33,159 --> 00:46:37,719
little eyes nuggets that yeah thought

1183
00:46:36,039 --> 00:46:39,820

we'd mentioned because it shows you go

1184

00:46:37,719 --> 00:46:44,159

ahead things that people discover with

1185

00:46:39,820 --> 00:46:47,860

this these data sets like these um so

1186

00:46:44,159 --> 00:46:51,879

Scott I guess plot the samp the that

1187

00:46:47,860 --> 00:46:54,820

mean welcome page which one you want to

1188

00:46:51,880 --> 00:46:56,349

shippers well I there was a some nice

1189

00:46:54,820 --> 00:47:00,670

graphics on the black backgrounds that

1190

00:46:56,349 --> 00:47:02,980

yeah it showed the I think so which said

1191

00:47:00,670 --> 00:47:05,590

am I going off of well when I sent you

1192

00:47:02,980 --> 00:47:07,420

the last time that the Black slides with

1193

00:47:05,590 --> 00:47:08,590

them oh yeah yeah yeah I'll just run

1194

00:47:07,420 --> 00:47:09,550

through those real quick just to show

1195

00:47:08,590 --> 00:47:11,650

you what kinds of things we're talking

1196

00:47:09,550 --> 00:47:13,240

about and while those are being brought

1197

00:47:11,650 --> 00:47:14,349

up one of the we're talking about open

1198
00:47:13,239 --> 00:47:15,639
data and one of the things that we've

1199
00:47:14,349 --> 00:47:18,839
done with archives one of the things

1200
00:47:15,639 --> 00:47:21,609
we're really hoping will happen with uh

1201
00:47:18,840 --> 00:47:25,030
making this archive both publicly

1202
00:47:21,610 --> 00:47:28,269
available and easily searchable is the

1203
00:47:25,030 --> 00:47:30,610
real power is when people propose to

1204
00:47:28,269 --> 00:47:32,199
take observations with Hubble you know

1205
00:47:30,610 --> 00:47:33,880
they had their science question that

1206
00:47:32,199 --> 00:47:36,579
they want to ask of the data they're

1207
00:47:33,880 --> 00:47:38,500
getting uh but a lot of different sized

1208
00:47:36,579 --> 00:47:41,889
questions can be asked and answered with

1209
00:47:38,500 --> 00:47:47,230
the data so what's really going to come

1210
00:47:41,889 --> 00:47:50,079
out of this archival data is questions

1211
00:47:47,230 --> 00:47:52,000
and answers that the people who

1212
00:47:50,079 --> 00:47:54,219
originally proposed those observations

1213
00:47:52,000 --> 00:47:56,889
never even thought to ask in the first

1214
00:47:54,219 --> 00:48:00,159
place that if the data we're just

1215
00:47:56,889 --> 00:48:05,409
sitting in some drawer somewhere that's

1216
00:48:00,159 --> 00:48:07,359
right ok so the Scott brought up a nice

1217
00:48:05,409 --> 00:48:14,289
graphic I wanted to just show a couple

1218
00:48:07,360 --> 00:48:15,820
of things which are the you know sort of

1219
00:48:14,289 --> 00:48:19,090
some science highlights for what you can

1220
00:48:15,820 --> 00:48:22,030
get out of this stuff one of the things

1221
00:48:19,090 --> 00:48:24,789
that people can do with with Hubble this

1222
00:48:22,030 --> 00:48:26,650
is actually with the this particular

1223
00:48:24,789 --> 00:48:29,860
observations with this instrument not

1224
00:48:26,650 --> 00:48:33,220
cost but it's the same idea there's this

1225
00:48:29,860 --> 00:48:36,309
planet which is a natural like planet an

1226

00:48:33,219 --> 00:48:39,399
ice giant orbiting a star called GJ 436

1227
00:48:36,309 --> 00:48:41,469
and the planet is close to its star that

1228
00:48:39,400 --> 00:48:43,269
the radiation from the star is actually

1229
00:48:41,469 --> 00:48:44,379
evaporating the atmosphere of the planet

1230
00:48:43,269 --> 00:48:46,568
boiling it away

1231
00:48:44,380 --> 00:48:48,039
and over time you know hundreds of

1232
00:48:46,568 --> 00:48:49,869
millions or maybe billions of years the

1233
00:48:48,039 --> 00:48:51,519
plan is just completely dissipate and

1234
00:48:49,869 --> 00:48:54,579
you might be left with just the rocky

1235
00:48:51,518 --> 00:48:56,229
core and if you take a spectrum of that

1236
00:48:54,579 --> 00:48:58,410
planet you can actually see the

1237
00:48:56,230 --> 00:49:00,990
signature of the hydrogen and the oxygen

1238
00:48:58,409 --> 00:49:03,548
boiling off the atmosphere of the planet

1239
00:49:00,989 --> 00:49:05,828
with Hubble data so that you know the

1240
00:49:03,548 --> 00:49:07,778

fact that there are planets being

1241

00:49:05,829 --> 00:49:10,059

destroyed by their host stars was a real

1242

00:49:07,778 --> 00:49:11,619

discovery of Hubble's and this was the

1243

00:49:10,059 --> 00:49:12,910

observation that did it and that you

1244

00:49:11,619 --> 00:49:14,410

would have met you would have noticed

1245

00:49:12,909 --> 00:49:16,480

any other way would you really oh

1246

00:49:14,409 --> 00:49:19,588

absolutely not you can't Anna to take

1247

00:49:16,480 --> 00:49:21,849

pictures of that that planet and that

1248

00:49:19,588 --> 00:49:24,190

star all day and you would never see

1249

00:49:21,849 --> 00:49:25,539

this because on the one number one the

1250

00:49:24,190 --> 00:49:27,759

planets too close to the star to

1251

00:49:25,539 --> 00:49:28,990

actually separate them and number two is

1252

00:49:27,759 --> 00:49:31,028

you wouldn't be able to see the fact

1253

00:49:28,989 --> 00:49:32,618

that the gases coming off the planet

1254

00:49:31,028 --> 00:49:34,869

have a velocity as they come off the

1255
00:49:32,619 --> 00:49:37,390
planet as they boil off you can only

1256
00:49:34,869 --> 00:49:40,509
measure those velocities and the content

1257
00:49:37,389 --> 00:49:43,028
of that stuff that's boiling off with a

1258
00:49:40,509 --> 00:49:46,389
with a spectrum in the ultraviolet so

1259
00:49:43,028 --> 00:49:51,358
cool observation and then if you go to

1260
00:49:46,389 --> 00:49:54,278
the next slide in that set this one is

1261
00:49:51,358 --> 00:49:55,929
really cool and I got an issue a

1262
00:49:54,278 --> 00:49:58,980
disclaimer I'm actually on the paper

1263
00:49:55,929 --> 00:50:01,899
Andrew had a whole thing about it yeah

1264
00:49:58,980 --> 00:50:03,909
our friend Andrew Fox who did right yeah

1265
00:50:01,900 --> 00:50:05,410
so Andy Fox is an astronomer here at

1266
00:50:03,909 --> 00:50:06,879
Space Telescope and actually he was

1267
00:50:05,409 --> 00:50:10,358
involved with the group of us that put

1268
00:50:06,880 --> 00:50:11,559
this archive together in addition to

1269
00:50:10,358 --> 00:50:12,788
leading up this area of science so

1270
00:50:11,559 --> 00:50:15,009
there's these things called the Fermi

1271
00:50:12,789 --> 00:50:17,619
bubbles these are very high energetic

1272
00:50:15,009 --> 00:50:18,940
that observed in gamma rays these

1273
00:50:17,619 --> 00:50:20,619
bubbles that come up out of the Milky

1274
00:50:18,940 --> 00:50:23,980
Way galaxy and it's thought that these

1275
00:50:20,619 --> 00:50:26,140
were created by ejecta from the

1276
00:50:23,980 --> 00:50:28,059
supermassive black hole that lives in

1277
00:50:26,139 --> 00:50:30,730
the center of the Milky Way so what Andy

1278
00:50:28,059 --> 00:50:33,220
did was to take the gamma-ray maps that

1279
00:50:30,730 --> 00:50:35,889
was produced by NASA's Fermi satellite

1280
00:50:33,219 --> 00:50:38,018
and then use Hubble's costs instrument

1281
00:50:35,889 --> 00:50:40,000
the spectrograph to look for the gas

1282
00:50:38,018 --> 00:50:44,348
that's associated with this gamma-ray

1283

00:50:40,000 --> 00:50:46,088
emission what we didn't know was whether

1284
00:50:44,349 --> 00:50:48,338
whatever event it was from the

1285
00:50:46,088 --> 00:50:51,068
supermassive black hole only generated

1286
00:50:48,338 --> 00:50:52,630
this gamma-ray emission or whether it

1287
00:50:51,068 --> 00:50:55,058
would actually driven you know get a

1288
00:50:52,630 --> 00:50:57,099
bubble of gas up out of the disk and

1289
00:50:55,059 --> 00:50:57,880
into this bubble shape and when you

1290
00:50:57,099 --> 00:50:59,920
observe

1291
00:50:57,880 --> 00:51:01,059
objects on the other side of the bubble

1292
00:50:59,920 --> 00:51:04,900
from where the Sun is you can actually

1293
00:51:01,059 --> 00:51:06,429
see that gas flow and in the same way as

1294
00:51:04,900 --> 00:51:08,260
I mentioned for the exoplanet just now

1295
00:51:06,429 --> 00:51:10,779
you can only measure the gas velocities

1296
00:51:08,260 --> 00:51:15,430
with the technique that they ain't used

1297
00:51:10,780 --> 00:51:17,380

so the data that was used to produce

1298

00:51:15,429 --> 00:51:18,789

these measurements and that some of the

1299

00:51:17,380 --> 00:51:21,820

data you're seeing these little squiggly

1300

00:51:18,789 --> 00:51:24,670

lines here in this graphic are in our

1301

00:51:21,820 --> 00:51:26,920

spectroscopic legacy archive andy's data

1302

00:51:24,670 --> 00:51:29,619

and a bunch of data like it are sitting

1303

00:51:26,920 --> 00:51:34,420

right there you can go and get it it's

1304

00:51:29,619 --> 00:51:37,059

also decidedly American hahaha yeah

1305

00:51:34,420 --> 00:51:39,220

that's all I'm gonna beat friend water

1306

00:51:37,059 --> 00:51:41,619

French or French yes it could be it some

1307

00:51:39,219 --> 00:51:42,879

kind of accidental yeah so the the joke

1308

00:51:41,619 --> 00:51:47,079

there you say it's French or American

1309

00:51:42,880 --> 00:51:49,690

headies English but I'll see a Union

1310

00:51:47,079 --> 00:51:53,170

Jack there yeah the reason is that the

1311

00:51:49,690 --> 00:51:55,150

reason is that the on the on the side

1312
00:51:53,170 --> 00:51:56,500
facing us the side facing the Sun which

1313
00:51:55,150 --> 00:51:58,630
is the right side here in the graphic

1314
00:51:56,500 --> 00:52:01,030
that absorption is blue shifted it's

1315
00:51:58,630 --> 00:52:03,550
moving towards us and the Doppler effect

1316
00:52:01,030 --> 00:52:05,470
causes it as it's moving toward us to

1317
00:52:03,550 --> 00:52:07,539
look to move to slightly shorter

1318
00:52:05,469 --> 00:52:09,369
wavelengths and on the other side where

1319
00:52:07,539 --> 00:52:11,679
the gas is moving away it's sort of in

1320
00:52:09,369 --> 00:52:14,079
this flow which is moving like that up

1321
00:52:11,679 --> 00:52:15,639
out of the center the on the other side

1322
00:52:14,079 --> 00:52:17,319
it's red shifted because the velocity is

1323
00:52:15,639 --> 00:52:18,969
moving it away from us and its

1324
00:52:17,320 --> 00:52:21,550
wavelength hits a little longer so in

1325
00:52:18,969 --> 00:52:23,079
the spectral trace down there the red

1326
00:52:21,550 --> 00:52:26,890
stuff corresponds with the red stuff in

1327
00:52:23,079 --> 00:52:29,650
the blue stuff this stuff and again at

1328
00:52:26,889 --> 00:52:32,019
velocity those kinematics you would

1329
00:52:29,650 --> 00:52:35,740
never know if you didn't have a spectrum

1330
00:52:32,019 --> 00:52:38,320
if you just take a picture okay did you

1331
00:52:35,739 --> 00:52:39,279
have it yeah so that shows the value of

1332
00:52:38,320 --> 00:52:40,539
some of the things you're getting out of

1333
00:52:39,280 --> 00:52:43,750
here did you have another use case there

1334
00:52:40,539 --> 00:52:45,340
Jason I don't okay so well guys wanna

1335
00:52:43,750 --> 00:52:47,170
make sure you got to you got to show the

1336
00:52:45,340 --> 00:52:48,670
ones you were thinking of because I now

1337
00:52:47,170 --> 00:52:50,590
I'd like to get you guys to comment on

1338
00:52:48,670 --> 00:52:52,510
something that I've been thinking about

1339
00:52:50,590 --> 00:52:54,750
quite a bit with these archives and that

1340

00:52:52,510 --> 00:52:57,460
is these for a long time we thought that

1341
00:52:54,750 --> 00:52:58,630
and I know that this isn't exactly big

1342
00:52:57,460 --> 00:53:00,880
data because you can get the whole thing

1343
00:52:58,630 --> 00:53:03,640
to fit on a thumb drive and that's not

1344
00:53:00,880 --> 00:53:06,369
exactly big data but this idea that the

1345
00:53:03,639 --> 00:53:09,099
data are becoming presentable in ways

1346
00:53:06,369 --> 00:53:10,779
that are very interesting to not to not

1347
00:53:09,099 --> 00:53:11,349
just scientist but in ways that we

1348
00:53:10,780 --> 00:53:13,870
probably

1349
00:53:11,349 --> 00:53:15,130
might not have thought to look at these

1350
00:53:13,869 --> 00:53:16,210
data before I like to get you guys to

1351
00:53:15,130 --> 00:53:18,400
comment a little bit about the

1352
00:53:16,210 --> 00:53:19,809
importance of there were there was a

1353
00:53:18,400 --> 00:53:21,190
there was a movement in the past I don't

1354
00:53:19,809 --> 00:53:22,690

even know what happened to it I having

1355

00:53:21,190 --> 00:53:24,730

something called a virtual Observatory

1356

00:53:22,690 --> 00:53:26,050

where lots of different data archives

1357

00:53:24,730 --> 00:53:27,670

plugged into it and you could ask

1358

00:53:26,050 --> 00:53:29,500

science questions of the virtual

1359

00:53:27,670 --> 00:53:30,970

observatory I think those have kind of

1360

00:53:29,500 --> 00:53:34,210

gone away a little bit in favor of these

1361

00:53:30,969 --> 00:53:38,129

individual ones but do you think no this

1362

00:53:34,210 --> 00:53:41,139

is the feud you girls meant to ask I

1363

00:53:38,130 --> 00:53:45,280

don't agree with you but go ahead what

1364

00:53:41,139 --> 00:53:49,900

about what what I said yes I don't agree

1365

00:53:45,280 --> 00:53:52,930

with your premise yeah didn't stop my

1366

00:53:49,900 --> 00:53:55,420

premise yet observatories went away

1367

00:53:52,929 --> 00:53:58,119

that's not true but go ahead all right

1368

00:53:55,420 --> 00:54:04,260

well I think even the ones that I knew

1369
00:53:58,119 --> 00:54:08,920
it you know even here they don't go away

1370
00:54:04,260 --> 00:54:09,940
then how important do you think and I

1371
00:54:08,920 --> 00:54:12,400
like to get your comments and thoughts

1372
00:54:09,940 --> 00:54:14,530
on this are these archives are to

1373
00:54:12,400 --> 00:54:15,820
answering not just the science questions

1374
00:54:14,530 --> 00:54:18,220
you know about that you set out to

1375
00:54:15,820 --> 00:54:19,870
answer but maybe even think about those

1376
00:54:18,219 --> 00:54:22,569
things you hadn't thought to answer do

1377
00:54:19,869 --> 00:54:24,519
these visualization tools you think have

1378
00:54:22,570 --> 00:54:25,420
a bright or are they how important do

1379
00:54:24,519 --> 00:54:28,599
you think they're going to be the future

1380
00:54:25,420 --> 00:54:30,190
scientists going forward and maybe Molly

1381
00:54:28,599 --> 00:54:33,519
you could start commenting and I'll just

1382
00:54:30,190 --> 00:54:36,550
go down the row um I'm not gonna dive

1383
00:54:33,519 --> 00:54:37,900
into the whole virtual observatory okay

1384
00:54:36,550 --> 00:54:40,660
I don't want to get booked into the debt

1385
00:54:37,900 --> 00:54:44,019
I died what I meant to say was I'll

1386
00:54:40,659 --> 00:54:50,190
argue with him later yeah what but I'll

1387
00:54:44,019 --> 00:54:53,500
stay X on periscope Carol braids Tony I

1388
00:54:50,190 --> 00:54:57,720
think this I you're gonna start seeing a

1389
00:54:53,500 --> 00:55:01,539
lot more of this idea of being able to

1390
00:54:57,719 --> 00:55:06,579
search by what kinds of targets you're

1391
00:55:01,539 --> 00:55:09,429
interested in um rather than just

1392
00:55:06,579 --> 00:55:11,529
searching by the traditional way would

1393
00:55:09,429 --> 00:55:17,679
be to search by a location on the sky

1394
00:55:11,530 --> 00:55:19,870
and if you're interested in physics in

1395
00:55:17,679 --> 00:55:23,349
what's going on with something

1396
00:55:19,869 --> 00:55:24,789
physically then you know you don't

1397

00:55:23,349 --> 00:55:28,539
really care

1398
00:55:24,789 --> 00:55:30,730
where it is on the sky right even in the

1399
00:55:28,539 --> 00:55:35,980
case of you know this mapping that flows

1400
00:55:30,730 --> 00:55:37,570
out of the Milky Way where a you you

1401
00:55:35,980 --> 00:55:38,949
know really do care to figure out that

1402
00:55:37,570 --> 00:55:40,480
geometry the location of those

1403
00:55:38,949 --> 00:55:42,879
individual objects you're looking at on

1404
00:55:40,480 --> 00:55:44,500
the sky to map the geometry the first

1405
00:55:42,880 --> 00:55:47,440
thing you care about is what those

1406
00:55:44,500 --> 00:55:49,360
objects are and then you care about

1407
00:55:47,440 --> 00:55:50,920
where they are on the sky the first

1408
00:55:49,360 --> 00:55:52,780
thing is well is this object and I be

1409
00:55:50,920 --> 00:55:57,659
able to be useful to answer my science

1410
00:55:52,780 --> 00:56:00,519
question um so I think that that mode of

1411
00:55:57,659 --> 00:56:03,399

interacting with data is going to become

1412

00:56:00,519 --> 00:56:06,280

a lot more common and definitely I think

1413

00:56:03,400 --> 00:56:11,710

that these kinds of archives especially

1414

00:56:06,280 --> 00:56:14,550

um ones that show you that give you data

1415

00:56:11,710 --> 00:56:19,329

that you could use out of the box

1416

00:56:14,550 --> 00:56:23,650

instead of having to just download and

1417

00:56:19,329 --> 00:56:26,259

reproduce all of the data in some

1418

00:56:23,650 --> 00:56:29,800

painstaking way it's definitely going to

1419

00:56:26,260 --> 00:56:31,300

increase the longevity of things okay

1420

00:56:29,800 --> 00:56:33,340

John how about you not here I could talk

1421

00:56:31,300 --> 00:56:34,570

about this yeah y'all want to get to

1422

00:56:33,340 --> 00:56:36,309

John on this okay let's get your

1423

00:56:34,570 --> 00:56:38,590

thoughts on this one well I I have two

1424

00:56:36,309 --> 00:56:39,940

thoughts I mean one of them is is that

1425

00:56:38,590 --> 00:56:42,280

the other really exciting thing about

1426
00:56:39,940 --> 00:56:43,840
this and why it's exciting for me

1427
00:56:42,280 --> 00:56:46,090
because I mix ground and space-based

1428
00:56:43,840 --> 00:56:48,340
astronomy all the time is that I've

1429
00:56:46,090 --> 00:56:50,289
worked on a similar effort with the Keck

1430
00:56:48,340 --> 00:56:52,570
telescope in what we call the Kodiak

1431
00:56:50,289 --> 00:56:56,259
survey to build up a giant public survey

1432
00:56:52,570 --> 00:56:58,210
Kodiak with a Q with a que yeah but

1433
00:56:56,260 --> 00:57:04,090
spelled a queue at the end right and

1434
00:56:58,210 --> 00:57:06,340
it's it fits it well but the purpose of

1435
00:57:04,090 --> 00:57:08,800
that is to is to bring as much pet data

1436
00:57:06,340 --> 00:57:10,210
to public as well but what's going to be

1437
00:57:08,800 --> 00:57:12,250
really exciting is where these two

1438
00:57:10,210 --> 00:57:14,050
things overlap in the sense that there

1439
00:57:12,250 --> 00:57:16,420
is going to be a significant parameter

1440
00:57:14,050 --> 00:57:18,580
space from from the Hubble spectroscopic

1441
00:57:16,420 --> 00:57:21,250
archives and the ground-based by

1442
00:57:18,579 --> 00:57:22,929
spectroscopic archives where as long as

1443
00:57:21,250 --> 00:57:25,780
you know and in many ways Kodiaks

1444
00:57:22,929 --> 00:57:28,179
searchability was inspired by mast and

1445
00:57:25,780 --> 00:57:30,610
then archives like this what to try to

1446
00:57:28,179 --> 00:57:33,099
give as much discovery space to people

1447
00:57:30,610 --> 00:57:34,780
who haven't thought explicitly about the

1448
00:57:33,099 --> 00:57:36,819
nitty-gritty details of data reduction

1449
00:57:34,780 --> 00:57:37,420
in this than the other thing and so I'm

1450
00:57:36,820 --> 00:57:39,099
really

1451
00:57:37,420 --> 00:57:41,500
cited about seeing how these things

1452
00:57:39,099 --> 00:57:42,940
might overlap the other point that I was

1453
00:57:41,500 --> 00:57:44,829
going to make real quickly is that and

1454

00:57:42,940 --> 00:57:46,750
not to sound like a downer but we're not

1455
00:57:44,829 --> 00:57:51,480
going to have a UV spectrograph in space

1456
00:57:46,750 --> 00:57:53,920
forever and the you know the the great

1457
00:57:51,480 --> 00:57:55,329
opportunities afforded by archives which

1458
00:57:53,920 --> 00:57:59,798
have given a lot of thought to things

1459
00:57:55,329 --> 00:58:01,900
like this it's really helpful continuing

1460
00:57:59,798 --> 00:58:04,000
and continuing our ability to do UV

1461
00:58:01,900 --> 00:58:05,349
space astronomy that's true God we

1462
00:58:04,000 --> 00:58:07,599
brought that point up in many hangouts

1463
00:58:05,349 --> 00:58:09,369
word in all the one game in town and I

1464
00:58:07,599 --> 00:58:11,318
think graduate students will be trained

1465
00:58:09,369 --> 00:58:14,200
on archives like this because they won't

1466
00:58:11,318 --> 00:58:16,269
have new native Nick like this for at

1467
00:58:14,199 --> 00:58:17,828
least four at least for a while boy for

1468
00:58:16,269 --> 00:58:19,630

educational use as well this will be

1469

00:58:17,829 --> 00:58:21,460

amazing resource for people Jason can I

1470

00:58:19,630 --> 00:58:24,910

get your thoughts on that well yeah it's

1471

00:58:21,460 --> 00:58:27,460

funny so a couple things uh the the

1472

00:58:24,909 --> 00:58:31,420

Kodiak project is a perfect example of

1473

00:58:27,460 --> 00:58:34,088

what you the power of unleashing data

1474

00:58:31,420 --> 00:58:35,769

and unlocking it taking out taking it

1475

00:58:34,088 --> 00:58:37,119

out of the individual astronomers desk

1476

00:58:35,769 --> 00:58:39,280

drawer and putting it in the public

1477

00:58:37,119 --> 00:58:42,280

domain the Kinect project the Keck

1478

00:58:39,280 --> 00:58:44,319

telescope in Hawaii organized by private

1479

00:58:42,280 --> 00:58:46,809

universities they never were obliged by

1480

00:58:44,318 --> 00:58:48,940

law to release their data until NASA

1481

00:58:46,809 --> 00:58:50,170

made and do it now you're starting to

1482

00:58:48,940 --> 00:58:51,579

see more and more of a kept a to come

1483
00:58:50,170 --> 00:58:53,380
out in public and people are using it

1484
00:58:51,579 --> 00:58:55,510
you're seeing that publication rates and

1485
00:58:53,380 --> 00:58:57,608
the impact of that data finally come out

1486
00:58:55,510 --> 00:59:00,849
the other thing is a story I heard

1487
00:58:57,608 --> 00:59:03,190
recently uh you know we all know that

1488
00:59:00,849 --> 00:59:04,780
back in the medieval times the reason

1489
00:59:03,190 --> 00:59:06,670
all the Greek and Roman manuscript

1490
00:59:04,780 --> 00:59:09,099
survived was that the monks were copying

1491
00:59:06,670 --> 00:59:11,260
them right what I don't have first-hand

1492
00:59:09,099 --> 00:59:13,960
experience but do you know why they had

1493
00:59:11,260 --> 00:59:15,700
to copy them it wasn't that they wanted

1494
00:59:13,960 --> 00:59:18,670
to read more copies it was that the

1495
00:59:15,699 --> 00:59:20,558
copies sitting on the shelf had a finite

1496
00:59:18,670 --> 00:59:24,099
lifetime because they literally the

1497
00:59:20,559 --> 00:59:26,230
bookworms would eat them so if Iran even

1498
00:59:24,099 --> 00:59:28,000
if you didn't want to sim simma Nate the

1499
00:59:26,230 --> 00:59:30,369
manuscript and pass the information

1500
00:59:28,000 --> 00:59:32,679
around you still had to make sure that

1501
00:59:30,369 --> 00:59:34,960
it stayed alive by copying the version

1502
00:59:32,679 --> 00:59:37,058
that you had in your monastery because

1503
00:59:34,960 --> 00:59:39,670
otherwise it would get eaten by worms so

1504
00:59:37,059 --> 00:59:41,319
what we're in in that same way what

1505
00:59:39,670 --> 00:59:45,220
we're doing here is keeping a database

1506
00:59:41,318 --> 00:59:47,048
alive we're making sure you know through

1507
00:59:45,219 --> 00:59:48,779
our own intellects and through the work

1508
00:59:47,048 --> 00:59:50,860
of our IT people in the whole process

1509
00:59:48,780 --> 00:59:54,160
making sure that that data

1510
00:59:50,860 --> 00:59:57,370
Days alive and available you know you're

1511

00:59:54,159 --> 01:00:00,009
not going to be able to read a CD in 15

1512
00:59:57,369 --> 01:00:01,989
years already my kids who is four and

1513
01:00:00,010 --> 01:00:04,090
eight they don't know what a wild record

1514
01:00:01,989 --> 01:00:05,589
is oh yeah well we've all yes anybody

1515
01:00:04,090 --> 01:00:08,410
who's had a floppy disk and had to make

1516
01:00:05,590 --> 01:00:11,559
it go to see each other's and then they

1517
01:00:08,409 --> 01:00:14,019
will know he is right you can't rely on

1518
01:00:11,559 --> 01:00:15,489
the physical medium so we're you know

1519
01:00:14,019 --> 01:00:17,710
it's our job here at Space Telescope to

1520
01:00:15,489 --> 01:00:20,079
make sure that the data itself is the

1521
01:00:17,710 --> 01:00:21,909
thing we're trying to preserve stays in

1522
01:00:20,079 --> 01:00:23,619
the form that's usable through the

1523
01:00:21,909 --> 01:00:25,089
decades eventually as O'Meara says

1524
01:00:23,619 --> 01:00:25,929
Hubble isn't going to last forever but

1525
01:00:25,090 --> 01:00:27,970

eventually we're going to have a

1526

01:00:25,929 --> 01:00:29,710

telescope that's much bigger a lot of us

1527

01:00:27,969 --> 01:00:33,250

are working on a 10 or 12 your space

1528

01:00:29,710 --> 01:00:35,440

telescope jwst and we will definitely

1529

01:00:33,250 --> 01:00:37,329

absolutely want to reabsorb of the stuff

1530

01:00:35,440 --> 01:00:38,889

that Hubble's looked at and we'll want

1531

01:00:37,329 --> 01:00:40,239

to go back and compare new results with

1532

01:00:38,889 --> 01:00:42,670

those future observatories to what

1533

01:00:40,239 --> 01:00:44,589

Hubble saw 20 30 years before we have to

1534

01:00:42,670 --> 01:00:46,119

have these archives in place and they

1535

01:00:44,590 --> 01:00:48,490

have to still be intelligible readable

1536

01:00:46,119 --> 01:00:49,719

to us for that to work so there's a

1537

01:00:48,489 --> 01:00:52,299

really strong reason why we're keeping

1538

01:00:49,719 --> 01:00:54,189

these things away from the bookworms and

1539

01:00:52,300 --> 01:00:55,900

broadway to be put back on just that

1540
01:00:54,190 --> 01:00:58,179
last point for two seconds real fast

1541
01:00:55,900 --> 01:00:59,680
because we are with with the remaining

1542
01:00:58,179 --> 01:01:01,329
years of Hubble that we have every

1543
01:00:59,679 --> 01:01:04,149
second is precious and so the other

1544
01:01:01,329 --> 01:01:06,069
thing that this archive does is it helps

1545
01:01:04,150 --> 01:01:08,019
inform the last set of proposals that

1546
01:01:06,070 --> 01:01:09,940
will be made on Hubble's Mesa that were

1547
01:01:08,019 --> 01:01:11,800
not made wasting time and be so that we

1548
01:01:09,940 --> 01:01:14,440
really are getting the best photons down

1549
01:01:11,800 --> 01:01:17,170
the bucket and in archives like this are

1550
01:01:14,440 --> 01:01:18,329
crucial for things yes and I you guys

1551
01:01:17,170 --> 01:01:20,590
are raising a lot of really interesting

1552
01:01:18,329 --> 01:01:22,509
topics that I'd like to get into not not

1553
01:01:20,590 --> 01:01:24,010
just the educational aspects of what

1554
01:01:22,510 --> 01:01:25,480
these archives can we can bring but also

1555
01:01:24,010 --> 01:01:27,670
the fact that what Jason brought up the

1556
01:01:25,480 --> 01:01:28,990
the perpetuating of the data set the

1557
01:01:27,670 --> 01:01:30,940
saving of them to make sure we don't

1558
01:01:28,989 --> 01:01:33,549
lose any of this stuff as well as making

1559
01:01:30,940 --> 01:01:35,710
as John points out more efficient use of

1560
01:01:33,550 --> 01:01:36,730
the tools that we do have already and we

1561
01:01:35,710 --> 01:01:38,320
don't read OOP we don't duplicate

1562
01:01:36,730 --> 01:01:40,449
efforts so these are all excellent

1563
01:01:38,320 --> 01:01:42,220
points and big data oh my gosh that's

1564
01:01:40,449 --> 01:01:44,319
like 10 hangouts all in all right there

1565
01:01:42,219 --> 01:01:46,089
so we do really go into a lot of this

1566
01:01:44,320 --> 01:01:47,650
stuff's but but I hope you guys got a

1567
01:01:46,090 --> 01:01:49,690
good introduction into this new

1568

01:01:47,650 --> 01:01:51,010
structural archive that's out available

1569
01:01:49,690 --> 01:01:52,900
on mass now I want to thank Molly

1570
01:01:51,010 --> 01:01:54,010
people's Jason Tomlinson and John

1571
01:01:52,900 --> 01:01:56,289
O'Meara for telling us a little bit

1572
01:01:54,010 --> 01:01:58,750
about it go visit go ask your questions

1573
01:01:56,289 --> 01:02:01,210
go explore it's there for you it's wide

1574
01:01:58,750 --> 01:02:02,829
open and ready to go and I am excited

1575
01:02:01,210 --> 01:02:04,269
for this hopefully we'll see a lot of

1576
01:02:02,829 --> 01:02:06,069
really cool new sign

1577
01:02:04,269 --> 01:02:08,079
coming out of it and I even wanted to

1578
01:02:06,070 --> 01:02:10,809
talk about citizen science impact but we

1579
01:02:08,079 --> 01:02:12,460
just didn't have time so anyway many

1580
01:02:10,809 --> 01:02:14,889
turn it all into an art project you know

1581
01:02:12,460 --> 01:02:20,949
yeah exactly is a little heavy there's a

1582
01:02:14,889 --> 01:02:23,170

lot of major oh we're doing that okay

1583

01:02:20,949 --> 01:02:24,429

okay guys well thank you all for I guess

1584

01:02:23,170 --> 01:02:26,230

we have to stop it there I did see one

1585

01:02:24,429 --> 01:02:28,210

quick comment from from Twitter from

1586

01:02:26,230 --> 01:02:30,670

days off 77 who's talking about a great

1587

01:02:28,210 --> 01:02:34,000

library from HST what a great tool the

1588

01:02:30,670 --> 01:02:36,490

Hubble legacy offside archive please

1589

01:02:34,000 --> 01:02:37,780

guys go explore this is your data set so

1590

01:02:36,489 --> 01:02:39,159

we hope you guys can get a lot of good

1591

01:02:37,780 --> 01:02:41,110

use out of it the astronomers I'm sure

1592

01:02:39,159 --> 01:02:42,670

well and we look forward to see what

1593

01:02:41,110 --> 01:02:43,930

comes out of it on behalf of carol

1594

01:02:42,670 --> 01:02:46,170

christian and scott lewis i want to

1595

01:02:43,929 --> 01:02:50,009

thank you all for watching and as always

1596

01:02:46,170 --> 01:02:50,010

keep looking up

