

PUBLIC LECTURE SERIES

Finding the Music of the
Spheres: Hearing Stars

Featuring Guest Speakers:
The Consonance Collective and
the Bergamot Quartet

1
00:00:04,150 --> 00:00:02,470
and welcome to the space telescope

2
00:00:07,110 --> 00:00:04,160
public lecture series

3
00:00:07,909 --> 00:00:07,120
tonight we have a very special event for

4
00:00:10,629 --> 00:00:07,919
you

5
00:00:11,669 --> 00:00:10,639
finding music of the spheres hearing

6
00:00:13,430 --> 00:00:11,679
stars

7
00:00:14,709 --> 00:00:13,440
by the consonants collective and the

8
00:00:16,710 --> 00:00:14,719
bergamot quartet

9
00:00:20,550 --> 00:00:16,720
of the peabody institute of the johns

10
00:00:25,269 --> 00:00:22,550
i'm your host dr frank summers of the

11
00:00:27,910 --> 00:00:25,279
space telescope science institute

12
00:00:29,029 --> 00:00:27,920
and i have to thank my amazing tech team

13
00:00:31,189 --> 00:00:29,039

who not only

14

00:00:32,790 --> 00:00:31,199

records this webcast but gets it out to

15

00:00:35,990 --> 00:00:32,800

you live on youtube

16

00:00:38,549 --> 00:00:36,000

thomas marufu and grant justice

17

00:00:41,190 --> 00:00:38,559

a reminder that space telescope public

18

00:00:45,029 --> 00:00:41,200

lectures will continue to be online only

19

00:00:48,150 --> 00:00:45,039

until further notice

20

00:00:51,430 --> 00:00:48,160

our upcoming talks next month

21

00:00:54,389 --> 00:00:51,440

june 1st how to hunt for distant

22

00:00:56,069 --> 00:00:54,399

worlds by emily rickman of the european

23

00:00:59,270 --> 00:00:56,079

space agency

24

00:01:02,310 --> 00:00:59,280

space telescope science institute in

25

00:01:03,990 --> 00:01:02,320

july quinn hart will be back with

26

00:01:06,789 --> 00:01:04,000

another installment

27

00:01:08,950 --> 00:01:06,799

of her armchair astrophysics if you

28

00:01:09,910 --> 00:01:08,960

remember she gave us a wonderful talk

29

00:01:12,870 --> 00:01:09,920

last summer

30

00:01:15,350 --> 00:01:12,880

and she has decided that she has so much

31

00:01:18,550 --> 00:01:15,360

to say she'll send you some more

32

00:01:20,630 --> 00:01:18,560

on august 3rd we have a fantastic

33

00:01:23,910 --> 00:01:20,640

speaker that i have not yet found

34

00:01:25,749 --> 00:01:23,920

uh i will fill that up in the next

35

00:01:27,590 --> 00:01:25,759

month and if you want to find out who

36

00:01:30,630 --> 00:01:27,600

that next speaker is

37

00:01:32,630 --> 00:01:30,640

well then you can go to our website if

38

00:01:33,429 --> 00:01:32,640

you just type in hubble public lectures

39

00:01:37,789 --> 00:01:33,439

you'll find

40

00:01:42,950 --> 00:01:39,749

www.stsci.edu

41

00:01:43,510 --> 00:01:42,960

public hyphen lectures this tells you

42

00:01:45,910 --> 00:01:43,520

all about

43

00:01:47,190 --> 00:01:45,920

our lectures it gives you on the left

44

00:01:49,670 --> 00:01:47,200

you can see the link to

45

00:01:51,429 --> 00:01:49,680

our webcast both on youtube and on the

46

00:01:54,069 --> 00:01:51,439

sdsci webcasting

47

00:01:55,749 --> 00:01:54,079

site and on the right we have a place

48

00:01:56,550 --> 00:01:55,759

where you can subscribe to our lecture

49

00:01:58,950 --> 00:01:56,560

announcements

50

00:02:01,190 --> 00:01:58,960

when we reveal who that amazing august

51

00:02:04,230 --> 00:02:01,200

speaker will be

52

00:02:05,990 --> 00:02:04,240

also on the website are the links for

53

00:02:08,550 --> 00:02:06,000

each individual lecture

54

00:02:09,109 --> 00:02:08,560

and if you click on the read more link

55

00:02:13,030 --> 00:02:09,119

you get

56

00:02:15,830 --> 00:02:13,040

the uh the the abstract of the talk

57

00:02:16,309 --> 00:02:15,840

as well as links to the stsci webcast up

58

00:02:20,630 --> 00:02:16,319

top

59

00:02:23,589 --> 00:02:20,640

and the youtube webcast down bottom

60

00:02:25,110 --> 00:02:23,599

for email as i said the announcements

61

00:02:26,150 --> 00:02:25,120

it's easiest just to sign up at the

62

00:02:28,150 --> 00:02:26,160

website

63

00:02:29,270 --> 00:02:28,160

but you can also subscribe to our

64

00:02:31,110 --> 00:02:29,280

youtube channel

65

00:02:32,949 --> 00:02:31,120

um and get notifications from our

66

00:02:34,830 --> 00:02:32,959

youtube channel of new videos

67

00:02:36,309 --> 00:02:34,840

as well as reminders of these live

68

00:02:38,550 --> 00:02:36,319

events

69

00:02:41,309 --> 00:02:38,560

if you have comments or questions you

70

00:02:44,229 --> 00:02:41,319

can send them to public lecture

71

00:02:46,229 --> 00:02:44,239

stsci.edu

72

00:02:47,670 --> 00:02:46,239

finally if you want to follow us on

73

00:02:51,350 --> 00:02:47,680

social media

74

00:02:52,470 --> 00:02:51,360

hubble space telescope the james webb

75

00:02:55,910 --> 00:02:52,480

space telescope

76

00:02:58,949 --> 00:02:55,920

institute we're on

77

00:03:01,990 --> 00:02:58,959

facebook twitter youtube and

78

00:03:04,229 --> 00:03:02,000

instagram i myself do a tiny

79

00:03:05,750 --> 00:03:04,239

tiny little bit of social media if you

80

00:03:08,070 --> 00:03:05,760

would like to hear what i have to say

81

00:03:11,430 --> 00:03:08,080

you can follow me on facebook or twitter

82

00:03:15,750 --> 00:03:14,390

our news from the universe is not

83

00:03:19,509 --> 00:03:15,760

appearing this month

84

00:03:22,790 --> 00:03:19,519

uh it will return in june why

85

00:03:24,550 --> 00:03:22,800

well because we have a large number of

86

00:03:27,830 --> 00:03:24,560

speakers tonight and i want to give

87

00:03:29,830 --> 00:03:27,840

all the time to them we have five

88

00:03:31,509 --> 00:03:29,840

count em five composers from the

89

00:03:34,710 --> 00:03:31,519

consonants collective

90

00:03:37,670 --> 00:03:34,720

and we have the four folks the the

91

00:03:39,990 --> 00:03:37,680

artists in the bergamot quartet and they

92

00:03:42,149 --> 00:03:40,000

will be speaking to you tonight

93

00:03:43,670 --> 00:03:42,159

i also want to let you know that the

94

00:03:46,550 --> 00:03:43,680

videos the full

95

00:03:47,830 --> 00:03:46,560

complete compositions and the videos

96

00:03:51,110 --> 00:03:47,840

that go with them

97

00:03:52,309 --> 00:03:51,120

are available on youtube in the hearing

98

00:03:54,949 --> 00:03:52,319

stars playlist

99

00:03:57,750 --> 00:03:54,959

there are five videos and the entire

100

00:04:00,789 --> 00:03:57,760

playlist lasts over 65 minutes

101
00:04:02,710 --> 00:04:00,799
however i want to point out that if

102
00:04:04,229 --> 00:04:02,720
you're watching this on youtube you're

103
00:04:06,550 --> 00:04:04,239
watching it on the hubble space

104
00:04:08,229 --> 00:04:06,560
telescope youtube channel

105
00:04:10,390 --> 00:04:08,239
these videos were not posted on the

106
00:04:12,789 --> 00:04:10,400
hubble space telescope youtube channel

107
00:04:14,630 --> 00:04:12,799
instead as you can see in the lower left

108
00:04:17,189 --> 00:04:14,640
they were posted on the space

109
00:04:18,069 --> 00:04:17,199
telescope science institute youtube

110
00:04:20,150 --> 00:04:18,079
channel

111
00:04:21,349 --> 00:04:20,160
so you come to the hubble space

112
00:04:23,189 --> 00:04:21,359
telescope

113
00:04:24,710 --> 00:04:23,199

youtube channel for the lecture and you

114

00:04:28,230 --> 00:04:24,720

go to the space telescope

115

00:04:31,670 --> 00:04:28,240

youtube channel for the videos

116

00:04:32,070 --> 00:04:31,680

alright so it is my wonderful pleasure

117

00:04:35,430 --> 00:04:32,080

to

118

00:04:38,710 --> 00:04:35,440

introduce just one of the uh

119

00:04:41,749 --> 00:04:38,720

speakers tonight bobby gee was

120

00:04:44,390 --> 00:04:41,759

raised in shanghai but he came to the us

121

00:04:45,749 --> 00:04:44,400

and did a double major in physics and

122

00:04:49,430 --> 00:04:45,759

music at uc

123

00:04:50,550 --> 00:04:49,440

berkeley then he did a masters in

124

00:04:53,270 --> 00:04:50,560

composing

125

00:04:55,189 --> 00:04:53,280

at the peabody conservatory he is

126
00:04:56,710 --> 00:04:55,199
currently working on new pieces for the

127
00:05:00,070 --> 00:04:56,720
albany symphony

128
00:05:00,469 --> 00:05:00,080
uh music and a working with a new music

129
00:05:04,310 --> 00:05:00,479
group

130
00:05:06,150 --> 00:05:04,320
called mind on fire he will introduce

131
00:05:08,629 --> 00:05:06,160
uh actually he will start off the

132
00:05:09,510 --> 00:05:08,639
introductions of all the members of this

133
00:05:12,070 --> 00:05:09,520
amazing

134
00:05:13,270 --> 00:05:12,080
uh performing folks here tonight so

135
00:05:19,749 --> 00:05:13,280
ladies and gentlemen

136
00:05:24,230 --> 00:05:21,510
all right thank you so much frank for

137
00:05:26,150 --> 00:05:24,240
that uh very generous introduction um

138
00:05:27,590 --> 00:05:26,160

yeah we're all super super glad to be

139

00:05:28,230 --> 00:05:27,600

here and we're all really excited just

140

00:05:33,270 --> 00:05:28,240

to

141

00:05:35,189 --> 00:05:33,280

a spot in their public lecture series

142

00:05:36,469 --> 00:05:35,199

it's not super common having musicians

143

00:05:37,990 --> 00:05:36,479

come on here so we're really really glad

144

00:05:40,390 --> 00:05:38,000

that we got to be here

145

00:05:41,590 --> 00:05:40,400

um yeah so just to begin by introducing

146

00:05:44,230 --> 00:05:41,600

everybody else

147

00:05:46,230 --> 00:05:44,240

um so i will start out by introducing

148

00:05:48,550 --> 00:05:46,240

constance and who we are

149

00:05:49,510 --> 00:05:48,560

um so constance is a collective of

150

00:05:51,830 --> 00:05:49,520

composers

151

00:05:54,070 --> 00:05:51,840

we all met as graduate students in

152

00:05:55,909 --> 00:05:54,080

composition at the peabody conservatory

153

00:05:57,510 --> 00:05:55,919

and our whole thing is wanting to bring

154

00:05:58,230 --> 00:05:57,520

contemporary classical music to

155

00:06:00,870 --> 00:05:58,240

audiences

156

00:06:01,670 --> 00:06:00,880

through multimedia collaborations like

157

00:06:04,070 --> 00:06:01,680

this

158

00:06:06,309 --> 00:06:04,080

and themed concerts unconventional

159

00:06:08,150 --> 00:06:06,319

concert venues that kind of thing

160

00:06:10,629 --> 00:06:08,160

so just to introduce everybody obviously

161

00:06:11,909 --> 00:06:10,639

there's myself um there's zach gulabov

162

00:06:14,870 --> 00:06:11,919

davis

163

00:06:16,790 --> 00:06:14,880

there is dan despins there's gouay and

164

00:06:19,110 --> 00:06:16,800

there is sayuna kim

165

00:06:20,629 --> 00:06:19,120

yeah if you want to find out more about

166

00:06:23,350 --> 00:06:20,639

us you can check out our website which

167

00:06:24,710 --> 00:06:23,360

is up here www.cnsnc.org

168

00:06:27,189 --> 00:06:24,720

you can also follow us on facebook and

169

00:06:29,590 --> 00:06:27,199

instagram um next i will i will leave it

170

00:06:31,590 --> 00:06:29,600

to the bergamot quartets to introduce

171

00:06:35,670 --> 00:06:31,600

their members i'll pass it off to

172

00:06:40,629 --> 00:06:35,680

cellist irene hahn let me go ahead and

173

00:06:48,150 --> 00:06:44,070

hi um i'm irene i am the cellist in

174

00:06:52,070 --> 00:06:48,160

bergamot quartet um

175

00:06:54,150 --> 00:06:52,080

sorry um and i think

176

00:06:56,469 --> 00:06:54,160

everyone would like to introduce

177

00:06:58,550 --> 00:06:56,479

themselves individually first before i

178

00:07:00,309 --> 00:06:58,560

um talk a little bit more about who we

179

00:07:02,390 --> 00:07:00,319

are

180

00:07:05,270 --> 00:07:02,400

so yeah hi i'm amy 10 and i play the

181

00:07:06,950 --> 00:07:05,280

viola in the bergamot quartet

182

00:07:08,390 --> 00:07:06,960

hello everyone i'm sarah thomas and i'm

183

00:07:11,110 --> 00:07:08,400

one of the violinists in the bergamot

184

00:07:16,550 --> 00:07:14,830

hi i'm lita think and i'm also a

185

00:07:19,270 --> 00:07:16,560

violinist

186

00:07:20,230 --> 00:07:19,280

so we are a string quartet based in new

187

00:07:22,309 --> 00:07:20,240

york city we

188

00:07:23,589 --> 00:07:22,319

are the graduate quartet at the manu

189

00:07:26,629 --> 00:07:23,599

school of music right now

190

00:07:29,990 --> 00:07:26,639

we met at peabody in

191

00:07:33,110 --> 00:07:30,000

2016 and we've been performing together

192

00:07:35,510 --> 00:07:33,120

ever since we um specialize in

193

00:07:39,430 --> 00:07:35,520

performing music by living composers

194

00:07:41,589 --> 00:07:39,440

um and that's how through peabody

195

00:07:44,070 --> 00:07:41,599

that's how we got to get to know the

196

00:07:47,189 --> 00:07:44,080

composers of this album um

197

00:07:48,869 --> 00:07:47,199

and we're really excited to do that um

198

00:07:50,869 --> 00:07:48,879

i'm going to hand it over to bobby to

199

00:07:54,469 --> 00:07:50,879

continue our presentation for this

200

00:07:58,309 --> 00:07:56,629

great thanks a bunch irene and uh thanks

201

00:08:00,230 --> 00:07:58,319

to the content for being here

202

00:08:01,909 --> 00:08:00,240

um yeah so just to explain a little bit

203

00:08:03,909 --> 00:08:01,919

more about hearing stars and how this

204

00:08:07,270 --> 00:08:03,919

whole project came together

205

00:08:08,390 --> 00:08:07,280

um so this was last year this was in the

206

00:08:11,110 --> 00:08:08,400

before times before

207

00:08:12,710 --> 00:08:11,120

covet and everything um so the members

208

00:08:13,830 --> 00:08:12,720

of consonants and bergamot were getting

209

00:08:15,029 --> 00:08:13,840

together and just sort of talking

210

00:08:16,710 --> 00:08:15,039

because we knew that we wanted to try

211

00:08:18,150 --> 00:08:16,720

and do some kind of a project or some

212

00:08:19,670 --> 00:08:18,160

kind of a concert together

213

00:08:21,189 --> 00:08:19,680

our original idea was that we were

214

00:08:22,230 --> 00:08:21,199

thinking about working with something in

215

00:08:24,150 --> 00:08:22,240

the visual medium

216

00:08:26,230 --> 00:08:24,160

so you know film scores that kind of

217

00:08:28,309 --> 00:08:26,240

thing and the more we talked the more

218

00:08:30,950 --> 00:08:28,319

the project ended up shifting until we

219

00:08:31,589 --> 00:08:30,960

until we came out we decided to uh focus

220

00:08:35,670 --> 00:08:31,599

on

221

00:08:37,589 --> 00:08:35,680

is public domain because

222

00:08:39,430 --> 00:08:37,599

for at least available for fair use

223

00:08:40,310 --> 00:08:39,440

because yay hubble space telescope yeah

224

00:08:42,870 --> 00:08:40,320

science

225

00:08:44,550 --> 00:08:42,880

um and from there as we begin to explore

226
00:08:46,230 --> 00:08:44,560
more we learned that the space telescope

227
00:08:47,670 --> 00:08:46,240
science institute or sdsci

228
00:08:49,190 --> 00:08:47,680
folks who manage all those photos and

229
00:08:50,790 --> 00:08:49,200
everything are actually based in our

230
00:08:52,630 --> 00:08:50,800
backyard here in baltimore

231
00:08:54,070 --> 00:08:52,640
and so from there we ended up chatting

232
00:08:56,710 --> 00:08:54,080
more and eventually the entire

233
00:08:57,590 --> 00:08:56,720
project has sort of evolved into this

234
00:09:00,230 --> 00:08:57,600
hour-long

235
00:09:01,430 --> 00:09:00,240
visual album depicting the life stages

236
00:09:02,470 --> 00:09:01,440
of stars

237
00:09:05,430 --> 00:09:02,480
so that's what we're going to end up

238
00:09:07,910 --> 00:09:05,440

talking about today every single

239

00:09:09,430 --> 00:09:07,920

composer composed a different piece or

240

00:09:11,910 --> 00:09:09,440

based on a different

241

00:09:13,829 --> 00:09:11,920

stellar life stage so we'll start out

242

00:09:15,829 --> 00:09:13,839

with the birth of stars we'll go on to

243

00:09:17,910 --> 00:09:15,839

star systems we'll go on to

244

00:09:19,990 --> 00:09:17,920

supernovae and like the death of stars

245

00:09:21,910 --> 00:09:20,000

and then black holes and finally

246

00:09:23,670 --> 00:09:21,920

dark matter just to close us out and

247

00:09:25,670 --> 00:09:23,680

then after we're done with each

248

00:09:27,350 --> 00:09:25,680

after each composer is done presenting

249

00:09:28,630 --> 00:09:27,360

their piece we'll turn it over back to

250

00:09:30,070 --> 00:09:28,640

the quartet for them

251

00:09:32,230 --> 00:09:30,080

just to explain a little bit more about

252

00:09:34,550 --> 00:09:32,240

what it was like to put together our

253

00:09:36,470 --> 00:09:34,560

pieces because all the pieces have

254

00:09:38,630 --> 00:09:36,480

a variety of techniques that exist

255

00:09:41,190 --> 00:09:38,640

outside sort of standard classical

256

00:09:43,110 --> 00:09:41,200

you know procedure and style and part of

257

00:09:44,389 --> 00:09:43,120

the great fun with working with them was

258

00:09:45,990 --> 00:09:44,399

watching them sort of

259

00:09:47,910 --> 00:09:46,000

wrestle through our notation and our new

260

00:09:50,150 --> 00:09:47,920

ideas and you know try and bring them to

261

00:09:51,910 --> 00:09:50,160

life as effectively as possible

262

00:09:53,750 --> 00:09:51,920

yeah so if you like the videos or you

263

00:09:55,350 --> 00:09:53,760

like what you see here once again check

264

00:09:57,910 --> 00:09:55,360

out the full playlist on youtube

265

00:09:59,430 --> 00:09:57,920

um and if you like the music a whole lot

266

00:10:00,790 --> 00:09:59,440

this whole album is available

267

00:10:04,150 --> 00:10:00,800

just you know anywhere you listen to

268

00:10:07,190 --> 00:10:04,160

music spotify youtube apple music if

269

00:10:08,790 --> 00:10:07,200

anyone uses that um yeah cool so with

270

00:10:09,910 --> 00:10:08,800

that i'm gonna go ahead and jump right

271

00:10:13,509 --> 00:10:09,920

in by explaining

272

00:10:15,350 --> 00:10:13,519

uh my particular topic so

273

00:10:17,350 --> 00:10:15,360

here we go so my piece is called celeste

274

00:10:19,990 --> 00:10:17,360

forma and is based on

275

00:10:21,350 --> 00:10:20,000

um protostars this idea of forming star

276

00:10:24,470 --> 00:10:21,360

formation and how they go

277

00:10:26,470 --> 00:10:24,480

from you know being goblets of dust and

278

00:10:28,310 --> 00:10:26,480

gas and eventually becoming the raging

279

00:10:30,069 --> 00:10:28,320

you know thermonuclear explosions and

280

00:10:31,670 --> 00:10:30,079

all that that that light up our night

281

00:10:34,230 --> 00:10:31,680

sky

282

00:10:34,710 --> 00:10:34,240

so the overall structure of this piece

283

00:10:37,269 --> 00:10:34,720

um

284

00:10:38,150 --> 00:10:37,279

is in broadly speaking is in three

285

00:10:39,990 --> 00:10:38,160

chapters

286

00:10:41,030 --> 00:10:40,000

so i'll go and i'll talk more about each

287

00:10:41,430 --> 00:10:41,040

one i'm just going to go ahead and do a

288

00:10:43,110 --> 00:10:41,440

quick

289

00:10:44,870 --> 00:10:43,120

overview here so the first one we start

290

00:10:46,710 --> 00:10:44,880

out with nebulae

291

00:10:48,069 --> 00:10:46,720

and then it goes on to the rapid

292

00:10:50,310 --> 00:10:48,079

expansion of

293

00:10:52,230 --> 00:10:50,320

protostars basically once protostars and

294

00:10:53,350 --> 00:10:52,240

these dense cores actually form how they

295

00:10:55,829 --> 00:10:53,360

begin to grow

296

00:10:57,590 --> 00:10:55,839

and they uh yeah very rapidly um and

297

00:10:58,310 --> 00:10:57,600

then finally the last chapter of the

298

00:11:01,269 --> 00:10:58,320

piece

299

00:11:03,829 --> 00:11:01,279

is sort of based around um main sequence

300

00:11:04,949 --> 00:11:03,839

stars so once protostars have stabilized

301
00:11:07,430 --> 00:11:04,959
and they're no longer

302
00:11:08,790 --> 00:11:07,440
you know um proto so to speak they're no

303
00:11:10,230 --> 00:11:08,800
longer exploding all over the place and

304
00:11:10,870 --> 00:11:10,240
trying to figure themselves out so to

305
00:11:13,590 --> 00:11:10,880
speak

306
00:11:15,110 --> 00:11:13,600
which is like a person in the 20s um the

307
00:11:16,870 --> 00:11:15,120
week when it goes on did they go on to

308
00:11:17,269 --> 00:11:16,880
become main sequence stars which is what

309
00:11:28,550 --> 00:11:17,279
the

310
00:11:31,670 --> 00:11:28,560
thought of nebulae

311
00:11:33,829 --> 00:11:31,680
um was that um

312
00:11:36,230 --> 00:11:33,839
there's sort of these big chaotic swirls

313
00:11:38,790 --> 00:11:36,240

of dust and gas right like

314

00:11:40,470 --> 00:11:38,800

um they have it's kind of impossible to

315

00:11:41,110 --> 00:11:40,480

predict with the exact you know pinpoint

316

00:11:43,430 --> 00:11:41,120

precision

317

00:11:45,190 --> 00:11:43,440

or this exact part of the nebula the

318

00:11:46,470 --> 00:11:45,200

nebula is going to like become

319

00:11:48,069 --> 00:11:46,480

is going to have is it going to grow

320

00:11:49,509 --> 00:11:48,079

proto stars first and then this exact

321

00:11:51,190 --> 00:11:49,519

and then this exact bit's going to go

322

00:11:52,389 --> 00:11:51,200

for it's going to happen first and this

323

00:11:53,750 --> 00:11:52,399

person will happen here first and that

324

00:11:55,509 --> 00:11:53,760

person will happen there next

325

00:11:56,949 --> 00:11:55,519

um that kind of pinpoint precision is

326

00:11:59,430 --> 00:11:56,959

not really possible for these kinds of

327

00:12:01,750 --> 00:11:59,440

massive super chaotic systems right

328

00:12:03,910 --> 00:12:01,760

um and so instead what we do know though

329

00:12:05,829 --> 00:12:03,920

is the overall behavior of these kinds

330

00:12:08,629 --> 00:12:05,839

of big chaotic systems

331

00:12:10,629 --> 00:12:08,639

um so basically so we know the rules

332

00:12:11,509 --> 00:12:10,639

that govern these nebulae but we don't

333

00:12:12,710 --> 00:12:11,519

actually know

334

00:12:14,710 --> 00:12:12,720

we can't necessarily this is not

335

00:12:16,310 --> 00:12:14,720

actually even useful to explain with

336

00:12:18,470 --> 00:12:16,320

exact pinpoint precision

337

00:12:20,069 --> 00:12:18,480

you know which bit how exactly the

338

00:12:21,590 --> 00:12:20,079

system is going to evolve

339

00:12:23,750 --> 00:12:21,600

um and so the way that i wanted to

340

00:12:25,430 --> 00:12:23,760

translate that was with this is

341

00:12:28,150 --> 00:12:25,440

this little musical thing called box

342

00:12:30,870 --> 00:12:28,160

notation and so what box notation

343

00:12:32,790 --> 00:12:30,880

is is where the musician basically i

344

00:12:34,150 --> 00:12:32,800

write these little boxes of music so

345

00:12:35,110 --> 00:12:34,160

there's a couple of notes inside and

346

00:12:36,949 --> 00:12:35,120

some techniques

347

00:12:38,790 --> 00:12:36,959

for the musicians and they are not

348

00:12:39,590 --> 00:12:38,800

trying to coordinate with each other

349

00:12:42,310 --> 00:12:39,600

with exact

350

00:12:42,870 --> 00:12:42,320

precision right basically they're all

351

00:12:44,470 --> 00:12:42,880

playing

352

00:12:46,629 --> 00:12:44,480

these little they're repeating these the

353

00:12:48,310 --> 00:12:46,639

notes in these boxes in their own times

354

00:12:50,629 --> 00:12:48,320

within their own rhythm

355

00:12:51,990 --> 00:12:50,639

and so basically what you get is you get

356

00:12:54,230 --> 00:12:52,000

this kind of unpredictable

357

00:12:55,590 --> 00:12:54,240

texture where you broadly speaking you

358

00:12:56,150 --> 00:12:55,600

know what it's going to sound like

359

00:12:57,750 --> 00:12:56,160

because

360

00:12:59,990 --> 00:12:57,760

the to the nodes the techniques are all

361

00:13:02,230 --> 00:13:00,000

written in the boxes but you don't know

362

00:13:03,509 --> 00:13:02,240

what the piece is going to sound

363

00:13:04,230 --> 00:13:03,519

different every time they play it right

364

00:13:05,509 --> 00:13:04,240

because

365

00:13:07,670 --> 00:13:05,519

they're not trying to coordinate with

366

00:13:09,910 --> 00:13:07,680

each other with pinpoint precision

367

00:13:11,670 --> 00:13:09,920

um so that was sort of my way of trying

368

00:13:14,710 --> 00:13:11,680

to you know

369

00:13:15,269 --> 00:13:14,720

imitate or simulate this notion of chaos

370

00:13:17,670 --> 00:13:15,279

and

371

00:13:18,629 --> 00:13:17,680

um chaotic systems as a whole so i'm

372

00:13:20,150 --> 00:13:18,639

going to go ahead and play a quick

373

00:13:21,590 --> 00:13:20,160

excerpt of my piece

374

00:13:23,590 --> 00:13:21,600

um so what you're going to hear is the

375

00:13:24,389 --> 00:13:23,600

two violins are playing these kind of

376
00:13:26,550 --> 00:13:24,399
boxes

377
00:13:28,389 --> 00:13:26,560
and the viola is going to play this like

378
00:13:30,310 --> 00:13:28,399
beautiful melody that sort of

379
00:13:34,430 --> 00:13:30,320
main theme of this piece over it so

380
00:14:14,829 --> 00:13:34,440
let's take a listen

381
00:14:32,550 --> 00:14:15,970
my

382
00:14:35,750 --> 00:14:32,560
[Music]

383
00:14:37,829 --> 00:14:35,760
all right um yeah and then the second

384
00:14:38,389 --> 00:14:37,839
part of the piece is rapid expansion so

385
00:14:40,870 --> 00:14:38,399
basically

386
00:14:42,310 --> 00:14:40,880
once some of the goblets of you know

387
00:14:43,590 --> 00:14:42,320
dust and all that begin to

388
00:14:45,430 --> 00:14:43,600

begin to pull towards one another

389

00:14:47,189 --> 00:14:45,440

because of gravity some of them

390

00:14:49,350 --> 00:14:47,199

come together faster than others and

391

00:14:50,230 --> 00:14:49,360

they um this sort of a snowball effect

392

00:14:51,829 --> 00:14:50,240

right where

393

00:14:53,590 --> 00:14:51,839

um the ones that come together first

394

00:14:54,710 --> 00:14:53,600

tend to come together faster and faster

395

00:14:56,470 --> 00:14:54,720

because they attain

396

00:14:58,150 --> 00:14:56,480

the greater and greater mass and pull in

397

00:14:59,910 --> 00:14:58,160

more material and all that

398

00:15:01,750 --> 00:14:59,920

and so you get these like really rapidly

399

00:15:03,269 --> 00:15:01,760

spinning cores that get hotter and

400

00:15:03,829 --> 00:15:03,279

hotter and pull in more and more matter

401
00:15:05,430 --> 00:15:03,839
and

402
00:15:06,790 --> 00:15:05,440
um you know sort of off to the races at

403
00:15:07,829 --> 00:15:06,800
that point they just kind of explode

404
00:15:09,350 --> 00:15:07,839
into uh

405
00:15:11,350 --> 00:15:09,360
to end with lots of energy and lots of

406
00:15:12,230 --> 00:15:11,360
life um and so the way that i want to

407
00:15:14,949 --> 00:15:12,240
try and imitate

408
00:15:16,389 --> 00:15:14,959
this particular idea of you know

409
00:15:18,470 --> 00:15:16,399
protostars that kind of

410
00:15:20,470 --> 00:15:18,480
slowly accumulate matter and grow and

411
00:15:23,430 --> 00:15:20,480
grow but are also very violent

412
00:15:26,150 --> 00:15:23,440
um and you know explosive and all that

413
00:15:28,629 --> 00:15:26,160

was to have this sort of pulsing driving

414

00:15:30,310 --> 00:15:28,639

cyclical kind of rhythm um you'll hear

415

00:15:32,150 --> 00:15:30,320

this repeating three note pattern

416

00:15:33,590 --> 00:15:32,160

um that sort of oscillates that sort of

417

00:15:35,189 --> 00:15:33,600

goes through the piece that gives it a

418

00:15:36,870 --> 00:15:35,199

kind of pulse of rhythm

419

00:15:38,550 --> 00:15:36,880

um and the whole time it's sort of

420

00:15:40,949 --> 00:15:38,560

gathering energy

421

00:15:41,670 --> 00:15:40,959

it's also like slowly going upwards and

422

00:15:43,509 --> 00:15:41,680

key

423

00:15:45,030 --> 00:15:43,519

so you know you'll start out on a

424

00:15:46,629 --> 00:15:45,040

certain key and then as it goes it just

425

00:15:48,230 --> 00:15:46,639

keeps modulating or it keeps changing

426
00:15:48,629 --> 00:15:48,240
keys higher and higher and higher sort

427
00:15:50,150 --> 00:15:48,639
of

428
00:15:51,670 --> 00:15:50,160
you know ratcheting up the tension and

429
00:15:53,430 --> 00:15:51,680
everything and then while all that's

430
00:15:55,590 --> 00:15:53,440
going on you also have the

431
00:15:57,590 --> 00:15:55,600
other strings sort of giving these

432
00:15:58,389 --> 00:15:57,600
really intense crescendos and that kind

433
00:15:59,749 --> 00:15:58,399
of thing

434
00:16:03,420 --> 00:15:59,759
um i'll just go ahead and play that

435
00:16:06,829 --> 00:16:03,430
because your description only does so

436
00:16:06,839 --> 00:16:33,190
much

437
00:17:09,590 --> 00:17:07,270
[Music]

438
00:17:11,270 --> 00:17:09,600

great and then the final chapter of the

439

00:17:13,590 --> 00:17:11,280

piece is once these you know

440

00:17:15,029 --> 00:17:13,600

raging balls of fire the protostars

441

00:17:16,470 --> 00:17:15,039

eventually stabilize

442

00:17:18,870 --> 00:17:16,480

um they become these things called main

443

00:17:21,029 --> 00:17:18,880

sequence stars which is when they reach

444

00:17:23,110 --> 00:17:21,039

equilibrium between their own gravity

445

00:17:23,829 --> 00:17:23,120

and sort of the outward thermal pressure

446

00:17:24,710 --> 00:17:23,839

of

447

00:17:26,949 --> 00:17:24,720

you know because they're essentially

448

00:17:27,590 --> 00:17:26,959

just like raging balls like hydro

449

00:17:29,270 --> 00:17:27,600

nuclear

450

00:17:30,630 --> 00:17:29,280

explosions and fusion and all that stuff

451
00:17:33,270 --> 00:17:30,640
right so um

452
00:17:34,630 --> 00:17:33,280
that that out that pressure uh obviously

453
00:17:35,990 --> 00:17:34,640
pushes outwards and gravity pulls

454
00:17:36,950 --> 00:17:36,000
inwards and so at some point they

455
00:17:38,710 --> 00:17:36,960
stabilize and reach

456
00:17:40,310 --> 00:17:38,720
equilibrium and that's uh that's what

457
00:17:41,510 --> 00:17:40,320
main sequence stars are

458
00:17:44,070 --> 00:17:41,520
so the way that i wanted to represent

459
00:17:44,789 --> 00:17:44,080
this musically was to sort of stabilize

460
00:17:46,230 --> 00:17:44,799
into a

461
00:17:48,070 --> 00:17:46,240
key that i thought was just you know

462
00:17:49,909 --> 00:17:48,080
it's sort of the purest amount of people

463
00:17:51,110 --> 00:17:49,919

called like the most primal key of c

464

00:17:53,270 --> 00:17:51,120

major which is

465

00:17:55,029 --> 00:17:53,280

um you know just like all the white

466

00:17:57,510 --> 00:17:55,039

notes on a piano right and so it's

467

00:17:58,390 --> 00:17:57,520

very simple very transparent kind of

468

00:18:00,150 --> 00:17:58,400

sound

469

00:18:02,070 --> 00:18:00,160

um that i wanted to sort of you know

470

00:18:02,710 --> 00:18:02,080

arrive at after all the violence and all

471

00:18:06,230 --> 00:18:02,720

that of the

472

00:18:06,789 --> 00:18:06,240

of the peace beforehand so um yeah just

473

00:18:17,530 --> 00:18:06,799

to

474

00:18:17,540 --> 00:18:54,830

[Music]

475

00:18:54,840 --> 00:19:15,190

bye

476

00:19:18,390 --> 00:19:17,029

yeah so that is an overview of my piece

477

00:19:21,590 --> 00:19:18,400

uh before i hand it off

478

00:19:25,110 --> 00:19:21,600

um i wanted to briefly just to thank um

479

00:19:26,870 --> 00:19:25,120

dr massimo roberto of the st of sdsci

480

00:19:28,470 --> 00:19:26,880

astronomer who i got to meet with over

481

00:19:29,590 --> 00:19:28,480

the course of writing this piece

482

00:19:31,110 --> 00:19:29,600

and who was really helpful in just

483

00:19:33,029 --> 00:19:31,120

shaping the direction and everything of

484

00:19:35,909 --> 00:19:33,039

how i thought about stars and

485

00:19:37,350 --> 00:19:35,919

how i thought about the music yeah so up

486

00:19:39,430 --> 00:19:37,360

next i want to hand it off to my

487

00:19:41,830 --> 00:19:39,440

esteemed colleague and fellow composers

488

00:20:02,789 --> 00:19:41,840

that gulab davis will be talking

489

00:20:02,799 --> 00:20:10,310

zach can you unmute

490

00:20:14,149 --> 00:20:13,029

there we go sorry about that should be

491

00:20:15,909 --> 00:20:14,159

working now

492

00:20:17,909 --> 00:20:15,919

all right yeah i'm zach cooliboff davis

493

00:20:18,950 --> 00:20:17,919

one of the five composers of the

494

00:20:22,230 --> 00:20:18,960

consonants collective

495

00:20:24,070 --> 00:20:22,240

real happy to be here i'll be speaking

496

00:20:28,310 --> 00:20:24,080

briefly about my string quartet

497

00:20:32,470 --> 00:20:30,230

so just to begin a little bit about the

498

00:20:35,590 --> 00:20:32,480

overall inspiration and whatnot

499

00:20:36,149 --> 00:20:35,600

in contrast to um some of my colleagues

500

00:20:39,270 --> 00:20:36,159

works

501
00:20:42,070 --> 00:20:39,280
my quartet um takes a somewhat more

502
00:20:42,549 --> 00:20:42,080
abstract um look at the cosmos a bit of

503
00:21:12,870 --> 00:20:42,559
a

504
00:21:14,710 --> 00:21:12,880
my work

505
00:21:15,990 --> 00:21:14,720
because i often play with uh the

506
00:21:19,909 --> 00:21:16,000
transparency of

507
00:21:23,430 --> 00:21:19,919
my selected media media so for example

508
00:21:26,789 --> 00:21:23,440
i'll overlay like videos of the quartet

509
00:21:29,190 --> 00:21:26,799
in tandem with imagery

510
00:21:30,149 --> 00:21:29,200
and simulate visualizations and stuff

511
00:21:32,870 --> 00:21:30,159
like that

512
00:21:35,590 --> 00:21:32,880
so kind of creating this ever-evolving

513
00:21:38,070 --> 00:21:35,600

array of color

514

00:21:39,750 --> 00:21:38,080

uh the work was composed pretty much in

515

00:21:40,789 --> 00:21:39,760

tandem with my search for visual

516

00:21:43,909 --> 00:21:40,799

materials

517

00:21:44,789 --> 00:21:43,919

so my connection between the music and

518

00:21:46,630 --> 00:21:44,799

media

519

00:21:48,549 --> 00:21:46,640

was more or less direct and

520

00:21:49,430 --> 00:21:48,559

instantaneous during the compositional

521

00:21:52,230 --> 00:21:49,440

process

522

00:21:53,430 --> 00:21:52,240

as a composer that's super super fun

523

00:21:55,830 --> 00:21:53,440

because

524

00:21:58,549 --> 00:21:55,840

oftentimes it doesn't quite unfold so

525

00:22:01,350 --> 00:21:58,559

organically and being able to have

526
00:22:02,310 --> 00:22:01,360
these absolutely amazing videos and

527
00:22:05,590 --> 00:22:02,320
images

528
00:22:07,590 --> 00:22:05,600
to you know serve as a sort of kernel of

529
00:22:08,630 --> 00:22:07,600
inspiration i was i was as i was working

530
00:22:11,750 --> 00:22:08,640
on this piece

531
00:22:14,789 --> 00:22:11,760
was just absolutely out of this world i

532
00:22:15,750 --> 00:22:14,799
enjoyed it immensely uh iridescence my

533
00:22:19,029 --> 00:22:15,760
quartet

534
00:22:20,710 --> 00:22:19,039
is somewhat cyclical in nature um having

535
00:22:21,909 --> 00:22:20,720
a lot of sort of connected material

536
00:22:23,990 --> 00:22:21,919
overall

537
00:22:26,710 --> 00:22:24,000
starting in one place venturing off to

538
00:22:29,029 --> 00:22:26,720

sort of turbulent

539

00:22:30,390 --> 00:22:29,039

middle section and then returning to

540

00:22:33,029 --> 00:22:30,400

materials that are

541

00:22:34,549 --> 00:22:33,039

somewhat reminiscent of the opening kind

542

00:22:37,750 --> 00:22:34,559

of charting this path

543

00:22:38,950 --> 00:22:37,760

from dark to light in the upper

544

00:22:42,149 --> 00:22:38,960

registers

545

00:22:45,430 --> 00:22:42,159

of the instruments i strove to

546

00:22:45,990 --> 00:22:45,440

capture the mystery and maybe austere

547

00:22:48,630 --> 00:22:46,000

beauty

548

00:22:50,710 --> 00:22:48,640

of star systems through sound and

549

00:22:52,310 --> 00:22:50,720

resulting video

550

00:22:53,590 --> 00:22:52,320

so i'm just going to briefly guide you

551
00:22:54,789 --> 00:22:53,600
through the work and sort of my

552
00:22:56,870 --> 00:22:54,799
compositional process

553
00:22:58,070 --> 00:22:56,880
how the piece unfolded again in tandem

554
00:23:01,510 --> 00:22:58,080
with

555
00:23:04,390 --> 00:23:01,520
uh these amazing media elements

556
00:23:05,990 --> 00:23:04,400
so here we go a little bit about the

557
00:23:07,990 --> 00:23:06,000
opening here

558
00:23:09,350 --> 00:23:08,000
um listen for subtle harmonies subtle

559
00:23:10,710 --> 00:23:09,360
gestures between

560
00:23:12,549 --> 00:23:10,720
the four instruments just sort of

561
00:23:15,029 --> 00:23:12,559
passing around um

562
00:23:17,909 --> 00:23:15,039
very sort of muted in nature this form

563
00:23:23,100 --> 00:23:17,919

is actually the basis of the entire work

564

00:24:06,789 --> 00:23:23,110

here we go

565

00:24:10,789 --> 00:24:09,190

so as i mentioned um this work is sort

566

00:24:12,630 --> 00:24:10,799

of constructed in three distinct

567

00:24:14,390 --> 00:24:12,640

sections so at some point

568

00:24:15,909 --> 00:24:14,400

i had to try to get to the next section

569

00:24:17,750 --> 00:24:15,919

get to this more

570

00:24:19,830 --> 00:24:17,760

turbulent and energetic section and in

571

00:24:21,830 --> 00:24:19,840

order to do that um

572

00:24:23,510 --> 00:24:21,840

the work sort of wanders and begins to

573

00:24:26,870 --> 00:24:23,520

um build towards

574

00:24:29,269 --> 00:24:26,880

um a climactic point so here listen as

575

00:24:30,789 --> 00:24:29,279

the music just sort of drifts and

576

00:24:33,029 --> 00:24:30,799

eventually um

577

00:24:34,630 --> 00:24:33,039

ends up in this fairly exciting

578

00:24:36,390 --> 00:24:34,640

cacophony of sound which we'll hear in

579

00:24:38,870 --> 00:24:36,400

the subsequent video

580

00:24:49,970 --> 00:24:38,880

but this is um sort of working towards

581

00:25:30,230 --> 00:25:28,549

[Music]

582

00:25:31,909 --> 00:25:30,240

so yeah so these serene harmonies

583

00:25:33,190 --> 00:25:31,919

gradually build up and build up and as

584

00:25:37,190 --> 00:25:33,200

you can see i had so much

585

00:25:38,710 --> 00:25:37,200

fun mixing um the transparency with the

586

00:25:41,590 --> 00:25:38,720

video of the quartet

587

00:25:43,510 --> 00:25:41,600

versus these absolutely amazing videos

588

00:25:45,110 --> 00:25:43,520

and images and yes so this moves along

589

00:25:47,190 --> 00:25:45,120

and eventually we reach

590

00:25:49,269 --> 00:25:47,200

our first sort of true point of climax

591

00:25:51,669 --> 00:25:49,279

the um

592

00:25:53,269 --> 00:25:51,679

beginning of the middle section here we

593

00:25:55,830 --> 00:25:53,279

go let me play a bit of this

594

00:25:56,310 --> 00:25:55,840

over here everything is faster paced so

595

00:25:58,230 --> 00:25:56,320

um

596

00:26:00,070 --> 00:25:58,240

it's extremely turbulent honestly

597

00:26:02,070 --> 00:26:00,080

there's fiendishly difficult writing for

598

00:26:03,029 --> 00:26:02,080

all four members of the bergamot quartet

599

00:26:05,669 --> 00:26:03,039

so they were taxed

600

00:26:07,350 --> 00:26:05,679

to their extreme to play this and i also

601
00:26:10,149 --> 00:26:07,360
worked on

602
00:26:11,990 --> 00:26:10,159
interspersing much faster paced media

603
00:26:12,710 --> 00:26:12,000
here so lots of rapid changes between

604
00:26:14,950 --> 00:26:12,720
clips

605
00:26:29,250 --> 00:26:14,960
just faster moving stuff in general i

606
00:27:37,350 --> 00:27:35,350
[Music]

607
00:27:39,110 --> 00:27:37,360
so the intensity here never really dies

608
00:27:40,950 --> 00:27:39,120
off it just keeps building and building

609
00:27:43,269 --> 00:27:40,960
for a while until we finally reach

610
00:27:44,870 --> 00:27:43,279
the sort of ultimate climax of the piece

611
00:27:47,269 --> 00:27:44,880
located

612
00:27:48,389 --> 00:27:47,279
more or less in the last third of the

613
00:27:51,830 --> 00:27:48,399

work

614

00:27:52,789 --> 00:27:51,840

this ensuing wall of sound continues for

615

00:27:55,590 --> 00:27:52,799

a while and then

616

00:27:57,269 --> 00:27:55,600

gradually begins to dissipate as we

617

00:27:59,750 --> 00:27:57,279

transition into the final section

618

00:28:04,050 --> 00:27:59,760

but here's just a bit of this um

619

00:28:04,060 --> 00:28:14,830

[Music]

620

00:28:19,700 --> 00:28:16,890

climax

621

00:28:22,730 --> 00:28:19,710

[Music]

622

00:29:00,870 --> 00:28:22,740

[Applause]

623

00:29:02,870 --> 00:29:00,880

[Music]

624

00:29:05,750 --> 00:29:02,880

and last but not least as this section

625

00:29:07,430 --> 00:29:05,760

dies away we finally return to the third

626
00:29:07,750 --> 00:29:07,440
section when we get to the third section

627
00:29:15,190 --> 00:29:07,760
a

628
00:29:17,350 --> 00:29:15,200
time

629
00:29:18,310 --> 00:29:17,360
in the absolute upper extremities of the

630
00:29:19,830 --> 00:29:18,320
instruments

631
00:29:22,070 --> 00:29:19,840
we still see these little gestures

632
00:29:23,750 --> 00:29:22,080
passing around between the instruments

633
00:29:25,750 --> 00:29:23,760
this was probably my favorite part

634
00:29:28,630 --> 00:29:25,760
because i used some

635
00:29:30,070 --> 00:29:28,640
absolutely brilliantly colored images

636
00:29:41,200 --> 00:29:30,080
and videos here

637
00:29:52,330 --> 00:29:41,210
just a tiny little tidbit of this

638
00:29:52,340 --> 00:30:03,430

[Music]

639

00:30:06,470 --> 00:30:05,269

and as you might guess from this excerpt

640

00:30:10,230 --> 00:30:06,480

the work kind of

641

00:30:12,870 --> 00:30:10,240

dies away in almost absolute silence

642

00:30:14,149 --> 00:30:12,880

not long after this if you'd like to

643

00:30:15,909 --> 00:30:14,159

check out the full thing again you can

644

00:30:19,029 --> 00:30:15,919

find it on the stsci

645

00:30:20,830 --> 00:30:19,039

youtube channel a huge thank you to

646

00:30:23,269 --> 00:30:20,840

everyone involved with this especially

647

00:30:25,269 --> 00:30:23,279

stsci for all their support

648

00:30:27,110 --> 00:30:25,279

and i'd now like to hand off the

649

00:30:29,510 --> 00:30:27,120

presentation to my esteemed colleague

650

00:30:30,549 --> 00:30:29,520

suyna kim who will be talking about sn

651
00:30:37,350 --> 00:30:30,559
1054

652
00:30:54,470 --> 00:30:37,360
supernova thanks again

653
00:31:03,110 --> 00:30:57,669
hello my name is tayun sayuna kim and i

654
00:31:06,470 --> 00:31:05,029
when we started our project hearing

655
00:31:09,269 --> 00:31:06,480
stars i

656
00:31:10,950 --> 00:31:09,279
chose this topic that's of a star just

657
00:31:13,190 --> 00:31:10,960
because it sounded romantic

658
00:31:15,269 --> 00:31:13,200
and i didn't have a concrete idea what

659
00:31:18,070 --> 00:31:15,279
to write about

660
00:31:20,950 --> 00:31:18,080
and so i started my pre-compositional

661
00:31:24,470 --> 00:31:23,669
was under the guidance of doctor current

662
00:31:27,509 --> 00:31:24,480
pub

663
00:31:30,149 --> 00:31:27,519

piranpakti i learned there are two types

664

00:31:33,269 --> 00:31:30,159

of death of stars

665

00:31:38,070 --> 00:31:33,279

i learned how some stars die quietly

666

00:31:40,710 --> 00:31:38,080

as white dwarfs and how some stars

667

00:31:41,509 --> 00:31:40,720

explode with all their power for the

668

00:31:46,789 --> 00:31:41,519

last time

669

00:31:48,789 --> 00:31:46,799

and leave this beautiful remnants

670

00:31:50,870 --> 00:31:48,799

after i gained some knowledge i was

671

00:31:53,509 --> 00:31:50,880

surfing the internet and suddenly saw

672

00:31:56,549 --> 00:31:53,519

this science article

673

00:31:58,070 --> 00:31:56,559

it was supernova remnant from 6 000

674

00:32:00,789 --> 00:31:58,080

light years away

675

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

our charming crab nebula this was an

676
00:32:05,029 --> 00:32:03,200
article about the club netherlands

677
00:32:07,590 --> 00:32:05,039
and then it said the crab nebula was

678
00:32:12,830 --> 00:32:07,600
discovered in 1731

679
00:32:17,590 --> 00:32:16,470
bevis and then this article was writing

680
00:32:20,549 --> 00:32:17,600
on something about

681
00:32:22,389 --> 00:32:20,559
that i didn't know before it said

682
00:32:24,630 --> 00:32:22,399
astronomers

683
00:32:25,430 --> 00:32:24,640
found out when the crab nebula was

684
00:32:28,470 --> 00:32:25,440
formed

685
00:32:32,070 --> 00:32:28,480
with the help of ancient records

686
00:32:34,389 --> 00:32:32,080
in 1928 hubble announced that they found

687
00:32:38,149 --> 00:32:34,399
out the record of a supernova

688
00:32:40,830 --> 00:32:38,159

1054 in ancient chinese documents

689

00:32:42,710 --> 00:32:40,840

and the crab nebula is a remnant of the

690

00:32:46,549 --> 00:32:42,720

supernova

691

00:32:50,950 --> 00:32:46,559

the ancient chinese documents say tj era

692

00:32:54,070 --> 00:32:50,960

first year seventh lunar month 22nd day

693

00:32:57,110 --> 00:32:54,080

summer in southeast sky

694

00:33:00,149 --> 00:32:57,120

a strange star has appeared

695

00:33:01,909 --> 00:33:00,159

its color was reddish white it was

696

00:33:04,389 --> 00:33:01,919

bright as a venus

697

00:33:05,590 --> 00:33:04,399

that could be seen in daylight for 23

698

00:33:08,310 --> 00:33:05,600

days

699

00:33:09,190 --> 00:33:08,320

the star was visible at night for two

700

00:33:13,110 --> 00:33:09,200

years

701
00:33:15,830 --> 00:33:13,120
and then gradually disappeared in spring

702
00:33:17,269 --> 00:33:15,840
the records of supernova 1054 can be

703
00:33:20,950 --> 00:33:17,279
found not only in

704
00:33:23,350 --> 00:33:20,960
china but also in korea japan turkey

705
00:33:26,070 --> 00:33:23,360
and in the mural by native americans in

706
00:33:28,630 --> 00:33:26,080
arizona region

707
00:33:29,269 --> 00:33:28,640
as journalists confirmed the exact date

708
00:33:33,430 --> 00:33:29,279
of

709
00:33:37,269 --> 00:33:33,440
the crescent moon and the mural

710
00:33:41,669 --> 00:33:37,279
the supernova exploded on july 5th

711
00:33:45,269 --> 00:33:41,679
54 and this last paragraph just

712
00:33:46,789 --> 00:33:45,279
intrigued me i began to imagine people

713
00:33:50,389 --> 00:33:46,799

in one summer day in 10

714

00:33:52,870 --> 00:33:50,399

54 suddenly people see a new strange

715

00:33:56,310 --> 00:33:52,880

star that is so bright that can be seen

716

00:33:56,950 --> 00:33:56,320

even in daytime people get so curious

717

00:33:59,029 --> 00:33:56,960

about it

718

00:34:00,070 --> 00:33:59,039

some of them worry some of them are

719

00:34:03,110 --> 00:34:00,080

fascinated

720

00:34:05,110 --> 00:34:03,120

ask each other what it is and then even

721

00:34:07,830 --> 00:34:05,120

though they don't have an answer

722

00:34:09,349 --> 00:34:07,840

they just write it down withdraw with

723

00:34:12,950 --> 00:34:09,359

them

724

00:34:16,149 --> 00:34:12,960

record it they observe and record

725

00:34:18,710 --> 00:34:16,159

because they want to know what it is

726
00:34:24,069 --> 00:34:18,720
people pass down their curiosities and

727
00:34:31,190 --> 00:34:28,230
and then almost a thousand years after

728
00:34:33,190 --> 00:34:31,200
descendants study it and with knowledge

729
00:34:34,550 --> 00:34:33,200
that has accumulated through numerous

730
00:34:37,829 --> 00:34:34,560
generations

731
00:34:39,510 --> 00:34:37,839
finally answered the question they tell

732
00:34:42,790 --> 00:34:39,520
their ancestors

733
00:34:44,550 --> 00:34:42,800
it wasn't a new star it was the death of

734
00:34:49,669 --> 00:34:44,560
a star

735
00:34:51,909 --> 00:34:49,679
people communicate beyond time

736
00:34:53,510 --> 00:34:51,919
here's my musical reenactment of people

737
00:34:55,030 --> 00:34:53,520
who witnessed the explosion of the

738
00:34:58,230 --> 00:34:55,040

supernova

739

00:34:59,510 --> 00:34:58,240

in my imaginations they are filled with

740

00:35:04,530 --> 00:34:59,520

curiosities

741

00:36:21,829 --> 00:35:42,829

[Music]

742

00:36:28,390 --> 00:36:25,270

people have studied the supernova 1054

743

00:36:30,710 --> 00:36:28,400

for a thousand years

744

00:36:31,510 --> 00:36:30,720

while people were doing this it's

745

00:36:34,790 --> 00:36:31,520

remnant

746

00:36:38,630 --> 00:36:34,800

the crab nebula very slowly expanded for

747

00:36:43,510 --> 00:36:40,550

another article that inspired me in

748

00:36:46,870 --> 00:36:43,520

writing this piece was this

749

00:36:52,230 --> 00:36:46,880

the last breath of a dying star

750

00:36:56,710 --> 00:36:54,950

the articles said it takes a few

751
00:37:00,150 --> 00:36:56,720
thousand years for a star

752
00:37:00,790 --> 00:37:00,160
to breathe for the last time it feels

753
00:37:03,829 --> 00:37:00,800
like an

754
00:37:04,870 --> 00:37:03,839
eternity for our students but it is just

755
00:37:08,310 --> 00:37:04,880
a split second

756
00:37:13,270 --> 00:37:08,320
for a star whose entire life is several

757
00:37:16,470 --> 00:37:15,829
the crab nebula is the star's last

758
00:37:19,670 --> 00:37:16,480
breath

759
00:37:23,190 --> 00:37:19,680
that lasts for a few thousand years

760
00:37:25,109 --> 00:37:23,200
also remember the crab nebula is 6000

761
00:37:27,190 --> 00:37:25,119
light years away from us

762
00:37:28,550 --> 00:37:27,200
so maybe all of this events we are

763
00:37:30,710 --> 00:37:28,560

seeing now

764

00:37:35,030 --> 00:37:30,720

already has ended in the universe a few

765

00:37:42,370 --> 00:37:37,349

let me play you my imagination of a

766

00:38:30,220 --> 00:37:48,829

[Music]

767

00:38:56,380 --> 00:38:30,230

[Applause]

768

00:39:27,349 --> 00:39:08,420

[Music]

769

00:39:33,670 --> 00:39:30,790

the supernova 1054 and the crab nebula

770

00:39:36,470 --> 00:39:33,680

tell us how we study explore and

771

00:39:38,950 --> 00:39:36,480

accumulate knowledge through generations

772

00:39:39,750 --> 00:39:38,960

it is the story of people who diligently

773

00:39:42,150 --> 00:39:39,760

observe

774

00:39:43,510 --> 00:39:42,160

and record unknown phenomena when there

775

00:39:45,430 --> 00:39:43,520

is no guarantee

776

00:39:47,750 --> 00:39:45,440

they'll have an explanation in their

777

00:39:49,910 --> 00:39:47,760

lives

778

00:39:51,589 --> 00:39:49,920

it is the story of people who step onto

779

00:39:54,870 --> 00:39:51,599

the stepping stones

780

00:39:57,910 --> 00:39:54,880

laid by their ancestors and finally

781

00:40:02,550 --> 00:39:57,920

find the answer to the long awaited

782

00:40:04,790 --> 00:40:02,560

question even at this very moment

783

00:40:06,309 --> 00:40:04,800

i imagine people are communicating with

784

00:40:09,990 --> 00:40:06,319

it with the fast

785

00:40:13,910 --> 00:40:10,000

and future laying out or stepping

786

00:40:17,510 --> 00:40:13,920

on the stone a desire for knowledge

787

00:40:20,950 --> 00:40:17,520

is the driving force of human history

788

00:40:27,030 --> 00:40:20,960

my music is a contribute is tribute

789

00:40:32,950 --> 00:40:30,390

our next speaker is kuwait

790

00:40:34,150 --> 00:40:32,960

kuwait is going to talk about his piece

791

00:40:49,109 --> 00:40:34,160

beyond the horizon

792

00:40:55,670 --> 00:40:52,790

thank you so you know

793

00:40:57,270 --> 00:40:55,680

okay my name is gooey and i'm so happy

794

00:41:00,870 --> 00:40:57,280

to be here

795

00:41:03,910 --> 00:41:00,880

um and thank you to

796

00:41:06,790 --> 00:41:03,920

um sdsci for having us and

797

00:41:09,430 --> 00:41:06,800

um i'm so happy to be here to present my

798

00:41:12,630 --> 00:41:09,440

music together with my friends from

799

00:41:17,510 --> 00:41:12,640

consonants and bergamot content so

800

00:41:21,750 --> 00:41:17,520

um my piece is called beyond the horizon

801
00:41:25,270 --> 00:41:21,760
and um when

802
00:41:27,829 --> 00:41:25,280
when the project first started um

803
00:41:28,710 --> 00:41:27,839
i wanted to do something that's really

804
00:41:31,829 --> 00:41:28,720
mysterious

805
00:41:34,950 --> 00:41:31,839
about the universe and since

806
00:41:38,870 --> 00:41:34,960
i've always been fascinated by

807
00:41:42,150 --> 00:41:38,880
the idea of like space travel

808
00:41:45,750 --> 00:41:42,160
and like going to different dimensions

809
00:41:47,510 --> 00:41:45,760
in space i wanted to do something about

810
00:41:49,030 --> 00:41:47,520
black holes because black holes is

811
00:41:51,750 --> 00:41:49,040
something that's really

812
00:41:54,630 --> 00:41:51,760
mysterious to us we don't know a whole

813
00:41:57,750 --> 00:41:54,640

lot a whole lot about it

814

00:42:00,790 --> 00:41:57,760

so i want to explore into the idea of

815

00:42:02,710 --> 00:42:00,800

traveling into a black hole and

816

00:42:05,109 --> 00:42:02,720

not only know not knowing what's going

817

00:42:08,550 --> 00:42:05,119

to happen when we go in

818

00:42:11,430 --> 00:42:08,560

and yeah the idea of mystery

819

00:42:12,470 --> 00:42:11,440

um but that's about my piece and my

820

00:42:15,349 --> 00:42:12,480

piece

821

00:42:16,069 --> 00:42:15,359

the overall structure is divided into

822

00:42:18,630 --> 00:42:16,079

three main

823

00:42:20,150 --> 00:42:18,640

sections so there's a brief introduction

824

00:42:23,030 --> 00:42:20,160

which sets a scene

825

00:42:24,069 --> 00:42:23,040

in a vast universe and the second

826

00:42:26,550 --> 00:42:24,079

section

827

00:42:29,430 --> 00:42:26,560

uh is it's about a journey of the

828

00:42:33,829 --> 00:42:29,440

protagonist into the black hole

829

00:42:37,270 --> 00:42:33,839

and the third is my imagination of

830

00:42:42,309 --> 00:42:37,280

the emergence of the protagonist

831

00:42:48,150 --> 00:42:45,990

the black hole is not like it's not

832

00:42:49,349 --> 00:42:48,160

where there is certain depth but there

833

00:42:51,990 --> 00:42:49,359

uh there is a hope

834

00:42:52,790 --> 00:42:52,000

right there there's a hole that will go

835

00:42:55,030 --> 00:42:52,800

somewhere

836

00:42:56,470 --> 00:42:55,040

um when we enter the black hole so in

837

00:42:59,510 --> 00:42:56,480

this case it's actually

838

00:43:02,550 --> 00:42:59,520

a wormhole and as i wrote

839

00:43:04,630 --> 00:43:02,560

in the program notes of my piece this

840

00:43:08,230 --> 00:43:04,640

piece is a musical interpretation of

841

00:43:09,510 --> 00:43:08,240

my imagination of the unknown beyond the

842

00:43:11,829 --> 00:43:09,520

event horizon

843

00:43:13,109 --> 00:43:11,839

that's the title beyond the horizon

844

00:43:14,790 --> 00:43:13,119

which could lead to a point of

845

00:43:18,069 --> 00:43:14,800

singularity where everything

846

00:43:20,710 --> 00:43:18,079

is ceases to exist or to another

847

00:43:23,349 --> 00:43:20,720

universe in which case the black hole is

848

00:43:26,390 --> 00:43:23,359

in fact a wormhole

849

00:43:29,430 --> 00:43:26,400

so i'm going to play you two excerpts

850

00:43:32,790 --> 00:43:29,440

from my piece and the first excerpt

851

00:43:37,990 --> 00:43:32,800

is taken from the journey

852

00:43:42,390 --> 00:43:38,000

into the black hole and in this excerpt

853

00:43:45,430 --> 00:43:42,400

i explored two kind of physical effects

854

00:43:46,710 --> 00:43:45,440

and i tried to um portray these two kind

855

00:43:48,950 --> 00:43:46,720

of effects

856

00:43:49,910 --> 00:43:48,960

musically so the first one is time

857

00:43:52,470 --> 00:43:49,920

dilation

858

00:43:53,349 --> 00:43:52,480

the idea of time gradually slowing down

859

00:43:57,510 --> 00:43:53,359

for

860

00:44:01,109 --> 00:43:57,520

into the black hole

861

00:44:01,990 --> 00:44:01,119

um to reflect that kind of time slowing

862

00:44:06,230 --> 00:44:02,000

down

863

00:44:10,390 --> 00:44:06,240

over the course of a few minutes

864

00:44:11,829 --> 00:44:10,400

um it's like i think over three minutes

865

00:44:13,750 --> 00:44:11,839

so so over the course of three minutes

866

00:44:15,670 --> 00:44:13,760

it just quit it just gradually slows

867

00:44:18,870 --> 00:44:15,680

down bit by bit

868

00:44:21,109 --> 00:44:18,880

and i also use some extended techniques

869

00:44:22,150 --> 00:44:21,119

so they're like techniques that you

870

00:44:25,589 --> 00:44:22,160

wouldn't normally

871

00:44:29,109 --> 00:44:25,599

hear um in extremes

872

00:44:31,910 --> 00:44:29,119

uh such as stretch tones which are um

873

00:44:32,630 --> 00:44:31,920

which is kind of when you apply a lot of

874

00:44:34,870 --> 00:44:32,640

pressure

875

00:44:36,630 --> 00:44:34,880

onto the stream so you create a very

876
00:44:40,150 --> 00:44:36,640
scratchy and

877
00:44:44,069 --> 00:44:40,160
noisy tone and glissandi which is like

878
00:44:47,750 --> 00:44:44,079
pitch vents so these kind of

879
00:44:52,550 --> 00:44:47,760
effects depict the

880
00:44:54,870 --> 00:44:52,560
idea of distortion as created by the

881
00:44:56,710 --> 00:44:54,880
the immense gravitational forces of a

882
00:45:00,470 --> 00:44:56,720
black hole

883
00:45:04,550 --> 00:45:00,480
and then secondly is

884
00:45:07,670 --> 00:45:04,560
the doppler effect so um

885
00:45:09,030 --> 00:45:07,680
the visual um the visual version of the

886
00:45:12,309 --> 00:45:09,040
buffer effect

887
00:45:15,829 --> 00:45:12,319
as we enter black hole is

888
00:45:17,109 --> 00:45:15,839

that light from outside the black hole

889

00:45:20,630 --> 00:45:17,119

will become

890

00:45:24,710 --> 00:45:20,640

blue shifted because of the of immense

891

00:45:27,910 --> 00:45:24,720

gravitational force from the black hole

892

00:45:30,390 --> 00:45:27,920

so in order to

893

00:45:32,390 --> 00:45:30,400

reflect that kind of doppler effect i

894

00:45:33,190 --> 00:45:32,400

use the audio version of the buffer

895

00:45:36,390 --> 00:45:33,200

effect

896

00:45:39,030 --> 00:45:36,400

so i guess one of the most famous um um

897

00:45:39,430 --> 00:45:39,040

examples of the buffer effect in daily

898

00:45:41,990 --> 00:45:39,440

life

899

00:45:43,109 --> 00:45:42,000

is like when when you're walking on the

900

00:45:48,740 --> 00:45:43,119

streets and

901
00:45:52,950 --> 00:45:50,550

[Music]

902
00:45:54,309 --> 00:45:52,960
so kind of like the pitch gradually

903
00:45:57,829 --> 00:45:54,319
descends right

904
00:45:59,589 --> 00:45:57,839
as it passes by you so um

905
00:46:02,550 --> 00:45:59,599
there is a little bit of that in the

906
00:46:05,430 --> 00:46:02,560
piece as i

907
00:46:06,390 --> 00:46:05,440
give the strings the violins in

908
00:46:09,349 --> 00:46:06,400
particular

909
00:46:10,790 --> 00:46:09,359
some fragments where the pitch gradually

910
00:46:15,910 --> 00:46:10,800
descends

911
00:46:35,100 --> 00:46:15,920
so that's a doppler effect and

912
00:46:35,110 --> 00:46:40,829
[Music]

913
00:46:40,839 --> 00:46:55,610

uh

914

00:46:55,620 --> 00:48:16,150

[Music]

915

00:48:21,109 --> 00:48:19,190

all right so and then now

916

00:48:23,270 --> 00:48:21,119

um i'm going to tell you guys the second

917

00:48:25,510 --> 00:48:23,280

excerpt and in this excerpt is from the

918

00:48:29,589 --> 00:48:25,520

final section of the piece

919

00:48:32,549 --> 00:48:29,599

where the traveler emerges

920

00:48:33,190 --> 00:48:32,559

from the white hole so again this is

921

00:48:39,670 --> 00:48:33,200

totally

922

00:48:41,510 --> 00:48:39,680

but um i like to bring some kind of

923

00:48:44,950 --> 00:48:41,520

artistic liberty into

924

00:48:47,030 --> 00:48:44,960

the other piece um so this is based on

925

00:48:48,390 --> 00:48:47,040

yeah the hypothetical white hole and

926
00:48:51,109 --> 00:48:48,400
wormhole

927
00:48:51,589 --> 00:48:51,119
and from which the protagonist emerges

928
00:48:54,069 --> 00:48:51,599
into

929
00:48:56,670 --> 00:48:54,079
another part of space-time so again the

930
00:49:00,470 --> 00:48:59,270
inter-dimensional travel to another part

931
00:49:02,230 --> 00:49:00,480
of space-time

932
00:49:03,589 --> 00:49:02,240
that really intrigued me as i was

933
00:49:06,230 --> 00:49:03,599
writing this piece

934
00:49:08,309 --> 00:49:06,240
and the tone in this piece shifts to

935
00:49:10,950 --> 00:49:08,319
something that's more hopeful

936
00:49:11,510 --> 00:49:10,960
and more uplifting and to reflect that

937
00:49:14,150 --> 00:49:11,520
there is

938
00:49:16,390 --> 00:49:14,160

a technique which i use is and that's

939

00:49:19,910 --> 00:49:16,400

called like um like a

940

00:49:23,510 --> 00:49:19,920

micro total modulation so the

941

00:49:24,309 --> 00:49:23,520

pitch of this melody which repeats over

942

00:49:27,990 --> 00:49:24,319

and over again

943

00:49:32,390 --> 00:49:31,109

a bit by bit and as you can hear in the

944

00:49:35,030 --> 00:49:32,400

following excerpt

945

00:49:35,750 --> 00:49:35,040

there's um the same melody it gradually

946

00:49:38,790 --> 00:49:35,760

gets higher

947

00:49:43,430 --> 00:49:38,800

and higher and higher and

948

00:49:45,430 --> 00:49:43,440

um the gradual rise is very subtle

949

00:49:47,910 --> 00:49:45,440

and that kind of leads to the final

950

00:49:51,270 --> 00:49:47,920

climax of the piece

951
00:49:54,950 --> 00:49:51,280
which ends up the piece in a like a

952
00:50:01,830 --> 00:49:54,960
huge um a huge climax okay so i'm gonna

953
00:50:01,840 --> 00:50:38,829
[Music]

954
00:50:38,839 --> 00:50:42,940
foreign

955
00:51:34,829 --> 00:51:06,829
[Music]

956
00:51:34,839 --> 00:51:41,490
me

957
00:51:41,500 --> 00:51:57,750
[Music]

958
00:52:03,670 --> 00:52:00,870
all right that concludes my presentation

959
00:52:04,150 --> 00:52:03,680
and last one and last but not least we

960
00:52:08,150 --> 00:52:04,160
have

961
00:52:09,670 --> 00:52:08,160
um my esteemed colleague daniel daskins

962
00:52:12,470 --> 00:52:09,680
who will be presenting

963
00:52:16,829 --> 00:52:12,480

on his piece called dark mysteries about

964

00:52:16,839 --> 00:52:22,710

matter

965

00:52:27,030 --> 00:52:24,390

thanks so much for that introduction

966

00:52:30,309 --> 00:52:27,040

giveaway and uh

967

00:52:33,430 --> 00:52:30,319

thank you to sdsci for having us here

968

00:52:35,670 --> 00:52:33,440

it is uh it's a really great honor and

969

00:52:37,829 --> 00:52:35,680

uh wonderful opportunity to be able to

970

00:52:41,030 --> 00:52:37,839

share our music with all of you

971

00:52:43,270 --> 00:52:41,040

um as do i said my

972

00:52:44,790 --> 00:52:43,280

piece is called dark mysteries and it's

973

00:52:48,470 --> 00:52:44,800

about the concept of

974

00:52:50,390 --> 00:52:48,480

dark matter so uh

975

00:52:51,670 --> 00:52:50,400

my original inspiration for this piece

976
00:52:55,190 --> 00:52:51,680
came from

977
00:52:58,470 --> 00:52:55,200
this picture which uh nasa

978
00:53:03,670 --> 00:52:58,480
uh created in collaboration with

979
00:53:09,109 --> 00:53:07,430
the doughy cluster able2744 and uh

980
00:53:11,109 --> 00:53:09,119
the these beautiful colors that you see

981
00:53:13,109 --> 00:53:11,119
in the picture um

982
00:53:14,150 --> 00:53:13,119
are a result of several images that were

983
00:53:17,190 --> 00:53:14,160
put together

984
00:53:19,910 --> 00:53:17,200
and one of them is the

985
00:53:22,069 --> 00:53:19,920
mass distribution of the dark matter in

986
00:53:22,870 --> 00:53:22,079
the galaxy cluster which you can see in

987
00:53:33,190 --> 00:53:22,880
the

988
00:53:36,150 --> 00:53:33,200

explore dark matter

989

00:53:36,950 --> 00:53:36,160

in music is uh is actually because it's

990

00:53:39,589 --> 00:53:36,960

such a

991

00:53:40,549 --> 00:53:39,599

big mystery to us still um hence the

992

00:53:45,270 --> 00:53:40,559

title of my piece

993

00:53:50,309 --> 00:53:48,309

so when in the in the 90s uh my

994

00:53:52,630 --> 00:53:50,319

understanding is that

995

00:53:54,870 --> 00:53:52,640

what astronomers thought of originally

996

00:53:57,829 --> 00:53:54,880

was that the

997

00:53:58,630 --> 00:53:57,839

expansion of the universe was slowing

998

00:54:00,950 --> 00:53:58,640

down

999

00:54:01,750 --> 00:54:00,960

uh over time but the hubble space

1000

00:54:04,230 --> 00:54:01,760

telescope

1001
00:54:05,190 --> 00:54:04,240
actually took pictures of things at the

1002
00:54:07,829 --> 00:54:05,200
edge of the universe

1003
00:54:09,510 --> 00:54:07,839
that proved that the expansion of the

1004
00:54:12,470 --> 00:54:09,520
universe is not slowing down

1005
00:54:13,109 --> 00:54:12,480
it's actually speeding up and no one

1006
00:54:16,069 --> 00:54:13,119
could

1007
00:54:18,309 --> 00:54:16,079
explain why so this theory was created

1008
00:54:21,589 --> 00:54:18,319
that there was some kind of

1009
00:54:23,990 --> 00:54:21,599
force or uh presence of matter

1010
00:54:26,710 --> 00:54:24,000
that was actually taking up a vast

1011
00:54:28,630 --> 00:54:26,720
majority of the universe

1012
00:54:30,950 --> 00:54:28,640
but the funny thing about dark matter is

1013
00:54:31,349 --> 00:54:30,960

that there's so much we don't know about

1014

00:54:42,470 --> 00:54:31,359

it

1015

00:54:45,990 --> 00:54:42,480

uh a lot of our current technology

1016

00:54:47,829 --> 00:54:46,000

um the cool thing that the fascinating

1017

00:54:48,710 --> 00:54:47,839

thing that i found about dark matter was

1018

00:54:51,430 --> 00:54:48,720

that

1019

00:54:53,030 --> 00:54:51,440

even though we can't see it its presence

1020

00:54:55,910 --> 00:54:53,040

can still be observed uh

1021

00:54:56,950 --> 00:54:55,920

indirectly by the way it interacts with

1022

00:54:59,030 --> 00:54:56,960

other things

1023

00:55:00,710 --> 00:54:59,040

so that's why in this picture i have

1024

00:55:04,150 --> 00:55:00,720

here um

1025

00:55:06,870 --> 00:55:04,160

you can see that the um

1026
00:55:07,510 --> 00:55:06,880
there are these blue halos surrounding

1027
00:55:10,069 --> 00:55:07,520
these uh

1028
00:55:11,430 --> 00:55:10,079
pictures of galaxy clusters and uh

1029
00:55:14,150 --> 00:55:11,440
that's because the

1030
00:55:16,150 --> 00:55:14,160
of the way that the light is bending is

1031
00:55:19,430 --> 00:55:16,160
actually being affected by the

1032
00:55:22,470 --> 00:55:19,440
uh gravitational pull of the dark matter

1033
00:55:25,270 --> 00:55:22,480
so you can see that the um

1034
00:55:26,870 --> 00:55:25,280
the dark matter is uh itself is not

1035
00:55:29,430 --> 00:55:26,880
visible but it's actually

1036
00:55:31,430 --> 00:55:29,440
affecting the uh the way the light is

1037
00:55:33,109 --> 00:55:31,440
bending around it and i thought that was

1038
00:55:34,549 --> 00:55:33,119

it's like a really fascinating and

1039

00:55:36,710 --> 00:55:34,559

profound thing

1040

00:55:38,390 --> 00:55:36,720

um as well as the fact that there is

1041

00:55:41,829 --> 00:55:38,400

this force in the universe

1042

00:55:44,630 --> 00:55:41,839

that controls so much of uh

1043

00:55:45,030 --> 00:55:44,640

what we know about the universe and yet

1044

00:55:50,230 --> 00:55:45,040

we

1045

00:55:53,829 --> 00:55:50,240

little about that force itself

1046

00:55:58,150 --> 00:55:53,839

so i'd like to share a couple clips of

1047

00:56:00,309 --> 00:55:58,160

my piece with you the first one um

1048

00:56:01,430 --> 00:56:00,319

in the first clip you're going to hear

1049

00:56:03,829 --> 00:56:01,440

what i was

1050

00:56:04,789 --> 00:56:03,839

messing around with uh or experimenting

1051
00:56:08,069 --> 00:56:04,799
with rather

1052
00:56:11,190 --> 00:56:08,079
which are these things called sub tones

1053
00:56:12,150 --> 00:56:11,200
so uh when you when you place when you

1054
00:56:14,150 --> 00:56:12,160
take two or more

1055
00:56:15,670 --> 00:56:14,160
very very high pitches and you place

1056
00:56:19,349 --> 00:56:15,680
them very close together

1057
00:56:21,030 --> 00:56:19,359
what happens is that this sort of

1058
00:56:24,150 --> 00:56:21,040
phantom lower tone

1059
00:56:25,030 --> 00:56:24,160
uh appears and it sort of has this

1060
00:56:28,069 --> 00:56:25,040
effect of

1061
00:56:29,750 --> 00:56:28,079
um ringing in your ear but this

1062
00:56:31,589 --> 00:56:29,760
tone is not actually being played by the

1063
00:56:35,430 --> 00:56:31,599

quartet it's uh

1064

00:56:38,230 --> 00:56:35,440

it's sort of a uh an um musical

1065

00:56:39,430 --> 00:56:38,240

effect so uh i thought that was a really

1066

00:56:43,030 --> 00:56:39,440

cool way of

1067

00:56:46,230 --> 00:56:43,040

uh demonstrating how uh musically how

1068

00:56:50,069 --> 00:56:46,240

dark matter is like

1069

00:56:51,750 --> 00:56:50,079

not entirely um

1070

00:56:53,270 --> 00:56:51,760

like we can't perceive it but it is

1071

00:56:55,990 --> 00:56:53,280

still there uh

1072

00:56:56,630 --> 00:56:56,000

affecting us so what you're about to

1073

00:57:00,710 --> 00:56:56,640

hear are

1074

00:57:03,750 --> 00:57:00,720

these musical subtones being played uh

1075

00:57:05,030 --> 00:57:03,760

by the quartet while this sort of very

1076
00:57:07,670 --> 00:57:05,040
fast and

1077
00:57:09,190 --> 00:57:07,680
violent and very difficult cello solo is

1078
00:57:12,980 --> 00:57:09,200
being played underneath it

1079
00:57:14,720 --> 00:57:12,990
so let's take a listen

1080
00:57:19,360 --> 00:57:14,730
[Applause]

1081
00:57:19,590 --> 00:57:19,370
[Music]

1082
00:57:32,870 --> 00:57:19,600
[Applause]

1083
00:57:52,829 --> 00:57:44,380
[Music]

1084
00:57:52,839 --> 00:57:58,470
so

1085
00:57:58,480 --> 00:58:06,829
[Music]

1086
00:58:06,839 --> 00:58:10,470
um

1087
00:58:10,480 --> 00:58:15,750
[Music]

1088
00:58:19,030 --> 00:58:17,829

all right and then the uh the next clip

1089

00:58:20,390 --> 00:58:19,040

i want to share with you comes

1090

00:58:24,069 --> 00:58:20,400

immediately after

1091

00:58:26,150 --> 00:58:24,079

um and uh in this section of music i

1092

00:58:29,190 --> 00:58:26,160

wanted to demonstrate uh

1093

00:58:30,549 --> 00:58:29,200

just how uh i wanted to demonstrate

1094

00:58:34,870 --> 00:58:30,559

musically how

1095

00:58:38,230 --> 00:58:34,880

the universe is uh expanding added

1096

00:58:39,190 --> 00:58:38,240

faster and faster rate so naturally i

1097

00:58:42,950 --> 00:58:39,200

wanted the music

1098

00:58:46,390 --> 00:58:42,960

to increase gradually uh in speed

1099

00:58:52,380 --> 00:58:46,400

until it reaches a sort of fever pitch

1100

00:58:55,660 --> 00:58:53,900

[Music]

1101
00:59:02,829 --> 00:58:55,670
[Applause]

1102
00:59:04,580 --> 00:59:02,839
[Music]

1103
00:59:44,829 --> 00:59:04,590
that

1104
00:59:44,839 --> 00:59:52,030
hey

1105
01:01:30,000 --> 01:00:22,700
[Music]

1106
01:01:36,829 --> 01:01:30,010
[Applause]

1107
01:01:36,839 --> 01:01:41,410
so

1108
01:02:09,589 --> 01:01:58,360
[Music]

1109
01:02:12,630 --> 01:02:11,190
i should add that the uh some of the

1110
01:02:15,109 --> 01:02:12,640
videos and pictures

1111
01:02:15,990 --> 01:02:15,119
used for throughout were simulations of

1112
01:02:18,549 --> 01:02:16,000
what

1113
01:02:19,990 --> 01:02:18,559

the uh distribution of dark matter

1114

01:02:23,190 --> 01:02:20,000

throughout the universe might look

1115

01:02:25,190 --> 01:02:23,200

like if it was visualized and uh

1116

01:02:26,309 --> 01:02:25,200

i thought those were very beautiful and

1117

01:02:29,430 --> 01:02:26,319

added in

1118

01:02:32,470 --> 01:02:29,440

uh added a layer of profundity to

1119

01:02:34,549 --> 01:02:32,480

this entire production so uh

1120

01:02:36,309 --> 01:02:34,559

thank you for watching and for listening

1121

01:02:38,950 --> 01:02:36,319

so next up i'd like to

1122

01:02:40,630 --> 01:02:38,960

introduce the four people or reintroduce

1123

01:02:42,710 --> 01:02:40,640

rather the four people who

1124

01:02:44,390 --> 01:02:42,720

uh made this entire project happen

1125

01:02:47,430 --> 01:02:44,400

without them uh

1126

01:02:50,150 --> 01:02:47,440

this wouldn't have happened of course so

1127

01:02:50,870 --> 01:02:50,160

uh here are four of my esteemed

1128

01:02:52,870 --> 01:02:50,880

colleagues

1129

01:02:59,750 --> 01:02:52,880

the wonderfully talented bergamot

1130

01:03:03,670 --> 01:03:01,589

hi everyone thanks dan for turning it

1131

01:03:05,349 --> 01:03:03,680

over to us um

1132

01:03:06,789 --> 01:03:05,359

we're super happy to be part of this

1133

01:03:09,270 --> 01:03:06,799

this is really fun for us

1134

01:03:10,950 --> 01:03:09,280

and um it's so great to hear all the

1135

01:03:13,510 --> 01:03:10,960

members of consonants collective

1136

01:03:15,109 --> 01:03:13,520

really talk through both the inspiration

1137

01:03:16,789 --> 01:03:15,119

and the methodology behind their pieces

1138

01:03:18,789 --> 01:03:16,799

it's really fascinating

1139

01:03:20,150 --> 01:03:18,799

um we've learned a lot through this

1140

01:03:22,710 --> 01:03:20,160

project and it's been

1141

01:03:24,069 --> 01:03:22,720

it's been really fun um we all think

1142

01:03:25,990 --> 01:03:24,079

space is cool but none of us knew that

1143

01:03:27,670 --> 01:03:26,000

much beforehand and

1144

01:03:29,430 --> 01:03:27,680

i can certainly see for myself and say

1145

01:03:30,069 --> 01:03:29,440

that i know a lot more now and my

1146

01:03:33,430 --> 01:03:30,079

curiosity

1147

01:03:34,710 --> 01:03:33,440

is peaked to learn more um

1148

01:03:36,549 --> 01:03:34,720

so we're just going to talk a little bit

1149

01:03:38,390 --> 01:03:36,559

about what the what the string quartet

1150

01:03:41,589 --> 01:03:38,400

side of this process was like for us

1151

01:03:43,510 --> 01:03:41,599

and what our experience was um

1152

01:03:44,789 --> 01:03:43,520

this was a pretty unique project for us

1153

01:03:46,950 --> 01:03:44,799

actually um

1154

01:03:49,029 --> 01:03:46,960

as a quartet we as irene said in the

1155

01:03:50,470 --> 01:03:49,039

introduction primarily focus on music by

1156

01:03:53,029 --> 01:03:50,480

living composers

1157

01:03:55,029 --> 01:03:53,039

um which means that we get to have kind

1158

01:03:56,789 --> 01:03:55,039

of a more collaborative process

1159

01:03:58,230 --> 01:03:56,799

in the music that we program than the

1160

01:04:00,230 --> 01:03:58,240

average string quartet

1161

01:04:01,750 --> 01:04:00,240

um there's a ton of repertoire for

1162

01:04:02,710 --> 01:04:01,760

string quartet out there most of it was

1163

01:04:05,190 --> 01:04:02,720

written by

1164

01:04:06,710 --> 01:04:05,200

people who died a long time ago so when

1165

01:04:08,390 --> 01:04:06,720

we perform music often we get to

1166

01:04:09,589 --> 01:04:08,400

collaborate directly with the composers

1167

01:04:11,190 --> 01:04:09,599

and that's amazing because we could ask

1168

01:04:12,789 --> 01:04:11,200

them any question that we want

1169

01:04:15,029 --> 01:04:12,799

um and the composers can even make

1170

01:04:17,109 --> 01:04:15,039

changes based on what they hear

1171

01:04:18,630 --> 01:04:17,119

but more than that with this project

1172

01:04:20,309 --> 01:04:18,640

with consonants we really got to craft

1173

01:04:23,190 --> 01:04:20,319

this whole program with them

1174

01:04:24,470 --> 01:04:23,200

um we sat down together over a year ago

1175

01:04:25,670 --> 01:04:24,480

and kind of just talked about what we

1176

01:04:26,789 --> 01:04:25,680

were interested in and what this could

1177

01:04:29,029 --> 01:04:26,799

look like

1178

01:04:30,470 --> 01:04:29,039

and um knowing that there was a goal to

1179

01:04:31,829 --> 01:04:30,480

have a multimedia component was

1180

01:04:33,270 --> 01:04:31,839

especially exciting for us because

1181

01:04:34,390 --> 01:04:33,280

that's been a goal of ours for a long

1182

01:04:36,390 --> 01:04:34,400

time and something that we're starting

1183

01:04:40,230 --> 01:04:36,400

to do more as well with our projects

1184

01:04:41,349 --> 01:04:40,240

just as a quartet so we really got to

1185

01:04:43,430 --> 01:04:41,359

have this very

1186

01:04:45,190 --> 01:04:43,440

personal and collaborative process from

1187

01:04:46,150 --> 01:04:45,200

start to finish with consonants which is

1188

01:04:48,309 --> 01:04:46,160

awesome

1189

01:04:50,069 --> 01:04:48,319

we um we already knew all of them from

1190

01:04:51,589 --> 01:04:50,079

school at peabody

1191

01:04:52,950 --> 01:04:51,599

so we were able to be in touch pretty

1192

01:04:54,870 --> 01:04:52,960

continually throughout the process

1193

01:04:56,470 --> 01:04:54,880

whenever any of the composers had

1194

01:04:57,829 --> 01:04:56,480

questions or wanted to hear a snippet of

1195

01:04:59,589 --> 01:04:57,839

their piece we could kind of

1196

01:05:01,910 --> 01:04:59,599

have dialogue back and forth about that

1197

01:05:03,829 --> 01:05:01,920

and that makes bringing music to life

1198

01:05:05,190 --> 01:05:03,839

especially exciting for us because we

1199

01:05:08,710 --> 01:05:05,200

know that it's really written with

1200

01:05:11,750 --> 01:05:08,720

with us and our instruments in mind um

1201

01:05:13,910 --> 01:05:11,760

so it has the potential to be

1202

01:05:15,270 --> 01:05:13,920

really a very profound collaboration for

1203

01:05:17,670 --> 01:05:15,280

everyone involved

1204

01:05:19,829 --> 01:05:17,680

and i hope that that comes through with

1205

01:05:22,150 --> 01:05:19,839

music to everyone listening um

1206

01:05:23,829 --> 01:05:22,160

the music is incredibly dense but really

1207

01:05:27,109 --> 01:05:23,839

just gorgeous and

1208

01:05:28,549 --> 01:05:27,119

i think extremely successful um

1209

01:05:30,230 --> 01:05:28,559

i also wanted to mention a little bit

1210

01:05:31,190 --> 01:05:30,240

about why we think this kind of

1211

01:05:34,630 --> 01:05:31,200

collaboration

1212

01:05:36,950 --> 01:05:34,640

should happen and keep happening between

1213

01:05:38,549 --> 01:05:36,960

performers composers and people from

1214

01:05:39,589 --> 01:05:38,559

totally different disciplines in this

1215

01:05:42,710 --> 01:05:39,599

case

1216

01:05:45,349 --> 01:05:42,720

astronomy um

1217

01:05:46,950 --> 01:05:45,359

i really think that something as vast as

1218

01:05:49,990 --> 01:05:46,960

the study of space

1219

01:05:51,670 --> 01:05:50,000

um kind of needs to be explored

1220

01:05:54,870 --> 01:05:51,680

from the perspective of many different

1221

01:05:56,789 --> 01:05:54,880

mediums um

1222

01:06:00,150 --> 01:05:56,799

because we can't really you know someone

1223

01:06:01,750 --> 01:06:00,160

like me who's got has a degree in music

1224

01:06:05,109 --> 01:06:01,760

can't really visualize what's out there

1225

01:06:09,510 --> 01:06:07,990

by by reading scientific texts and kind

1226

01:06:10,230 --> 01:06:09,520

of going about it the science and math

1227

01:06:13,270 --> 01:06:10,240

way

1228

01:06:14,789 --> 01:06:13,280

um but being able to play music that was

1229

01:06:15,670 --> 01:06:14,799

written about it helps bring it to life

1230

01:06:17,510 --> 01:06:15,680

for me

1231

01:06:19,270 --> 01:06:17,520

and i think i speak for all four of us

1232

01:06:20,150 --> 01:06:19,280

when i say that and and hopefully some

1233

01:06:23,349 --> 01:06:20,160

of you listeners

1234

01:06:26,390 --> 01:06:23,359

might feel the same way um it's a way in

1235

01:06:30,230 --> 01:06:26,400

for us to the emotional aspect of

1236

01:06:31,670 --> 01:06:30,240

learning about these vast topics um

1237

01:06:33,349 --> 01:06:31,680

and i think soyuna spoke really

1238

01:06:35,589 --> 01:06:33,359

beautifully about that in particular

1239

01:06:36,950 --> 01:06:35,599

when she was talking about her piece um

1240

01:06:38,230 --> 01:06:36,960

there's this incredible

1241

01:06:39,829 --> 01:06:38,240

emotion that comes with this kind of

1242

01:06:41,990 --> 01:06:39,839

discovery and i think that's what has

1243

01:06:44,390 --> 01:06:42,000

kept humanity going for millennia

1244

01:06:45,910 --> 01:06:44,400

um so we think that collaborating

1245

01:06:48,309 --> 01:06:45,920

between the arts and sciences is a

1246

01:06:50,549 --> 01:06:48,319

really really rich endeavor

1247

01:06:51,349 --> 01:06:50,559

and if this had if this project had

1248

01:06:53,589 --> 01:06:51,359

occurred

1249

01:06:55,430 --> 01:06:53,599

not in covet times we were planning to

1250

01:06:56,630 --> 01:06:55,440

kind of tore it to schools and various

1251
01:06:58,710 --> 01:06:56,640
educational

1252
01:06:59,990 --> 01:06:58,720
um circumstances so we could share it

1253
01:07:05,270 --> 01:07:00,000
with younger listeners

1254
01:07:09,829 --> 01:07:08,549
science and math can coexist with music

1255
01:07:11,670 --> 01:07:09,839
because of course all of those fields

1256
01:07:12,950 --> 01:07:11,680
have a very long history of coexisting

1257
01:07:13,349 --> 01:07:12,960
in ancient greece they were thought to

1258
01:07:14,630 --> 01:07:13,359
be

1259
01:07:16,390 --> 01:07:14,640
really on the same plane and kind of

1260
01:07:19,430 --> 01:07:16,400
using the same parts of the brain

1261
01:07:21,910 --> 01:07:19,440
um so that's super fascinating and

1262
01:07:23,349 --> 01:07:21,920
and we really think that there should be

1263
01:07:23,750 --> 01:07:23,359

many more projects like this in the

1264

01:07:25,190 --> 01:07:23,760

world

1265

01:07:27,190 --> 01:07:25,200

there of course are but we really want

1266

01:07:27,990 --> 01:07:27,200

to see this continue this kind of

1267

01:07:31,190 --> 01:07:28,000

multimedia

1268

01:07:34,230 --> 01:07:31,200

and um uh

1269

01:07:37,589 --> 01:07:34,240

crossing crossing careers i guess um

1270

01:07:39,829 --> 01:07:37,599

collaboration so

1271

01:07:40,789 --> 01:07:39,839

earlier on when bobby was talking about

1272

01:07:43,270 --> 01:07:40,799

this project

1273

01:07:44,789 --> 01:07:43,280

he mentioned that these pieces use

1274

01:07:48,150 --> 01:07:44,799

non-traditional

1275

01:07:50,390 --> 01:07:48,160

repertoire for the string quartet and i

1276

01:07:53,589 --> 01:07:50,400

wanted to talk a little bit more about

1277

01:07:54,470 --> 01:07:53,599

what that means so again you've probably

1278

01:07:56,230 --> 01:07:54,480

noticed that

1279

01:07:58,390 --> 01:07:56,240

this music doesn't sound a whole lot

1280

01:08:00,549 --> 01:07:58,400

like mozart or beethoven who

1281

01:08:01,990 --> 01:08:00,559

when we ask people what they think of

1282

01:08:03,670 --> 01:08:02,000

when we say classical music

1283

01:08:06,230 --> 01:08:03,680

those two composers are usually who they

1284

01:08:07,589 --> 01:08:06,240

list first um

1285

01:08:09,270 --> 01:08:07,599

repertoire for the string quartet has

1286

01:08:10,069 --> 01:08:09,280

evolved a lot in the last few hundred

1287

01:08:13,510 --> 01:08:10,079

years

1288

01:08:15,990 --> 01:08:13,520

um as exhibited by these five pieces um

1289

01:08:17,349 --> 01:08:16,000

of course they they draw on the on the

1290

01:08:18,550 --> 01:08:17,359

lineage that's been there since the time

1291

01:08:21,829 --> 01:08:18,560

of haydn

1292

01:08:23,669 --> 01:08:21,839

um and so each

1293

01:08:25,189 --> 01:08:23,679

each of these five composers have used

1294

01:08:27,030 --> 01:08:25,199

different techniques to

1295

01:08:29,189 --> 01:08:27,040

evoke the elements of space that they

1296

01:08:30,309 --> 01:08:29,199

chose to focus on

1297

01:08:31,669 --> 01:08:30,319

and we're just going to dive into

1298

01:08:33,590 --> 01:08:31,679

talking a little bit more specifically

1299

01:08:36,470 --> 01:08:33,600

about what those were and how it felt to

1300

01:08:40,390 --> 01:08:38,390

so bobby mentioned during his

1301

01:08:41,430 --> 01:08:40,400

presentation that his piece uses box

1302

01:08:43,510 --> 01:08:41,440

notation

1303

01:08:44,709 --> 01:08:43,520

which is different from traditional

1304

01:08:46,709 --> 01:08:44,719

notation in that

1305

01:08:48,149 --> 01:08:46,719

traditional notation is written on a

1306

01:08:49,910 --> 01:08:48,159

five-line staff

1307

01:08:53,030 --> 01:08:49,920

um kind of like you'd write on a line in

1308

01:08:54,870 --> 01:08:53,040

notebook paper per se um

1309

01:08:56,870 --> 01:08:54,880

when we have and that tells time that

1310

01:09:01,430 --> 01:08:56,880

tells location on the fingerboard

1311

01:09:04,789 --> 01:09:03,110

and basically every parameter that we

1312

01:09:06,870 --> 01:09:04,799

need to know when we're reading music

1313

01:09:08,309 --> 01:09:06,880

when using box notation it's a lot less

1314

01:09:10,950 --> 01:09:08,319

specific so

1315

01:09:12,149 --> 01:09:10,960

that can look like a lot of things um it

1316

01:09:13,829 --> 01:09:12,159

might give us kind of

1317

01:09:15,669 --> 01:09:13,839

a general pitch area where we get to

1318

01:09:17,430 --> 01:09:15,679

choose specific pitches out of it

1319

01:09:19,269 --> 01:09:17,440

it might give specific pitches but we

1320

01:09:20,070 --> 01:09:19,279

get to pick the order so it allows us

1321

01:09:26,470 --> 01:09:20,080

this

1322

01:09:28,550 --> 01:09:26,480

element of improvisation which is really

1323

01:09:30,470 --> 01:09:28,560

fun to play it it forces us to

1324

01:09:32,229 --> 01:09:30,480

really communicate to an even greater

1325

01:09:33,430 --> 01:09:32,239

degree than we already do as for string

1326

01:09:36,470 --> 01:09:33,440

quartet players

1327

01:09:39,189 --> 01:09:36,480

um and it allows us to really

1328

01:09:40,870 --> 01:09:39,199

find kind of a core of sound that feels

1329

01:09:44,229 --> 01:09:40,880

the most right to us

1330

01:09:45,349 --> 01:09:44,239

um so i think the presence of this box

1331

01:09:47,349 --> 01:09:45,359

notation in

1332

01:09:49,349 --> 01:09:47,359

in sections of bobby's piece really

1333

01:09:52,390 --> 01:09:49,359

helped us find a specific character

1334

01:09:53,829 --> 01:09:52,400

um and bobby piece is super exciting i

1335

01:09:54,229 --> 01:09:53,839

really hope you're able to check out the

1336

01:09:55,910 --> 01:09:54,239

full

1337

01:09:59,030 --> 01:09:55,920

versions of all five of these pieces

1338

01:10:01,270 --> 01:09:59,040

because they're amazing um

1339

01:10:03,030 --> 01:10:01,280

but that's something that probably

1340

01:10:05,030 --> 01:10:03,040

started outside of classical music you

1341

01:10:07,350 --> 01:10:05,040

might see it some in jazz

1342

01:10:08,470 --> 01:10:07,360

um and in this experimental music in

1343

01:10:10,950 --> 01:10:08,480

particular

1344

01:10:12,229 --> 01:10:10,960

um but we're really glad that bobby

1345

01:10:12,950 --> 01:10:12,239

chose to write in that way for this

1346

01:10:16,070 --> 01:10:12,960

piece

1347

01:10:16,630 --> 01:10:16,080

um one thing we thought was notable

1348

01:10:19,910 --> 01:10:16,640

about

1349

01:10:21,830 --> 01:10:19,920

zach's piece iridescence um was he uses

1350

01:10:23,350 --> 01:10:21,840

this huge range of the instruments and

1351

01:10:25,990 --> 01:10:23,360

i'm talking about like the lowest

1352

01:10:26,630 --> 01:10:26,000

note the c on the cello to the very

1353

01:10:28,790 --> 01:10:26,640

highest

1354

01:10:30,229 --> 01:10:28,800

harmonics on the violin which the violin

1355

01:10:32,950 --> 01:10:30,239

can literally play notes that are so

1356

01:10:34,390 --> 01:10:32,960

high you can't hear them

1357

01:10:35,990 --> 01:10:34,400

sarah and i are definitely a little bit

1358

01:10:40,310 --> 01:10:36,000

deaf in our left ears

1359

01:10:43,430 --> 01:10:40,320

um after many years of playing but

1360

01:10:46,149 --> 01:10:43,440

um zach making use of that huge

1361

01:10:47,590 --> 01:10:46,159

range of the string quartet i think

1362

01:10:50,950 --> 01:10:47,600

really evokes

1363

01:10:52,070 --> 01:10:50,960

this sense of vastness um and he talked

1364

01:10:53,110 --> 01:10:52,080

about the piece being very hard and it

1365

01:10:55,750 --> 01:10:53,120

is very hard

1366

01:10:56,950 --> 01:10:55,760

um zach also used some kind of

1367

01:10:58,950 --> 01:10:56,960

non-specific

1368

01:11:00,310 --> 01:10:58,960

notation in moments that allowed us to

1369

01:11:02,790 --> 01:11:00,320

kind of just play around

1370

01:11:04,550 --> 01:11:02,800

creating really um what i like to think

1371

01:11:07,750 --> 01:11:04,560

of as a space rather than

1372

01:11:09,110 --> 01:11:07,760

a linear narrative um

1373

01:11:10,790 --> 01:11:09,120

traditional notation i think lends

1374

01:11:13,270 --> 01:11:10,800

itself much more to linear narrative

1375

01:11:14,709 --> 01:11:13,280

whereas more experimental notation

1376

01:11:16,310 --> 01:11:14,719

allows us to kind of

1377

01:11:18,149 --> 01:11:16,320

create this setting that we're playing

1378

01:11:19,030 --> 01:11:18,159

around within in a less kind of from

1379

01:11:22,950 --> 01:11:19,040

point a to point b

1380

01:11:24,550 --> 01:11:22,960

way um i think that was that was audible

1381

01:11:25,990 --> 01:11:24,560

in the very opening of zach's piece that

1382

01:11:31,350 --> 01:11:26,000

she played

1383

01:11:34,070 --> 01:11:31,360

for us earlier um so yuna's piece

1384

01:11:35,750 --> 01:11:34,080

is i think a lot different than the

1385

01:11:38,870 --> 01:11:35,760

others in some ways she definitely

1386

01:11:41,430 --> 01:11:38,880

wrote the slowest piece of the five

1387

01:11:42,390 --> 01:11:41,440

um and this piece is so gorgeous we

1388

01:11:44,149 --> 01:11:42,400

really fell in love with it from the

1389

01:11:48,070 --> 01:11:44,159

moment we played the first melodies

1390

01:11:50,070 --> 01:11:48,080

um and also really liked that she chose

1391

01:11:52,870 --> 01:11:50,080

to work with kind of the more emotional

1392

01:11:53,590 --> 01:11:52,880

side of exploration rather than specific

1393

01:11:56,630 --> 01:11:53,600

um

1394

01:11:57,910 --> 01:11:56,640

scientific phenomena which is really

1395

01:11:58,709 --> 01:11:57,920

cool and going back to what i was saying

1396

01:12:01,590 --> 01:11:58,719

earlier

1397

01:12:03,510 --> 01:12:01,600

we think it's really important to use

1398

01:12:05,990 --> 01:12:03,520

music to explore this side of

1399

01:12:07,350 --> 01:12:06,000

space exploration because we can really

1400

01:12:10,709 --> 01:12:07,360

relate to it

1401
01:12:12,390 --> 01:12:10,719
um something we love about soyuna's

1402
01:12:13,990 --> 01:12:12,400
piece is that these slow

1403
01:12:17,110 --> 01:12:14,000
these slow melodies in the beginning and

1404
01:12:18,709 --> 01:12:17,120
end really call to mind

1405
01:12:20,390 --> 01:12:18,719
like ancient times you kind of this

1406
01:12:23,830 --> 01:12:20,400
whole stretch of time from the first

1407
01:12:25,430 --> 01:12:23,840
space explorers to now um

1408
01:12:27,350 --> 01:12:25,440
and we can kind of empathize with that

1409
01:12:29,350 --> 01:12:27,360
wonder that that every person making

1410
01:12:29,910 --> 01:12:29,360
discoveries about the world beyond our

1411
01:12:33,189 --> 01:12:29,920
own

1412
01:12:34,550 --> 01:12:33,199
have felt um

1413
01:12:35,750 --> 01:12:34,560

for good ways peace this place was

1414

01:12:36,550 --> 01:12:35,760

really this piece was really wild to

1415

01:12:39,430 --> 01:12:36,560

play

1416

01:12:40,950 --> 01:12:39,440

um he talked about the doppler effect

1417

01:12:44,070 --> 01:12:40,960

being present in the piece

1418

01:12:46,149 --> 01:12:44,080

and i'm sure you heard that the tonality

1419

01:12:49,270 --> 01:12:46,159

was a little bit weird in this piece

1420

01:12:50,550 --> 01:12:49,280

um over the course of the last third or

1421

01:12:53,189 --> 01:12:50,560

so of the piece

1422

01:12:53,590 --> 01:12:53,199

he actually asks us to very gradually

1423

01:12:56,950 --> 01:12:53,600

kind of

1424

01:13:00,070 --> 01:12:56,960

shift up the fingerboard um

1425

01:13:01,510 --> 01:13:00,080

it's like a modulation if um

1426

01:13:02,790 --> 01:13:01,520

if there's some is if this is something

1427

01:13:03,990 --> 01:13:02,800

that's familiar to anyone that's

1428

01:13:07,030 --> 01:13:04,000

studying music at all

1429

01:13:09,750 --> 01:13:07,040

um where we move from one key to another

1430

01:13:10,070 --> 01:13:09,760

in the case of blueway's piece we move

1431

01:13:12,390 --> 01:13:10,080

just

1432

01:13:13,110 --> 01:13:12,400

a very short distance so it's not even

1433

01:13:16,630 --> 01:13:13,120

like

1434

01:13:18,310 --> 01:13:16,640

a full notes worth of distance um

1435

01:13:20,870 --> 01:13:18,320

and doing this over the course of

1436

01:13:24,070 --> 01:13:20,880

several minutes is really hard

1437

01:13:27,350 --> 01:13:24,080

to do at the same time um but

1438

01:13:27,990 --> 01:13:27,360

super unsettling and it really feels

1439

01:13:30,070 --> 01:13:28,000

like we do

1440

01:13:31,270 --> 01:13:30,080

kind of move from a familiar world into

1441

01:13:32,870 --> 01:13:31,280

an alien one

1442

01:13:33,910 --> 01:13:32,880

maybe like you look in the mirror and

1443

01:13:35,189 --> 01:13:33,920

something on the other side of the

1444

01:13:36,390 --> 01:13:35,199

mirror moves and you didn't move like

1445

01:13:40,790 --> 01:13:36,400

that kind of

1446

01:13:43,910 --> 01:13:43,189

and it's really fun to play and

1447

01:13:45,669 --> 01:13:43,920

something like this

1448

01:13:47,110 --> 01:13:45,679

is really only possible for an ensemble

1449

01:13:48,550 --> 01:13:47,120

like a string quartet because we don't

1450

01:13:49,350 --> 01:13:48,560

have frets on our fingerboard we can

1451

01:13:50,630 --> 01:13:49,360

really slide

1452

01:13:51,830 --> 01:13:50,640

to any point we want to on our

1453

01:13:53,910 --> 01:13:51,840

fingerboard we can play all the notes

1454

01:13:56,790 --> 01:13:53,920

between the notes as you might say

1455

01:13:58,950 --> 01:13:56,800

um so really playing with these subtle

1456

01:14:02,630 --> 01:13:58,960

shifts of pitch and time

1457

01:14:03,110 --> 01:14:02,640

um was a huge element of kuwai's piece

1458

01:14:05,830 --> 01:14:03,120

calling

1459

01:14:07,750 --> 01:14:05,840

to mind what happens to time and space

1460

01:14:11,189 --> 01:14:07,760

when you go through a black hole

1461

01:14:14,229 --> 01:14:11,199

um and then and dan's piece

1462

01:14:16,229 --> 01:14:14,239

as he was talking about um there's this

1463

01:14:18,790 --> 01:14:16,239

kind of magical

1464

01:14:21,110 --> 01:14:18,800

tone that occurs when you play three

1465

01:14:22,630 --> 01:14:21,120

very high notes very close together

1466

01:14:24,390 --> 01:14:22,640

this is related to what i was saying

1467

01:14:26,070 --> 01:14:24,400

with goey's piece how there's kind of

1468

01:14:27,990 --> 01:14:26,080

notes between the notes that we are able

1469

01:14:31,990 --> 01:14:28,000

to play on our stream instruments

1470

01:14:32,709 --> 01:14:32,000

um and in rehearsal we call it our

1471

01:14:35,430 --> 01:14:32,719

special friend

1472

01:14:36,709 --> 01:14:35,440

or our friend because it's this pitch

1473

01:14:37,990 --> 01:14:36,719

that just appears and it's coming from

1474

01:14:39,590 --> 01:14:38,000

nowhere

1475

01:14:42,709 --> 01:14:39,600

and you can only hear it if you listen

1476

01:14:45,750 --> 01:14:42,719

very closely it's pretty creepy but very

1477

01:14:47,110 --> 01:14:45,760

effective um

1478

01:14:48,870 --> 01:14:47,120

and this is a really fun effect to play

1479

01:14:49,590 --> 01:14:48,880

again not super kind to me in sarah's

1480

01:14:52,950 --> 01:14:49,600

ears

1481

01:14:54,070 --> 01:14:52,960

but super worth it um

1482

01:14:55,990 --> 01:14:54,080

and that this is something we always

1483

01:14:59,350 --> 01:14:56,000

wish composers would use more because

1484

01:15:02,070 --> 01:14:59,360

it's so rich um

1485

01:15:02,950 --> 01:15:02,080

this range of pitches that are available

1486

01:15:04,470 --> 01:15:02,960

to us that

1487

01:15:06,470 --> 01:15:04,480

typically are not used by people

1488

01:15:08,950 --> 01:15:06,480

composing western classical music

1489

01:15:09,590 --> 01:15:08,960

so um so that's a little fun a lot of

1490

01:15:12,950 --> 01:15:09,600

fun

1491

01:15:14,229 --> 01:15:12,960

and um

1492

01:15:15,990 --> 01:15:14,239

so yeah that's kind of broad strokes

1493

01:15:17,430 --> 01:15:16,000

overview of what our experience learning

1494

01:15:19,750 --> 01:15:17,440

the pieces was like

1495

01:15:21,590 --> 01:15:19,760

um we got to record them all in studio

1496

01:15:23,430 --> 01:15:21,600

in baltimore together last fall which

1497

01:15:26,709 --> 01:15:23,440

was super fun that was

1498

01:15:27,669 --> 01:15:26,719

i think the first time since our initial

1499

01:15:29,350 --> 01:15:27,679

meeting that

1500

01:15:30,870 --> 01:15:29,360

most of us not all of us most of us were

1501

01:15:34,229 --> 01:15:30,880

in the same room together

1502

01:15:35,830 --> 01:15:34,239

which was great um and yeah did

1503

01:15:39,030 --> 01:15:35,840

any of the other bergamots have anything

1504

01:15:40,709 --> 01:15:39,040

to add to that

1505

01:15:42,229 --> 01:15:40,719

i think that was a really good summary

1506

01:15:44,149 --> 01:15:42,239

um yeah i

1507

01:15:45,910 --> 01:15:44,159

really enjoyed playing all of these

1508

01:15:47,430 --> 01:15:45,920

pieces and getting to know the composers

1509

01:15:48,310 --> 01:15:47,440

through their music and i really hope

1510

01:15:50,830 --> 01:15:48,320

that

1511

01:15:52,070 --> 01:15:50,840

other people will perform these pieces

1512

01:15:55,750 --> 01:15:52,080

because

1513

01:15:58,070 --> 01:15:55,760

it really is all of them have

1514

01:15:59,110 --> 01:15:58,080

really amazing techniques and textures

1515

01:16:04,550 --> 01:15:59,120

that i think everyone should

1516

01:16:08,550 --> 01:16:07,590

yeah absolutely um the music is written

1517

01:16:09,990 --> 01:16:08,560

down and

1518

01:16:12,390 --> 01:16:10,000

should absolutely be played by other

1519

01:16:16,070 --> 01:16:12,400

string quartets

1520

01:16:19,030 --> 01:16:16,080

um so please throw any questions

1521

01:16:20,070 --> 01:16:19,040

in the chat on youtube we'd love to to

1522

01:16:22,790 --> 01:16:20,080

talk more about

1523

01:16:24,709 --> 01:16:22,800

how this all came together um and i

1524

01:16:28,229 --> 01:16:24,719

think i'm gonna toss it back to bobby to

1525

01:16:31,510 --> 01:16:30,229

yeah thank you so much bergamot and uh

1526

01:16:32,950 --> 01:16:31,520

well yeah thanks so much leeda really

1527

01:16:34,390 --> 01:16:32,960

for giving all those incredibly

1528

01:16:36,470 --> 01:16:34,400

insightful thoughts and um

1529

01:16:38,229 --> 01:16:36,480

i don't know insights to how realizing

1530

01:16:39,590 --> 01:16:38,239

our pieces was all that is actually

1531

01:16:40,550 --> 01:16:39,600

really interesting for us as composers

1532

01:16:42,550 --> 01:16:40,560

to know as well

1533

01:16:44,229 --> 01:16:42,560

and we hope that just as um yeah just as

1534

01:16:45,270 --> 01:16:44,239

lay people were a science people that

1535

01:16:46,870 --> 01:16:45,280

some of that was interesting and

1536

01:16:49,030 --> 01:16:46,880

engaging to you

1537

01:16:51,270 --> 01:16:49,040

um i have to give credit where credit is

1538

01:16:52,950 --> 01:16:51,280

due um and also thank the various

1539

01:16:54,470 --> 01:16:52,960

organizations that helped support this

1540

01:16:55,430 --> 01:16:54,480

project including the maryland states

1541

01:16:57,110 --> 01:16:55,440

art council

1542

01:16:59,350 --> 01:16:57,120

the jersey city arts council and the

1543

01:17:00,550 --> 01:16:59,360

awesome foundation for providing funding

1544

01:17:02,550 --> 01:17:00,560

that allowed us

1545

01:17:04,470 --> 01:17:02,560

um yeah to get this whole project going

1546

01:17:05,990 --> 01:17:04,480

and to figure out all the production not

1547

01:17:08,390 --> 01:17:06,000

cost and all that kind of thing

1548

01:17:09,030 --> 01:17:08,400

i also want to thank uh caroline xia who

1549

01:17:12,070 --> 01:17:09,040

is

1550

01:17:15,030 --> 01:17:12,080

a real monster filmmaker we gave her

1551

01:17:16,550 --> 01:17:15,040

five music videos to shoot in like a day

1552

01:17:18,390 --> 01:17:16,560

and she managed to pull it off so we

1553

01:17:20,709 --> 01:17:18,400

were incredibly grateful for that

1554

01:17:22,630 --> 01:17:20,719

um yeah so if you can we would love if

1555

01:17:26,790 --> 01:17:22,640

you could stick around for a q a

1556

01:17:27,189 --> 01:17:26,800

and um if not uh may the fourth be with

1557

01:17:32,550 --> 01:17:27,199

you

1558

01:17:34,709 --> 01:17:32,560

all so much

1559

01:17:35,910 --> 01:17:34,719

all right thank you very much bobby and

1560

01:17:39,270 --> 01:17:35,920

thank you to all

1561

01:17:40,630 --> 01:17:39,280

our composers and our performers uh this

1562

01:17:42,870 --> 01:17:40,640

is truly a

1563

01:17:44,870 --> 01:17:42,880

unique and special presentation for the

1564

01:17:49,350 --> 01:17:44,880

public lecture series

1565

01:17:52,709 --> 01:17:49,360

i will totally totally agree with leta

1566

01:17:55,270 --> 01:17:52,719

on all of this idea of trying to get art

1567

01:17:57,189 --> 01:17:55,280

and science working together as an

1568

01:17:58,390 --> 01:17:57,199

astronomer who does visualizations you

1569

01:18:02,070 --> 01:17:58,400

know we take the

1570

01:18:03,590 --> 01:18:02,080

uh astronomy we put it into into into um

1571

01:18:06,229 --> 01:18:03,600

i get to pay an astronomer who makes

1572

01:18:09,110 --> 01:18:06,239

movies so i get to do a part of this

1573

01:18:10,870 --> 01:18:09,120

and i always say that adding the music

1574

01:18:13,430 --> 01:18:10,880

when we get to the visualization done

1575

01:18:14,229 --> 01:18:13,440

adding the music is such an important

1576

01:18:16,790 --> 01:18:14,239

element

1577

01:18:17,750 --> 01:18:16,800

to really bring up the emotion why

1578

01:18:20,470 --> 01:18:17,760

doesn't everybody

1579

01:18:21,750 --> 01:18:20,480

turn on their video cameras so that we

1580

01:18:24,830 --> 01:18:21,760

can see you all

1581

01:18:28,149 --> 01:18:24,840

and we'll have a big brady bunch type

1582

01:18:29,590 --> 01:18:28,159

presentation all right uh and we have

1583

01:18:31,669 --> 01:18:29,600

some questions now i

1584

01:18:33,189 --> 01:18:31,679

as host i get to ask uh some of the

1585

01:18:36,950 --> 01:18:33,199

first questions

1586

01:18:38,310 --> 01:18:36,960

so uh bobby um you were doing star

1587

01:18:40,950 --> 01:18:38,320

formation right

1588

01:18:42,310 --> 01:18:40,960

stars and star formation and such and i

1589

01:18:44,709 --> 01:18:42,320

got to imagine that

1590

01:18:46,550 --> 01:18:44,719

um the star when it becomes goes main

1591

01:18:47,750 --> 01:18:46,560

sequence is when the fusion turns on

1592

01:18:49,110 --> 01:18:47,760

with hydrogen fusion

1593

01:18:50,870 --> 01:18:49,120

it turns into the core is there some

1594

01:18:53,110 --> 01:18:50,880

sort of crescendo that that you know a

1595

01:18:55,189 --> 01:18:53,120

musical element that says fusion

1596

01:18:56,470 --> 01:18:55,199

to you yeah yeah yeah totally that's

1597

01:18:56,950 --> 01:18:56,480

actually a really good question so the

1598

01:18:59,430 --> 01:18:56,960

part

1599

01:19:01,030 --> 01:18:59,440

leading up right to the like the last

1600

01:19:01,910 --> 01:19:01,040

excerpt that i showed this pretty ec

1601

01:19:03,590 --> 01:19:01,920

major bit

1602

01:19:04,950 --> 01:19:03,600

is probably some of the thorniest and

1603

01:19:07,189 --> 01:19:04,960

most violent that

1604

01:19:08,229 --> 01:19:07,199

um that at least my piece gets i don't

1605

01:19:10,149 --> 01:19:08,239

want to say the whole album but

1606

01:19:13,110 --> 01:19:10,159

basically what's happening there is

1607

01:19:14,630 --> 01:19:13,120

um almost there's like no basically

1608

01:19:16,229 --> 01:19:14,640

almost all the musicians are just like

1609

01:19:17,830 --> 01:19:16,239

shredding on their instruments and there

1610

01:19:19,510 --> 01:19:17,840

isn't really a kind of clear kind of

1611

01:19:20,870 --> 01:19:19,520

pitch it's just super super violent and

1612

01:19:23,110 --> 01:19:20,880

really explosive

1613

01:19:24,709 --> 01:19:23,120

um it's super awesome and it was a lot

1614

01:19:25,910 --> 01:19:24,719

of fun watching the quartet sort of lean

1615

01:19:28,310 --> 01:19:25,920

into that because

1616

01:19:29,830 --> 01:19:28,320

um i don't yeah i haven't met musicians

1617

01:19:32,950 --> 01:19:29,840

who would be that willing to sort of

1618

01:19:34,550 --> 01:19:32,960

i don't know freak out i guess on from a

1619

01:19:37,669 --> 01:19:34,560

mic microphone so to speak yeah

1620

01:19:41,189 --> 01:19:37,679

a lot of fun all right um

1621

01:19:43,510 --> 01:19:41,199

i had a question for zach um you talked

1622

01:19:45,990 --> 01:19:43,520

about the video compositions that were

1623

01:19:46,790 --> 01:19:46,000

part of your sequence and so what i

1624

01:19:50,070 --> 01:19:46,800

wanted to know

1625

01:19:51,990 --> 01:19:50,080

was how much did the composers play a

1626

01:19:53,990 --> 01:19:52,000

role in the video editing

1627

01:19:55,830 --> 01:19:54,000

right um because i know that you

1628

01:19:58,149 --> 01:19:55,840

probably worked on on the image

1629

01:19:59,350 --> 01:19:58,159

collecting images uh do you do part of

1630

01:20:00,790 --> 01:19:59,360

the editing or did you have somebody

1631

01:20:02,310 --> 01:20:00,800

else do it you stood over them

1632

01:20:05,750 --> 01:20:02,320

stick it over them said no i want this i

1633

01:20:08,149 --> 01:20:05,760

want this i want this how did that work

1634

01:20:09,430 --> 01:20:08,159

awesome question it was entirely a

1635

01:20:10,070 --> 01:20:09,440

collaborative process throughout the

1636

01:20:12,229 --> 01:20:10,080

whole thing

1637

01:20:13,910 --> 01:20:12,239

um however the composers once they got

1638

01:20:16,470 --> 01:20:13,920

the raw footage so once they had

1639

01:20:17,270 --> 01:20:16,480

all those amazing images visualizations

1640

01:20:20,550 --> 01:20:17,280

etc from

1641

01:20:22,070 --> 01:20:20,560

stsci and everyone and they had the raw

1642

01:20:23,910 --> 01:20:22,080

video from that

1643

01:20:25,669 --> 01:20:23,920

epic video shoot that bobby was just

1644

01:20:28,310 --> 01:20:25,679

talking about a few moments ago

1645

01:20:29,910 --> 01:20:28,320

we you know um shot like eight hours of

1646

01:20:31,990 --> 01:20:29,920

material from the string quartet once we

1647

01:20:34,950 --> 01:20:32,000

had all that raw material

1648

01:20:35,590 --> 01:20:34,960

it was basically on us to just put it

1649

01:20:37,590 --> 01:20:35,600

together

1650

01:20:38,870 --> 01:20:37,600

so you know we were all sort of at

1651
01:20:41,750 --> 01:20:38,880
different um

1652
01:20:42,950 --> 01:20:41,760
stages in our video editing careers we

1653
01:20:44,870 --> 01:20:42,960
want to do a lot more of this

1654
01:20:46,149 --> 01:20:44,880
but i'll say it was definitely a

1655
01:20:48,629 --> 01:20:46,159
wonderful learning experience

1656
01:20:49,910 --> 01:20:48,639
for me and all my colleagues for sure

1657
01:20:52,310 --> 01:20:49,920
definitely one of the

1658
01:20:53,030 --> 01:20:52,320
most fun parts of it and i know we all

1659
01:20:55,590 --> 01:20:53,040
um

1660
01:20:57,270 --> 01:20:55,600
started the formative research process

1661
01:21:00,550 --> 01:20:57,280
and you know sort of amassing

1662
01:21:01,830 --> 01:21:00,560
all our um sdsci related videos very

1663
01:21:03,510 --> 01:21:01,840

very early in the process

1664

01:21:04,950 --> 01:21:03,520

like i was mentioning in my piece but

1665

01:21:06,390 --> 01:21:04,960

then just putting them all together at

1666

01:21:09,510 --> 01:21:06,400

the end was

1667

01:21:13,030 --> 01:21:09,520

definitely on us and it was exciting

1668

01:21:14,629 --> 01:21:13,040

and daunting at the same time

1669

01:21:16,149 --> 01:21:14,639

that's that that does sound quite like

1670

01:21:18,149 --> 01:21:16,159

quite a challenge

1671

01:21:20,550 --> 01:21:18,159

um let's see what other questions that i

1672

01:21:23,430 --> 01:21:20,560

write down oh uh sienna

1673

01:21:24,870 --> 01:21:23,440

you put out there about this idea of

1674

01:21:27,669 --> 01:21:24,880

communication across the

1675

01:21:29,669 --> 01:21:27,679

the generations across the centuries uh

1676

01:21:31,830 --> 01:21:29,679

from 1054 up through to

1677

01:21:32,790 --> 01:21:31,840

today and it just occurred to me like

1678

01:21:34,629 --> 01:21:32,800

like

1679

01:21:35,830 --> 01:21:34,639

music really does the same thing doesn't

1680

01:21:37,910 --> 01:21:35,840

it um

1681

01:21:38,950 --> 01:21:37,920

in terms of of building off of the

1682

01:21:40,950 --> 01:21:38,960

composers and

1683

01:21:43,030 --> 01:21:40,960

the ideas that have been been around for

1684

01:21:44,070 --> 01:21:43,040

centuries um

1685

01:21:46,149 --> 01:21:44,080

i don't know what's your thoughts on

1686

01:21:46,790 --> 01:21:46,159

that what's the did it affect any of

1687

01:21:49,990 --> 01:21:46,800

your piece

1688

01:21:54,149 --> 01:21:50,000

and that idea yeah i totally agree and

1689

01:21:55,910 --> 01:21:54,159

um um i think um i mentioned that it's

1690

01:22:00,709 --> 01:21:55,920

um

1691

01:22:03,990 --> 01:22:00,719

through the generation

1692

01:22:06,550 --> 01:22:04,000

is the the motivation of

1693

01:22:07,990 --> 01:22:06,560

our whole human history and i think it

1694

01:22:10,070 --> 01:22:08,000

concludes science and

1695

01:22:11,990 --> 01:22:10,080

all the music and all the humanities

1696

01:22:14,790 --> 01:22:12,000

everything in our lives so

1697

01:22:15,430 --> 01:22:14,800

i totally agree with that and yeah

1698

01:22:19,189 --> 01:22:15,440

that's

1699

01:22:20,550 --> 01:22:19,199

what inspired my piece yes

1700

01:22:22,310 --> 01:22:20,560

all right i don't want to take the

1701

01:22:23,990 --> 01:22:22,320

prerogative and ask all my questions

1702

01:22:26,550 --> 01:22:24,000

because i have about five or six more

1703

01:22:28,310 --> 01:22:26,560

so i'm gonna bring on grant justice uh

1704

01:22:29,990 --> 01:22:28,320

grant once you turn on your video and

1705

01:22:33,350 --> 01:22:30,000

he's been monitoring our

1706

01:22:36,550 --> 01:22:33,360

um our

1707

01:22:38,709 --> 01:22:36,560

uh quite boisterous chat tonight yeah

1708

01:22:39,750 --> 01:22:38,719

and i know you've pulled a few questions

1709

01:22:40,950 --> 01:22:39,760

out of there so why don't you go ahead

1710

01:22:43,669 --> 01:22:40,960

and ask one

1711

01:22:44,470 --> 01:22:43,679

yeah absolutely um i'll just go kind of

1712

01:22:47,430 --> 01:22:44,480

in order

1713

01:22:48,870 --> 01:22:47,440

uh so the first one would be for zach um

1714

01:22:51,030 --> 01:22:48,880

especially for your piece

1715

01:22:52,229 --> 01:22:51,040

do composers sometimes have specific

1716

01:22:54,790 --> 01:22:52,239

arrangements for

1717

01:22:57,590 --> 01:22:54,800

different celestial bodies different

1718

01:23:00,310 --> 01:22:57,600

types of like interstellar phenomena

1719

01:23:01,350 --> 01:23:00,320

or is there an instrument or instruments

1720

01:23:04,550 --> 01:23:01,360

that you associate

1721

01:23:07,669 --> 01:23:04,560

specifically with particular phenomena

1722

01:23:10,070 --> 01:23:07,679

or celestial bodies great great question

1723

01:23:10,870 --> 01:23:10,080

uh i definitely say for the former part

1724

01:23:12,870 --> 01:23:10,880

of it it's

1725

01:23:14,870 --> 01:23:12,880

very very specific to composer actually

1726

01:23:16,470 --> 01:23:14,880

the caveat is all this is super specific

1727

01:23:18,470 --> 01:23:16,480

to composers so i'd love to

1728

01:23:20,070 --> 01:23:18,480

hear what my esteemed colleagues think

1729

01:23:23,189 --> 01:23:20,080

of all this stuff as well

1730

01:23:24,390 --> 01:23:23,199

um but personally for me honestly i was

1731

01:23:27,510 --> 01:23:24,400

in the perfect medium

1732

01:23:29,830 --> 01:23:27,520

anything strings based you know

1733

01:23:30,870 --> 01:23:29,840

in conjunction with astronomy is kind of

1734

01:23:32,629 --> 01:23:30,880

amazing because

1735

01:23:33,910 --> 01:23:32,639

strings can sustain they can just

1736

01:23:35,110 --> 01:23:33,920

sustain forever they're not like

1737

01:23:36,709 --> 01:23:35,120

woodwind instruments that have to you

1738

01:23:37,430 --> 01:23:36,719

know take breaths they're not like piano

1739

01:23:39,750 --> 01:23:37,440

where the

1740

01:23:41,030 --> 01:23:39,760

sound decays they can sustain forever

1741

01:23:43,189 --> 01:23:41,040

kind of create this

1742

01:23:44,709 --> 01:23:43,199

wash of ethereal sound and at the same

1743

01:23:45,189 --> 01:23:44,719

time just like bergamot was talking

1744

01:23:47,430 --> 01:23:45,199

about

1745

01:23:48,950 --> 01:23:47,440

they can create um sort of sounds

1746

01:23:49,830 --> 01:23:48,960

outside the norm you know extended

1747

01:23:52,310 --> 01:23:49,840

techniques

1748

01:23:53,430 --> 01:23:52,320

otherworldly things you might not expect

1749

01:23:55,750 --> 01:23:53,440

to hear from

1750

01:23:57,350 --> 01:23:55,760

say a conventional acoustic instrument

1751

01:23:58,709 --> 01:23:57,360

like for example um

1752

01:24:00,870 --> 01:23:58,719

in my piece i have this section that

1753

01:24:03,030 --> 01:24:00,880

just sort of drifts through the um

1754

01:24:04,390 --> 01:24:03,040

bubble nebula and i couldn't think of a

1755

01:24:07,030 --> 01:24:04,400

better instrument to use than

1756

01:24:07,510 --> 01:24:07,040

a string quartet maybe more strings

1757

01:24:09,430 --> 01:24:07,520

maybe

1758

01:24:10,709 --> 01:24:09,440

you know a string orchestra or something

1759

01:24:13,830 --> 01:24:10,719

like that but strings are

1760

01:24:17,030 --> 01:24:13,840

maybe definitely yeah that would be

1761

01:24:19,510 --> 01:24:17,040

that would be amazing would you um

1762

01:24:20,709 --> 01:24:19,520

comment on this because you created so

1763

01:24:23,910 --> 01:24:20,719

much tension

1764

01:24:24,790 --> 01:24:23,920

in part of your piece there um and using

1765

01:24:28,070 --> 01:24:24,800

the strings was just

1766

01:24:29,750 --> 01:24:28,080

like wow i i surprised you could it felt

1767

01:24:30,550 --> 01:24:29,760

like you could all you just sustained it

1768

01:24:33,750 --> 01:24:30,560

for all

1769

01:24:35,669 --> 01:24:33,760

for a really long time there yeah i

1770

01:24:37,430 --> 01:24:35,679

definitely agree with the point that you

1771

01:24:40,790 --> 01:24:37,440

know with strings there's so

1772

01:24:43,590 --> 01:24:40,800

so so many possibilities that you can do

1773

01:24:43,990 --> 01:24:43,600

with you know the extended sounds like

1774

01:24:47,669 --> 01:24:44,000

effects

1775

01:24:51,189 --> 01:24:47,679

that you wouldn't necessarily um hear

1776

01:24:53,910 --> 01:24:51,199

normally so with like space and

1777

01:24:54,629 --> 01:24:53,920

and especially my piece with black holes

1778

01:24:58,310 --> 01:24:54,639

right

1779

01:25:00,629 --> 01:24:58,320

with the heavy distortions and

1780

01:25:02,950 --> 01:25:00,639

that kind of effect that was i thought

1781

01:25:05,990 --> 01:25:02,960

that using strings was like a

1782

01:25:08,470 --> 01:25:06,000

really effective way to control

1783

01:25:09,189 --> 01:25:08,480

um you know the visual effect in an

1784

01:25:12,790 --> 01:25:09,199

audio

1785

01:25:15,270 --> 01:25:12,800

way yeah okay great

1786

01:25:15,990 --> 01:25:15,280

uh grant i think we had one for daniel

1787

01:25:19,270 --> 01:25:16,000

about the

1788

01:25:20,870 --> 01:25:19,280

the imagery yeah um we

1789

01:25:22,870 --> 01:25:20,880

had someone in the chat who was asking

1790

01:25:25,189 --> 01:25:22,880

about the imagery in the background of

1791

01:25:26,070 --> 01:25:25,199

daniel's performance the visuals that

1792

01:25:28,950 --> 01:25:26,080

you chose

1793

01:25:31,350 --> 01:25:28,960

specifically about whether or not m87

1794

01:25:32,790 --> 01:25:31,360

was in there but also just to elaborate

1795

01:25:34,950 --> 01:25:32,800

a little bit more

1796

01:25:36,149 --> 01:25:34,960

and just as a reminder to the whole

1797

01:25:37,430 --> 01:25:36,159

group if they're any of these

1798

01:25:39,590 --> 01:25:37,440

questions or whatnot that you want to

1799

01:25:43,270 --> 01:25:39,600

chime in on please do there's a bunch of

1800

01:25:48,390 --> 01:25:45,510

oh that's a great question um so i guess

1801
01:25:51,750 --> 01:25:48,400
to further elaborate uh those were

1802
01:25:54,070 --> 01:25:51,760
uh visually visualizations of

1803
01:25:55,030 --> 01:25:54,080
simulations that were created based on

1804
01:25:58,149 --> 01:25:55,040
data

1805
01:26:01,110 --> 01:25:58,159
um uh that was gathered of

1806
01:26:01,750 --> 01:26:01,120
the uh distribution of dark matter

1807
01:26:04,950 --> 01:26:01,760
within

1808
01:26:06,390 --> 01:26:04,960
a specific area so i think the one that

1809
01:26:09,149 --> 01:26:06,400
was sort of very

1810
01:26:11,669 --> 01:26:09,159
um sort of like had a lot of purples and

1811
01:26:12,870 --> 01:26:11,679
yellowish and very warm colors was

1812
01:26:16,070 --> 01:26:12,880
actually from the

1813
01:26:18,550 --> 01:26:16,080

andromeda galaxy and uh there was a

1814

01:26:19,669 --> 01:26:18,560

there was another one that was um from

1815

01:26:21,510 --> 01:26:19,679

something called the millennium

1816

01:26:22,390 --> 01:26:21,520

simulation which was just a project that

1817

01:26:25,750 --> 01:26:22,400

was like

1818

01:26:28,790 --> 01:26:25,760

um designed to uh sort of

1819

01:26:31,990 --> 01:26:28,800

take all of this data and and

1820

01:26:35,669 --> 01:26:32,000

uh sort of visualize it in a

1821

01:26:37,590 --> 01:26:35,679

more artistic way for for us to see

1822

01:26:39,669 --> 01:26:37,600

and the one that was during the uh the

1823

01:26:40,390 --> 01:26:39,679

clips of irene playing her cello solo

1824

01:26:43,990 --> 01:26:40,400

was

1825

01:26:47,030 --> 01:26:44,000

uh another uh

1826

01:26:50,229 --> 01:26:47,040

similar one but

1827

01:26:53,030 --> 01:26:50,239

that was um yeah

1828

01:26:54,629 --> 01:26:53,040

that's uh that's about the uh that's

1829

01:26:54,950 --> 01:26:54,639

about as much clarification as i could

1830

01:26:58,390 --> 01:26:54,960

give

1831

01:27:00,629 --> 01:26:58,400

off off the top of my head it's all good

1832

01:27:01,910 --> 01:27:00,639

um the exact same question rereading the

1833

01:27:04,070 --> 01:27:01,920

chat uh

1834

01:27:05,430 --> 01:27:04,080

there was some questions about gu ways

1835

01:27:06,950 --> 01:27:05,440

visuals as well

1836

01:27:10,629 --> 01:27:06,960

if you want to continue elaborate and

1837

01:27:17,430 --> 01:27:14,229

yeah so i i think may mention

1838

01:27:20,790 --> 01:27:17,440

um you know the the use of like my

1839

01:27:22,070 --> 01:27:20,800

my choice of using m87 as the um as a

1840

01:27:24,950 --> 01:27:22,080

space imagery

1841

01:27:25,270 --> 01:27:24,960

yeah so um probably reason why i chose

1842

01:27:29,110 --> 01:27:25,280

that

1843

01:27:32,149 --> 01:27:29,120

only

1844

01:27:35,350 --> 01:27:32,159

image we have now of like an actual

1845

01:27:37,830 --> 01:27:35,360

black hole um like the first

1846

01:27:38,629 --> 01:27:37,840

picture of a black hole completely taken

1847

01:27:42,470 --> 01:27:38,639

that was

1848

01:27:46,070 --> 01:27:42,480

probably m87 galaxy so um

1849

01:27:48,790 --> 01:27:46,080

because like most of my videos um like

1850

01:27:49,189 --> 01:27:48,800

the videos that i use in my keys right

1851

01:27:52,550 --> 01:27:49,199

they

1852

01:27:55,590 --> 01:27:52,560

actual

1853

01:27:55,990 --> 01:27:55,600

pictures of black holes because they are

1854

01:28:03,910 --> 01:27:56,000

so

1855

01:28:07,030 --> 01:28:03,920

you know that's

1856

01:28:10,390 --> 01:28:07,040

actually taken by by um

1857

01:28:12,390 --> 01:28:10,400

like why it's an actual photograph

1858

01:28:14,629 --> 01:28:12,400

that's not like him so it's not all just

1859

01:28:17,750 --> 01:28:14,639

all visualizations

1860

01:28:20,229 --> 01:28:17,760

yeah okay great

1861

01:28:21,110 --> 01:28:20,239

um i want love to hear from some of the

1862

01:28:23,910 --> 01:28:21,120

artists uh

1863

01:28:24,709 --> 01:28:23,920

from the quartet um because uh they

1864

01:28:27,189 --> 01:28:24,719

talked about

1865

01:28:27,990 --> 01:28:27,199

sort of pushing you guys to extreme

1866

01:28:30,149 --> 01:28:28,000

going to these really

1867

01:28:31,750 --> 01:28:30,159

high notes into these really low notes

1868

01:28:32,629 --> 01:28:31,760

sort of making you improvise and such

1869

01:28:35,350 --> 01:28:32,639

and you have to

1870

01:28:35,910 --> 01:28:35,360

learn these right uh because you're

1871

01:28:39,030 --> 01:28:35,920

working with

1872

01:28:40,629 --> 01:28:39,040

live with with you know not things that

1873

01:28:42,870 --> 01:28:40,639

it's not like an orchestra where you've

1874

01:28:44,229 --> 01:28:42,880

played this symphony over and over for

1875

01:28:46,149 --> 01:28:44,239

you know and the way you go around

1876

01:28:48,149 --> 01:28:46,159

various symphonies so tell us a little

1877

01:28:49,910 --> 01:28:48,159

bit about how hard it is to work and

1878

01:28:52,070 --> 01:28:49,920

learn this stuff although i'm sure it's

1879

01:28:53,830 --> 01:28:52,080

enjoyable

1880

01:28:55,750 --> 01:28:53,840

yeah i think that's that's something

1881

01:28:57,030 --> 01:28:55,760

that we really love about getting to

1882

01:29:00,629 --> 01:28:57,040

play

1883

01:29:02,950 --> 01:29:00,639

really brand new music um and

1884

01:29:04,709 --> 01:29:02,960

and kind of getting to explore a piece

1885

01:29:06,790 --> 01:29:04,719

for the first time that

1886

01:29:08,550 --> 01:29:06,800

that no one else has played because that

1887

01:29:10,310 --> 01:29:08,560

means it is really

1888

01:29:12,390 --> 01:29:10,320

up to us and up to the composer to to

1889

01:29:14,870 --> 01:29:12,400

figure out exactly what

1890

01:29:16,709 --> 01:29:14,880

what this does mean um and so in some

1891

01:29:20,149 --> 01:29:16,719

ways yet yes it is

1892

01:29:23,430 --> 01:29:20,159

um sometimes challenging and uh a

1893

01:29:24,070 --> 01:29:23,440

creative and welcomed challenge um but

1894

01:29:27,430 --> 01:29:24,080

it also

1895

01:29:28,390 --> 01:29:27,440

sometimes gives us a lot of freedom

1896

01:29:32,070 --> 01:29:28,400

that's really nice

1897

01:29:32,470 --> 01:29:32,080

and and being able to um say okay we get

1898

01:29:35,669 --> 01:29:32,480

to

1899

01:29:38,310 --> 01:29:35,679

this particular

1900

01:29:39,189 --> 01:29:38,320

new weird technique sound as good as it

1901

01:29:42,470 --> 01:29:39,199

can

1902

01:29:46,149 --> 01:29:44,629

make strange noises on our instruments

1903

01:29:46,629 --> 01:29:46,159

until we find something that really

1904

01:29:49,110 --> 01:29:46,639

works

1905

01:29:50,870 --> 01:29:49,120

you know um that's that's really what it

1906

01:29:52,790 --> 01:29:50,880

looks like a lot of times it's trial and

1907

01:29:54,629 --> 01:29:52,800

error um

1908

01:29:56,310 --> 01:29:54,639

in and in a way that's that's what we're

1909

01:29:57,030 --> 01:29:56,320

doing with any music that that we would

1910

01:29:58,229 --> 01:29:57,040

be playing

1911

01:29:59,430 --> 01:29:58,239

that's what we're doing with mozart's

1912

01:30:00,709 --> 01:29:59,440

what we're doing with beethoven two

1913

01:30:02,310 --> 01:30:00,719

always trial and error

1914

01:30:04,070 --> 01:30:02,320

how can we make this sound the best that

1915

01:30:06,229 --> 01:30:04,080

we can make it sound but

1916

01:30:07,750 --> 01:30:06,239

there is an added element with this

1917

01:30:10,950 --> 01:30:07,760

really

1918

01:30:14,310 --> 01:30:10,960

like i said brand new music um

1919

01:30:15,990 --> 01:30:14,320

to to kind of take that to a different

1920

01:30:16,790 --> 01:30:16,000

level or maybe in a slightly different

1921

01:30:20,229 --> 01:30:16,800

way

1922

01:30:23,430 --> 01:30:20,239

um so i wouldn't say that it's

1923

01:30:25,430 --> 01:30:23,440

more challenging than if we were playing

1924

01:30:27,270 --> 01:30:25,440

older music because because everything

1925

01:30:29,350 --> 01:30:27,280

has its unique challenges but it does

1926

01:30:31,750 --> 01:30:29,360

bring kind of a different

1927

01:30:33,510 --> 01:30:31,760

um a different way of approaching it

1928

01:30:35,990 --> 01:30:33,520

sometimes

1929

01:30:37,270 --> 01:30:36,000

it's a great question thank you uh

1930

01:30:39,270 --> 01:30:37,280

anybody else from the quartet want to

1931

01:30:42,629 --> 01:30:39,280

comment on

1932

01:30:45,030 --> 01:30:42,639

yeah i um everything sarah said is super

1933

01:30:46,390 --> 01:30:45,040

true and um i just want to add that

1934

01:30:48,070 --> 01:30:46,400

a lot of the techniques that these

1935

01:30:51,270 --> 01:30:48,080

composers use we don't

1936

01:30:53,430 --> 01:30:51,280

learn in conservatory actually these are

1937

01:30:56,070 --> 01:30:53,440

fairly new techniques

1938

01:30:56,950 --> 01:30:56,080

um so there is a little bit of a

1939

01:30:59,510 --> 01:30:56,960

learning curve

1940

01:31:01,430 --> 01:30:59,520

and a lot of the times we just kind of

1941

01:31:04,390 --> 01:31:01,440

have to

1942

01:31:06,310 --> 01:31:04,400

um like sarah said experiment but yeah

1943

01:31:06,790 --> 01:31:06,320

these are all very new techniques that a

1944

01:31:10,470 --> 01:31:06,800

lot of

1945

01:31:14,629 --> 01:31:10,480

conservatory um students are not really

1946

01:31:15,030 --> 01:31:14,639

experimenting with and i think also just

1947

01:31:17,510 --> 01:31:15,040

to

1948

01:31:19,430 --> 01:31:17,520

piggyback on what irene said about these

1949

01:31:19,750 --> 01:31:19,440

extended techniques it's really fun for

1950

01:31:23,110 --> 01:31:19,760

us

1951

01:31:25,350 --> 01:31:23,120

being um

1952

01:31:26,790 --> 01:31:25,360

used more so in contemporary and newer

1953

01:31:29,110 --> 01:31:26,800

works as opposed to

1954

01:31:31,110 --> 01:31:29,120

older classical music but i think being

1955

01:31:34,070 --> 01:31:31,120

able to blend these like

1956

01:31:34,550 --> 01:31:34,080

newer um less orthodox sounds is also

1957

01:31:36,390 --> 01:31:34,560

like

1958

01:31:38,070 --> 01:31:36,400

a really fun process for us because we

1959

01:31:38,550 --> 01:31:38,080

can get to be really creative with like

1960

01:31:40,629 --> 01:31:38,560

how

1961

01:31:42,070 --> 01:31:40,639

all these sounds can actually be made

1962

01:31:43,270 --> 01:31:42,080

with just our instruments they're the

1963

01:31:45,510 --> 01:31:43,280

same instruments that were

1964

01:31:46,790 --> 01:31:45,520

being used 200 years ago as right now

1965

01:31:48,629 --> 01:31:46,800

and um

1966

01:31:50,709 --> 01:31:48,639

and it can just do so much more and i

1967

01:31:51,510 --> 01:31:50,719

think i hope that composers are still

1968

01:31:53,510 --> 01:31:51,520

discovering

1969

01:31:55,110 --> 01:31:53,520

hopefully new ways of using it let us

1970

01:31:57,510 --> 01:31:55,120

know if you do um but

1971

01:31:58,790 --> 01:31:57,520

yeah it's a really um exciting process

1972

01:32:00,550 --> 01:31:58,800

for us

1973

01:32:03,110 --> 01:32:00,560

well i have to say that you know there

1974

01:32:05,030 --> 01:32:03,120

is a mindset of what a string quartet

1975

01:32:07,030 --> 01:32:05,040

is and you guys have really expanded

1976

01:32:10,950 --> 01:32:07,040

that here tonight

1977

01:32:13,990 --> 01:32:10,960

uh yeah i actually have some

1978

01:32:16,870 --> 01:32:14,000

expansion on the last couple points um

1979

01:32:19,470 --> 01:32:16,880

for the quartet specifically uh there's

1980

01:32:22,390 --> 01:32:19,480

obviously a lot of

1981

01:32:23,750 --> 01:32:22,400

improvisation and ambiance that's being

1982

01:32:24,310 --> 01:32:23,760

created by the instruments like you just

1983

01:32:27,750 --> 01:32:24,320

mentioned

1984

01:32:29,189 --> 01:32:27,760

in not necessarily i would say unusual

1985

01:32:30,709 --> 01:32:29,199

but

1986

01:32:32,470 --> 01:32:30,719

ways that you would not particularly

1987

01:32:33,030 --> 01:32:32,480

expect in a piece like this that's used

1988

01:32:36,550 --> 01:32:33,040

to create

1989

01:32:37,830 --> 01:32:36,560

sort of this atmosphere so in that sort

1990

01:32:40,070 --> 01:32:37,840

of improvisation

1991

01:32:41,110 --> 01:32:40,080

do you find it easier to just be given a

1992

01:32:43,990 --> 01:32:41,120

key and go

1993

01:32:44,790 --> 01:32:44,000

find it or do you like the boxes that

1994

01:32:47,510 --> 01:32:44,800

were mentioned

1995

01:32:48,870 --> 01:32:47,520

as far as like a loose guideline and

1996

01:32:50,950 --> 01:32:48,880

from there you

1997

01:32:52,149 --> 01:32:50,960

can you know noodle your way into the

1998

01:32:55,189 --> 01:32:52,159

atmosphere

1999

01:32:56,950 --> 01:32:55,199

of where you want to be and continuing

2000

01:32:58,310 --> 01:32:56,960

on that i'm sorry this is a long one i'm

2001

01:33:01,350 --> 01:32:58,320

combining two

2002

01:33:03,350 --> 01:33:01,360

um more specifically for the composers

2003

01:33:04,550 --> 01:33:03,360

once they have talked about the act of

2004

01:33:05,830 --> 01:33:04,560

doing so

2005

01:33:08,350 --> 01:33:05,840

what was it you were trying to

2006

01:33:11,510 --> 01:33:08,360

demonstrate with the

2007

01:33:14,229 --> 01:33:11,520

discordancy and the off tempo and

2008

01:33:15,669 --> 01:33:14,239

the the seeming to at least the audience

2009

01:33:19,030 --> 01:33:15,679

online a little more

2010

01:33:22,390 --> 01:33:19,040

random in avant-garde pieces or choices

2011

01:33:23,990 --> 01:33:22,400

that have been made

2012

01:33:25,990 --> 01:33:24,000

who wants to who from the quartet wants

2013

01:33:28,310 --> 01:33:26,000

to handle the first part of that

2014

01:33:29,910 --> 01:33:28,320

sorry for the giant question of doom

2015

01:33:31,990 --> 01:33:29,920

yeah that's a great question

2016

01:33:34,149 --> 01:33:32,000

um i think what we've found the four of

2017

01:33:36,470 --> 01:33:34,159

us is that

2018

01:33:38,310 --> 01:33:36,480

when we have less specific music in

2019

01:33:40,470 --> 01:33:38,320

front of us

2020

01:33:41,910 --> 01:33:40,480

the most useful thing for us to know and

2021

01:33:42,229 --> 01:33:41,920

the most exciting thing for us to know

2022

01:33:44,790 --> 01:33:42,239

is

2023

01:33:45,669 --> 01:33:44,800

what the composer wants us to be evoking

2024

01:33:48,830 --> 01:33:45,679

and there's of course

2025

01:33:50,229 --> 01:33:48,840

a number of ways that that can be um

2026

01:33:52,629 --> 01:33:50,239

communicated

2027

01:33:53,350 --> 01:33:52,639

um often just like plain english works

2028

01:33:54,950 --> 01:33:53,360

the best

2029

01:33:56,629 --> 01:33:54,960

like it's great to know if we see kind

2030

01:33:59,510 --> 01:33:56,639

of like some

2031

01:34:01,110 --> 01:33:59,520

some visual information to know that the

2032

01:34:04,149 --> 01:34:01,120

composer wants us to be

2033

01:34:07,270 --> 01:34:04,159

evoking something ethereal and

2034

01:34:10,390 --> 01:34:07,280

gauzy or something tense and nervous

2035

01:34:12,070 --> 01:34:10,400

or um or a particular nebula that's

2036

01:34:14,470 --> 01:34:12,080

being born or

2037

01:34:16,149 --> 01:34:14,480

um just kind of knowing what the goal is

2038

01:34:17,510 --> 01:34:16,159

we know our instruments really well and

2039

01:34:18,390 --> 01:34:17,520

we're still learning more about them

2040

01:34:19,990 --> 01:34:18,400

every day

2041

01:34:21,030 --> 01:34:20,000

kind of as amy and erin are talking

2042

01:34:22,149 --> 01:34:21,040

about in collaboration with the

2043

01:34:24,229 --> 01:34:22,159

composers we work with

2044

01:34:25,990 --> 01:34:24,239

um who have ideas that we would never

2045

01:34:26,950 --> 01:34:26,000

have because they're like maybe

2046

01:34:28,550 --> 01:34:26,960

a little bit removed from the

2047

01:34:29,510 --> 01:34:28,560

instruments and kind of can open their

2048

01:34:32,550 --> 01:34:29,520

minds more

2049

01:34:36,550 --> 01:34:32,560

um but

2050

01:34:38,470 --> 01:34:36,560

we we love to be able to um

2051
01:34:40,709 --> 01:34:38,480
kind of be pushed to to really make the

2052
01:34:43,830 --> 01:34:40,719
most of our instruments and create

2053
01:34:47,510 --> 01:34:43,840
sounds that will evoke the

2054
01:34:50,629 --> 01:34:47,520
emotion or seeming question and

2055
01:34:52,229 --> 01:34:50,639
i think typically that isn't necessarily

2056
01:34:53,510 --> 01:34:52,239
achieved the best by just like giving us

2057
01:34:56,950 --> 01:34:53,520
a key or that kind of

2058
01:34:58,550 --> 01:34:56,960
framework um i think really what a lot

2059
01:35:00,870 --> 01:34:58,560
of these composers have done with this

2060
01:35:05,109 --> 01:35:00,880
particular music is to kind of

2061
01:35:07,189 --> 01:35:05,119
go away from tonality a little bit um

2062
01:35:09,750 --> 01:35:07,199
like i think probably the the piece by

2063
01:35:11,830 --> 01:35:09,760

gouay had the most audible key center

2064

01:35:12,790 --> 01:35:11,840

but some crazy stuff happened to that

2065

01:35:15,430 --> 01:35:12,800

key

2066

01:35:17,350 --> 01:35:15,440

as you heard um so yeah that's a great

2067

01:35:19,350 --> 01:35:17,360

question i'll let one of the composers

2068

01:35:20,870 --> 01:35:19,360

maybe talk about the rest of it all

2069

01:35:21,910 --> 01:35:20,880

right yeah so which composer would like

2070

01:35:24,310 --> 01:35:21,920

to talk about how you're

2071

01:35:25,030 --> 01:35:24,320

challenging yeah i can take that

2072

01:35:26,950 --> 01:35:25,040

question

2073

01:35:28,390 --> 01:35:26,960

for instance because i i really like the

2074

01:35:29,750 --> 01:35:28,400

question and because i really like the

2075

01:35:33,109 --> 01:35:29,760

subject matter

2076

01:35:36,470 --> 01:35:33,119

um here i'll tackle a bit of it too

2077

01:35:37,830 --> 01:35:36,480

yeah yeah um so yeah i guess for me the

2078

01:35:39,430 --> 01:35:37,840

question

2079

01:35:41,510 --> 01:35:39,440

had to do with like why what were we

2080

01:35:43,270 --> 01:35:41,520

trying to do when i just composes why

2081

01:35:44,550 --> 01:35:43,280

were we playing around with sounds

2082

01:35:46,229 --> 01:35:44,560

that could be stopped perceived as like

2083

01:35:47,910 --> 01:35:46,239

barely even music right just like super

2084

01:35:49,030 --> 01:35:47,920

vicious very nasty sounds and all that

2085

01:35:52,470 --> 01:35:49,040

combined with

2086

01:35:54,390 --> 01:35:52,480

um well yeah so i think for myself um

2087

01:35:55,830 --> 01:35:54,400

when i think about stars at least i i

2088

01:35:57,830 --> 01:35:55,840

tend to think of like this very

2089

01:35:58,550 --> 01:35:57,840

grandiose romantic kind of image of like

2090

01:36:00,470 --> 01:35:58,560

you know

2091

01:36:01,669 --> 01:36:00,480

celestial almost religious kind of

2092

01:36:03,270 --> 01:36:01,679

quality to them

2093

01:36:04,629 --> 01:36:03,280

um but at the same time like from a

2094

01:36:05,990 --> 01:36:04,639

scientific standpoint like stars are

2095

01:36:06,790 --> 01:36:06,000

like really horrifying and you wouldn't

2096

01:36:09,510 --> 01:36:06,800

actually want to be

2097

01:36:10,310 --> 01:36:09,520

near one or like even at any point like

2098

01:36:11,990 --> 01:36:10,320

remotely

2099

01:36:13,510 --> 01:36:12,000

close to one and like right because it's

2100

01:36:14,790 --> 01:36:13,520

just it's just like super super violent

2101

01:36:16,709 --> 01:36:14,800

in that and like they

2102

01:36:17,990 --> 01:36:16,719

you know i forget how hot they get they

2103

01:36:20,149 --> 01:36:18,000

get very hot

2104

01:36:21,030 --> 01:36:20,159

and so that whole idea of like really

2105

01:36:22,950 --> 01:36:21,040

nasty and

2106

01:36:24,390 --> 01:36:22,960

um just or just dark and violent

2107

01:36:26,629 --> 01:36:24,400

behavior of stars

2108

01:36:27,990 --> 01:36:26,639

um for myself was like explosions

2109

01:36:29,990 --> 01:36:28,000

explosions certain things

2110

01:36:31,590 --> 01:36:30,000

explosions exactly it was basically what

2111

01:36:32,870 --> 01:36:31,600

i was trying to do at least in my

2112

01:36:35,030 --> 01:36:32,880

particular piece you know

2113

01:36:36,390 --> 01:36:35,040

sort of going between this really

2114

01:36:38,390 --> 01:36:36,400

religious really beautiful sort of

2115

01:36:40,550 --> 01:36:38,400

portion of stars and this very

2116

01:36:42,149 --> 01:36:40,560

i think like zoomed in kind of up close

2117

01:36:45,350 --> 01:36:42,159

and personal fortune of stars

2118

01:36:45,669 --> 01:36:45,360

that are this very sort of um i don't

2119

01:36:48,229 --> 01:36:45,679

know

2120

01:36:49,590 --> 01:36:48,239

violent kind of uh yeah in this violent

2121

01:36:51,109 --> 01:36:49,600

kind of fashion right

2122

01:36:53,669 --> 01:36:51,119

now yeah i'll let zach take over from

2123

01:36:56,390 --> 01:36:53,679

here

2124

01:36:57,750 --> 01:36:56,400

no i absolutely second all of that um

2125

01:37:00,149 --> 01:36:57,760

i'll just add just a

2126

01:37:01,910 --> 01:37:00,159

touch in terms of sort of the alien

2127

01:37:03,750 --> 01:37:01,920

torque or indeterminate notation we were

2128

01:37:06,470 --> 01:37:03,760

using i know bobby and i used a lot of

2129

01:37:07,109 --> 01:37:06,480

boxes and stuff like that and personally

2130

01:37:08,870 --> 01:37:07,119

i found

2131

01:37:10,709 --> 01:37:08,880

especially when working with such

2132

01:37:13,510 --> 01:37:10,719

amazing musicians as we had the

2133

01:37:15,270 --> 01:37:13,520

privilege to work with that um giving a

2134

01:37:16,790 --> 01:37:15,280

dose of freedom to the performers

2135

01:37:18,790 --> 01:37:16,800

actually creates

2136

01:37:20,870 --> 01:37:18,800

a lot of confidence because you don't

2137

01:37:21,990 --> 01:37:20,880

have to be so insanely specific about

2138

01:37:24,070 --> 01:37:22,000

everything like oh this note has to

2139

01:37:25,430 --> 01:37:24,080

happen exactly here because honestly

2140

01:37:27,030 --> 01:37:25,440

if you're going for a specific effect

2141

01:37:27,830 --> 01:37:27,040

like you're going for this kind of you

2142

01:37:29,910 --> 01:37:27,840

know

2143

01:37:31,109 --> 01:37:29,920

nebulous maybe perhaps slightly

2144

01:37:33,430 --> 01:37:31,119

frightening sound

2145

01:37:35,189 --> 01:37:33,440

here and there um everything doesn't

2146

01:37:37,350 --> 01:37:35,199

have to be notated to a t

2147

01:37:38,790 --> 01:37:37,360

and it's almost better to hand it over

2148

01:37:40,550 --> 01:37:38,800

to such

2149

01:37:42,629 --> 01:37:40,560

absolutely brilliant musicians and let

2150

01:37:43,990 --> 01:37:42,639

them take it from there

2151

01:37:45,590 --> 01:37:44,000

the other thing about all this box

2152

01:37:46,550 --> 01:37:45,600

notation and whatnot is it could seem

2153

01:37:48,310 --> 01:37:46,560

like this sort of

2154

01:37:49,990 --> 01:37:48,320

esoteric thing that you know happens in

2155

01:37:52,229 --> 01:37:50,000

the new music academy or whatever

2156

01:37:53,750 --> 01:37:52,239

but it's also applicable across a wide

2157

01:37:55,510 --> 01:37:53,760

spectrum of things i've looked at

2158

01:37:57,430 --> 01:37:55,520

lots of film scores that employ this

2159

01:37:59,590 --> 01:37:57,440

kind of these devices actually

2160

01:38:01,030 --> 01:37:59,600

all over the place so it's fun to think

2161

01:38:03,750 --> 01:38:01,040

about that in sort of its

2162

01:38:05,270 --> 01:38:03,760

broader implications overall that was

2163

01:38:05,750 --> 01:38:05,280

one of the words that came up in the

2164

01:38:07,510 --> 01:38:05,760

chat

2165

01:38:10,470 --> 01:38:07,520

as we were talking back and forth is

2166

01:38:12,149 --> 01:38:10,480

atmosphere this is intended to create an

2167

01:38:13,669 --> 01:38:12,159

effect it's intended to bring you a

2168

01:38:15,189 --> 01:38:13,679

place or at least that's the sense that

2169

01:38:15,990 --> 01:38:15,199

i got from it and i wanted you guys to

2170

01:38:17,510 --> 01:38:16,000

be able to elaborate

2171

01:38:19,830 --> 01:38:17,520

a little more on the intent and the

2172

01:38:21,030 --> 01:38:19,840

emotion behind that's very much what i

2173

01:38:23,669 --> 01:38:21,040

went with on my piece

2174

01:38:25,109 --> 01:38:23,679

i'll turn it over to someone else

2175

01:38:27,350 --> 01:38:25,119

anybody else want to

2176

01:38:29,030 --> 01:38:27,360

make a comment on it i mean uh so yoona

2177

01:38:32,070 --> 01:38:29,040

you talked about the last breath

2178

01:38:33,590 --> 01:38:32,080

of uh the crab nebu uh the star that

2179

01:38:35,350 --> 01:38:33,600

became the crab nebula

2180

01:38:40,709 --> 01:38:35,360

i thought that was an incredibly poetic

2181

01:38:47,109 --> 01:38:44,310

oh thank you yeah i really liked um

2182

01:38:48,629 --> 01:38:47,119

that part so even though that is the

2183

01:38:51,270 --> 01:38:48,639

last part of the

2184

01:38:52,310 --> 01:38:51,280

of my piece i wrote it um at the

2185

01:38:54,950 --> 01:38:52,320

beginning

2186

01:38:55,830 --> 01:38:54,960

that was the first part that i wrote for

2187

01:38:59,109 --> 01:38:55,840

this piece

2188

01:39:01,830 --> 01:38:59,119

because i really like that concept

2189

01:39:03,109 --> 01:39:01,840

um when i was writing that i was

2190

01:39:06,629 --> 01:39:03,119

imagining

2191

01:39:06,870 --> 01:39:06,639

just a lone star that is in the universe

2192

01:39:10,229 --> 01:39:06,880

and

2193

01:39:13,990 --> 01:39:10,239

no one is around that around

2194

01:39:14,629 --> 01:39:14,000

it and it's like 6 000 light years away

2195

01:39:17,910 --> 01:39:14,639

from us

2196

01:39:18,470 --> 01:39:17,920

it's so far and it's so isolated and i

2197

01:39:20,470 --> 01:39:18,480

was just

2198

01:39:22,310 --> 01:39:20,480

imagining how the star would feel by

2199

01:39:25,270 --> 01:39:22,320

itself like

2200

01:39:26,070 --> 01:39:25,280

and then i read it so yeah i guess

2201

01:39:28,790 --> 01:39:26,080

that's

2202

01:39:32,390 --> 01:39:28,800

very atmospheric and we just need to

2203

01:39:37,350 --> 01:39:34,790

all right i think we could go for one

2204

01:39:39,910 --> 01:39:37,360

more question if we've got it uh grant

2205

01:39:40,709 --> 01:39:39,920

do we have one more or we can finish up

2206

01:39:43,030 --> 01:39:40,719

here

2207

01:39:44,229 --> 01:39:43,040

uh i combined my questions into that

2208

01:39:47,990 --> 01:39:44,239

giant doom

2209

01:39:50,470 --> 01:39:48,000

ah okay great all right uh any

2210

01:39:51,030 --> 01:39:50,480

of the composers or the performers have

2211

01:39:53,910 --> 01:39:51,040

anything

2212

01:39:54,390 --> 01:39:53,920

any last comments they want to say um

2213

01:39:57,350 --> 01:39:54,400

it's

2214

01:39:57,910 --> 01:39:57,360

been an amazing performance here tonight

2215

01:40:00,709 --> 01:39:57,920

uh

2216

01:40:01,189 --> 01:40:00,719

usually we have in our chat people

2217

01:40:03,109 --> 01:40:01,199

saying

2218

01:40:05,270 --> 01:40:03,119

hello from australia hello from germany

2219

01:40:06,950 --> 01:40:05,280

hello from you know california texas

2220

01:40:08,709 --> 01:40:06,960

tennessee whatever

2221

01:40:10,870 --> 01:40:08,719

what's i think is really cool tonight is

2222

01:40:11,350 --> 01:40:10,880

that our performers all of us are coming

2223

01:40:13,350 --> 01:40:11,360

from

2224

01:40:14,870 --> 01:40:13,360

different places yes i'm in baltimore

2225

01:40:18,390 --> 01:40:14,880

grants in baltimore

2226

01:40:20,310 --> 01:40:18,400

um but some of you are in new york right

2227

01:40:21,990 --> 01:40:20,320

uh some of you are somebody in

2228

01:40:25,270 --> 01:40:22,000

california if i remember

2229

01:40:26,950 --> 01:40:25,280

um and uh goo you're in singapore's in

2230

01:40:30,070 --> 01:40:26,960

singapore along with one other

2231

01:40:33,430 --> 01:40:30,080

so thank you for taking uh getting up

2232

01:40:36,709 --> 01:40:33,440

way early to come and join us for this

2233

01:40:39,669 --> 01:40:36,719

uh we have a really a multicultural and

2234

01:40:42,070 --> 01:40:39,679

around the world collaboration here

2235

01:40:43,590 --> 01:40:42,080

thank you all so very much for this i

2236

01:40:46,950 --> 01:40:43,600

have to say to my audience

2237

01:40:49,910 --> 01:40:46,960

that june 1st emily rickman

2238

01:40:51,270 --> 01:40:49,920

how to hunt for distant world we will be

2239

01:40:53,030 --> 01:40:51,280

back in a month

2240

01:40:54,550 --> 01:40:53,040

won't have this many speakers but we'll

2241

01:40:58,390 --> 01:40:54,560

still have a great talk for you