1
00:00:05,990 --> 00:00:04,390
hello i'm jd harrington public affairs

2
00:00:07,990 --> 00:00:06,000
officer for nasa's science mission

3
00:00:09,910 --> 00:00:08,000
directorate i'd like to welcome you to

4
00:00:11,830 --> 00:00:09,920
today's media conference where we will

5
00:00:14,150 --> 00:00:11,840
discuss the upcoming launch of nasa's

6
00:00:16,390 --> 00:00:14,160
newest space instrument the nuclear

7
00:00:18,630 --> 00:00:16,400
spectroscopic telescope array otherwise

8
00:00:21,750 --> 00:00:18,640
known as nustar before we get started

9
00:00:23,670 --> 00:00:21,760
though a few housekeeping duties we have

10
00:00:25,349 --> 00:00:23,680
four panelists joining us today each

11
00:00:27,670 --> 00:00:25,359
will give a short three to five minute

12
00:00:29,029 --> 00:00:27,680
presentation on their specific topic

13
00:00:31,109 --> 00:00:29,039

next we will move to the question and

14
00:00:33,270 --> 00:00:31,119
answer session taking questions from

15
00:00:35,190 --> 00:00:33,280
media here at nasa headquarters

16
00:00:36,709 --> 00:00:35,200
questions from the centers and others

17
00:00:37,750 --> 00:00:36,719
that are dialing into the telephone

18
00:00:39,350 --> 00:00:37,760
bridge

19
00:00:41,350 --> 00:00:39,360
questions can also be submitted to the

20
00:00:43,190 --> 00:00:41,360
panelists by the twitter

21
00:00:45,750 --> 00:00:43,200
via the twitter sphere by using the

22
00:00:47,990 --> 00:00:45,760
hashtag ask nasa

23
00:00:50,790 --> 00:00:48,000
this panel media conference is limited

24
00:00:53,510 --> 00:00:50,800
to one hour

25
00:00:55,430 --> 00:00:53,520
today's panelists include paul hertz

26
00:00:57,910 --> 00:00:55,440
nasa's astrophysics division director at

27
00:01:01,990 --> 00:00:57,920
the agency's headquarters in washington

28
00:01:06,070 --> 00:01:04,390
fiona harrison the new star principal

29
00:01:12,390 --> 00:01:06,080
investigator at the california institute

30
00:01:15,990 --> 00:01:14,310
daniel stern the new star project

31
00:01:20,310 --> 00:01:16,000
scientist at nasa's jet propulsion

32
00:01:26,070 --> 00:01:23,109
and yoon kin yunjin kim the new star

33
00:01:28,310 --> 00:01:26,080
project manager also at jpl and with

34
00:01:30,230 --> 00:01:28,320
that let's get started we open up with

35
00:01:33,270 --> 00:01:30,240
nasa's astrophysics division director

36
00:01:35,990 --> 00:01:33,280
paul hertz paul thanks very much jd

37
00:01:37,350 --> 00:01:36,000
well we all know that nasa pursues space

38
00:01:41,510 --> 00:01:37,360

exploration

39
00:01:44,149 --> 00:01:41,520
into space but also scientific

40
00:01:46,310 --> 00:01:44,159
exploration of our planet our solar

41
00:01:49,030 --> 00:01:46,320
system and the universe

42
00:01:51,510 --> 00:01:49,040
nustar does the last one explores the

43
00:01:53,670 --> 00:01:51,520
universe the data from nustar and the

44
00:01:55,590 --> 00:01:53,680
science analysis that comes from it will

45
00:01:57,749 --> 00:01:55,600
help us understand how our universe came

46
00:01:59,510 --> 00:01:57,759
to be the way it is how it got to from

47
00:02:01,749 --> 00:01:59,520
the simple state of the big bang to the

48
00:02:04,069 --> 00:02:01,759
complex universe we see today filled

49
00:02:05,830 --> 00:02:04,079
with galaxies stars planets and even

50
00:02:07,910 --> 00:02:05,840
people

51
00:02:09,589 --> 00:02:07,920
nasa puts telescopes in space because

52
00:02:11,110 --> 00:02:09,599
that's the only way we can do things

53
00:02:13,270 --> 00:02:11,120
that are impossible here on the surface

54
00:02:16,229 --> 00:02:13,280
of the earth

55
00:02:18,309 --> 00:02:16,239
stars nebulae and black holes emit

56
00:02:19,910 --> 00:02:18,319
x-rays of the type that we use in

57
00:02:21,350 --> 00:02:19,920
medical x-rays

58
00:02:23,510 --> 00:02:21,360
and these cannot be detected from the

59
00:02:25,750 --> 00:02:23,520
surface of the earth but the new star

60
00:02:28,309 --> 00:02:25,760
telescope will focus these x-rays onto

61
00:02:32,550 --> 00:02:28,319
its digital camera and send the pictures

62
00:02:36,550 --> 00:02:34,550
from the point of view of astronomers

63
00:02:37,990 --> 00:02:36,560

nustar will be opening up a new window

64
00:02:39,830 --> 00:02:38,000
on the universe

65
00:02:41,589 --> 00:02:39,840
and although we are going into this

66
00:02:43,509 --> 00:02:41,599
mission with many scientific questions

67
00:02:45,830 --> 00:02:43,519
that we know nustar will provide the

68
00:02:48,070 --> 00:02:45,840
data that will give us the answers

69
00:02:49,670 --> 00:02:48,080
like all of our nasa missions we're

70
00:02:51,589 --> 00:02:49,680
going to find unexpected things out

71
00:02:53,350 --> 00:02:51,599
there that will lead us to questions and

72
00:02:55,750 --> 00:02:53,360
answers that we aren't even anticipating

73
00:02:58,149 --> 00:02:55,760
at this time

74
00:03:00,790 --> 00:02:58,159
it's worth noting that nustar was

75
00:03:03,589 --> 00:03:00,800
selected by the scientific community as

76
00:03:05,270 --> 00:03:03,599
a mission that's really important to do

77
00:03:07,670 --> 00:03:05,280
professor fiona harrison the principal

78
00:03:09,589 --> 00:03:07,680
investigator was one of several dozen

79
00:03:13,509 --> 00:03:09,599
scientists who submitted a proposal to

80
00:03:15,750 --> 00:03:13,519
nasa for a small astrophysics mission

81
00:03:17,509 --> 00:03:15,760
nasa had these proposals reviewed by the

82
00:03:19,830 --> 00:03:17,519
peers in the scientific community and

83
00:03:22,309 --> 00:03:19,840
they judged nustar to have exceptional

84
00:03:24,869 --> 00:03:22,319
scientific merit and a really good plan

85
00:03:27,030 --> 00:03:24,879
for implementation and that's why nasa

86
00:03:29,030 --> 00:03:27,040
selected it to be its next small

87
00:03:30,710 --> 00:03:29,040
astrophysics mission

88
00:03:32,470 --> 00:03:30,720

this endorsement by the scientific

89
00:03:33,990 --> 00:03:32,480
community of the science that nustar

90
00:03:35,670 --> 00:03:34,000
will do is one of the reasons i'm

91
00:03:37,509 --> 00:03:35,680
confident that we're all going to be

92
00:03:39,350 --> 00:03:37,519
really excited by the discoveries that

93
00:03:43,589 --> 00:03:39,360
come from this mission

94
00:03:47,030 --> 00:03:44,789
okay

95
00:03:49,270 --> 00:03:47,040
here are nasa's current astrophysics

96
00:03:50,470 --> 00:03:49,280
missions including we've added nustar on

97
00:03:52,869 --> 00:03:50,480
the left there

98
00:03:55,270 --> 00:03:52,879
nustar is going to be the 14th nasa

99
00:03:56,789 --> 00:03:55,280
astrophysics mission in operation doing

100
00:03:58,470 --> 00:03:56,799
science

101
00:04:00,149 --> 00:03:58,480
many of these missions are done with our

102
00:04:02,070 --> 00:04:00,159
partners and i want to thank our

103
00:04:03,190 --> 00:04:02,080
international partners on new start this

104
00:04:05,270 --> 00:04:03,200
time

105
00:04:07,190 --> 00:04:05,280
nasa has partnered with the danish

106
00:04:09,910 --> 00:04:07,200
technical university space center and

107
00:04:11,910 --> 00:04:09,920
the italian space agency to make nustar

108
00:04:14,070 --> 00:04:11,920
a reality

109
00:04:16,069 --> 00:04:14,080
the next speaker is fiona harrison the

110
00:04:18,870 --> 00:04:16,079
principal investigator of the nustar

111
00:04:20,870 --> 00:04:18,880
mission fiona thanks paul so as paul

112
00:04:22,870 --> 00:04:20,880
said new star will open a whole new

113
00:04:25,590 --> 00:04:22,880

window on the universe by being the very

114
00:04:26,790 --> 00:04:25,600
first telescope to focus high-energy

115
00:04:29,110 --> 00:04:26,800
x-rays

116
00:04:31,350 --> 00:04:29,120
as such it'll make images that are 10

117
00:04:33,670 --> 00:04:31,360
times crisper and 100 times more

118
00:04:35,830 --> 00:04:33,680
sensitive than any telescope that is

119
00:04:37,350 --> 00:04:35,840
operated in this region of the spectrum

120
00:04:39,990 --> 00:04:37,360
now i want to point out

121
00:04:41,909 --> 00:04:40,000
that nustar operates at x-ray energies

122
00:04:43,749 --> 00:04:41,919
higher than what the sensitive

123
00:04:46,550 --> 00:04:43,759
telescopes like nasa's chandra

124
00:04:48,469 --> 00:04:46,560
observatory or isis xmm

125
00:04:51,350 --> 00:04:48,479
newton can detect

126
00:04:52,150 --> 00:04:51,360
could i have the first graphic please

127
00:04:54,230 --> 00:04:52,160
so

128
00:04:56,469 --> 00:04:54,240
this image shows you what nustar will

129
00:04:58,150 --> 00:04:56,479
look like after it's deployed on orbit

130
00:04:59,909 --> 00:04:58,160
and i have to say it's no ordinary

131
00:05:02,790 --> 00:04:59,919
looking telescope

132
00:05:05,510 --> 00:05:02,800
what you see on the right are two high

133
00:05:07,990 --> 00:05:05,520
energy x-ray optics which which are

134
00:05:11,350 --> 00:05:08,000
mirrors which act like ends lenses to

135
00:05:14,070 --> 00:05:11,360
focus x-ray light onto digital cameras

136
00:05:16,710 --> 00:05:14,080
that are placed 10 meters away so what

137
00:05:19,749 --> 00:05:16,720
you see on the left is where the two

138
00:05:21,110 --> 00:05:19,759

digital cameras are and the solar array

139
00:05:23,990 --> 00:05:21,120
from which

140
00:05:26,310 --> 00:05:24,000
we collect power now believe it or not

141
00:05:28,870 --> 00:05:26,320
nustar launches on a compact pegasus

142
00:05:30,790 --> 00:05:28,880
rocket from underneath the belly of an

143
00:05:33,350 --> 00:05:30,800
aircraft and you may wonder how can it

144
00:05:35,430 --> 00:05:33,360
do that and still be the length of a

145
00:05:36,150 --> 00:05:35,440
school bus

146
00:05:37,990 --> 00:05:36,160
so

147
00:05:40,070 --> 00:05:38,000
the tinker toy-like structure in the

148
00:05:42,629 --> 00:05:40,080
middle that you see is what enables

149
00:05:45,189 --> 00:05:42,639
nustar to do this that ingenious

150
00:05:49,590 --> 00:05:45,199
mechanism about a week after we get on

151
00:05:52,390 --> 00:05:49,600
to orbit will unfold piece by piece to

152
00:05:55,350 --> 00:05:52,400
it over about 20 minutes to achieve

153
00:05:58,629 --> 00:05:55,360
this long necessary separation between

154
00:06:00,710 --> 00:05:58,639
the optics and the detectors so nustar

155
00:06:02,629 --> 00:06:00,720
is going to be a first in several ways

156
00:06:04,870 --> 00:06:02,639
it'll be the first very sensitive

157
00:06:08,550 --> 00:06:04,880
high-energy x-ray telescope it'll be the

158
00:06:11,670 --> 00:06:08,560
first ever to incorporate these novel

159
00:06:12,710 --> 00:06:11,680
x-ray optics and digital cameras and

160
00:06:15,029 --> 00:06:12,720
it's also going to be the first

161
00:06:19,270 --> 00:06:15,039
astronomical telescope to use one of

162
00:06:20,629 --> 00:06:19,280
these extending uh focal benches in

163
00:06:23,270 --> 00:06:20,639

space

164
00:06:26,150 --> 00:06:23,280
so together this will enable nustar to

165
00:06:28,150 --> 00:06:26,160
study some of the hottest the densest

166
00:06:31,110 --> 00:06:28,160
and most energetic phenomena in the

167
00:06:32,309 --> 00:06:31,120
universe like for example black holes

168
00:06:35,110 --> 00:06:32,319
and the

169
00:06:37,510 --> 00:06:35,120
explosions of massive stars could i have

170
00:06:39,590 --> 00:06:37,520
the next graphic please

171
00:06:42,150 --> 00:06:39,600
so it used to be thought that black

172
00:06:45,350 --> 00:06:42,160
holes were rare and exotic

173
00:06:47,590 --> 00:06:45,360
that was just 20 years ago today we know

174
00:06:50,550 --> 00:06:47,600
that every massive galaxy like our milky

175
00:06:52,870 --> 00:06:50,560
way has a massive black hole at its

176
00:06:54,710 --> 00:06:52,880
heart and if you can start the video for

177
00:06:56,950 --> 00:06:54,720
me please

178
00:07:00,950 --> 00:06:56,960
what this shows is what makes the

179
00:07:03,350 --> 00:07:00,960
regions around black holes glow brightly

180
00:07:05,830 --> 00:07:03,360
so galaxies are full of dust and gas

181
00:07:08,150 --> 00:07:05,840
this dust and gas is attracted by the

182
00:07:11,510 --> 00:07:08,160
gravity of the black hole when it gets

183
00:07:14,550 --> 00:07:11,520
close it organizes itself into a disk

184
00:07:17,189 --> 00:07:14,560
and in this disk friction heats up the

185
00:07:20,390 --> 00:07:17,199
material so that when it gets very close

186
00:07:22,390 --> 00:07:20,400
to the black hole it's very hot

187
00:07:24,150 --> 00:07:22,400
and the combination of this very hot

188
00:07:25,990 --> 00:07:24,160

material and particles that are

189
00:07:28,469 --> 00:07:26,000
accelerated close to the

190
00:07:31,029 --> 00:07:28,479
speed of light

191
00:07:33,110 --> 00:07:31,039
boosts emission into the high energy

192
00:07:35,670 --> 00:07:33,120
x-ray bands so if you want to study the

193
00:07:36,870 --> 00:07:35,680
regions closest to the black holes

194
00:07:40,309 --> 00:07:36,880
you'll use

195
00:07:42,390 --> 00:07:40,319
x-ray telescopes now these regions these

196
00:07:44,469 --> 00:07:42,400
innermost regions near the black hole

197
00:07:46,710 --> 00:07:44,479
are only a few times

198
00:07:48,309 --> 00:07:46,720
the size of the event horizon so in

199
00:07:50,309 --> 00:07:48,319
these in the event horizon as you know

200
00:07:52,950 --> 00:07:50,319
that's the region from which no light

201
00:07:55,990 --> 00:07:52,960
can ever escape material disappears the

202
00:07:58,469 --> 00:07:56,000
black hole grows and it's gone forever

203
00:08:01,110 --> 00:07:58,479
but in these inner regions

204
00:08:03,430 --> 00:08:01,120
gravity is extremely strong and einstein

205
00:08:05,430 --> 00:08:03,440
told us that light gets bent and

206
00:08:09,270 --> 00:08:05,440
severely distorted as it escapes from

207
00:08:12,230 --> 00:08:09,280
these regions and by studying atoms in

208
00:08:13,990 --> 00:08:12,240
the x-ray band as they circle around

209
00:08:16,309 --> 00:08:14,000
before they disappear into the black

210
00:08:17,909 --> 00:08:16,319
hole we can actually detect this strong

211
00:08:20,230 --> 00:08:17,919
gravity the effects of this strong

212
00:08:22,950 --> 00:08:20,240
gravity and we can

213
00:08:25,110 --> 00:08:22,960

teaming with telescopes like chandra and

214
00:08:27,110 --> 00:08:25,120
xmm-newton we can tell things for

215
00:08:28,309 --> 00:08:27,120
example like how fast the black hole is

216
00:08:31,350 --> 00:08:28,319
spinning

217
00:08:34,230 --> 00:08:31,360
now in addition you'll notice uh

218
00:08:35,589 --> 00:08:34,240
there's beams of light headed headed out

219
00:08:37,509 --> 00:08:35,599
from the black hole well those are

220
00:08:40,310 --> 00:08:37,519
actually called jets and they're

221
00:08:42,469 --> 00:08:40,320
particles that are accelerated within a

222
00:08:44,149 --> 00:08:42,479
small fraction of the speed of light and

223
00:08:46,150 --> 00:08:44,159
they carry so much energy in that in

224
00:08:48,790 --> 00:08:46,160
some cases they can affect the entire

225
00:08:51,509 --> 00:08:48,800
galaxy and teaming with nasa's fermi

226
00:08:54,230 --> 00:08:51,519
gamma-ray telescope nustar can study

227
00:08:58,150 --> 00:08:54,240
these jets these regions of accelerated

228
00:08:59,829 --> 00:08:58,160
particles and try to understand uh what

229
00:09:02,630 --> 00:08:59,839
creates them

230
00:09:05,670 --> 00:09:02,640
could i have the next graphic please so

231
00:09:07,190 --> 00:09:05,680
if you were stargazing and you had eyes

232
00:09:09,110 --> 00:09:07,200
that worked in the high energy x-ray

233
00:09:10,949 --> 00:09:09,120
band and you looked up in the sky not in

234
00:09:13,590 --> 00:09:10,959
the plane of the galaxy but but up in

235
00:09:16,949 --> 00:09:13,600
the extra galactic sky you would see the

236
00:09:19,750 --> 00:09:16,959
glow of many hundreds of massive black

237
00:09:22,470 --> 00:09:19,760
holes scattered throughout the universe

238
00:09:24,150 --> 00:09:22,480

and this image what this shows you is

239
00:09:26,949 --> 00:09:24,160
what that glow looks like with the

240
00:09:29,990 --> 00:09:26,959
current best telescopes that we have we

241
00:09:32,070 --> 00:09:30,000
can't resolve it into sources

242
00:09:35,269 --> 00:09:32,080
but if you can give me the next graphic

243
00:09:37,509 --> 00:09:35,279
this is a simulation of what nustar will

244
00:09:39,829 --> 00:09:37,519
see when it surveys regions of the

245
00:09:42,710 --> 00:09:39,839
extragalactic sky it will be able to

246
00:09:44,550 --> 00:09:42,720
resolve this glow that we know most of

247
00:09:46,870 --> 00:09:44,560
the energy in this glow

248
00:09:48,710 --> 00:09:46,880
in the x-ray band comes out in the new

249
00:09:51,030 --> 00:09:48,720
star window

250
00:09:52,310 --> 00:09:51,040
it will be able to resolve this into

251
00:09:55,509 --> 00:09:52,320
sources

252
00:09:58,070 --> 00:09:55,519
which we can then take other telescopes

253
00:10:00,550 --> 00:09:58,080
like hubble and spitzer and look at the

254
00:10:02,550 --> 00:10:00,560
galaxies that these black holes reside

255
00:10:05,030 --> 00:10:02,560
in and try to understand how the black

256
00:10:07,910 --> 00:10:05,040
holes are affecting the gross growth of

257
00:10:09,269 --> 00:10:07,920
galaxies over the age of the universe

258
00:10:10,949 --> 00:10:09,279
so if i could have the next graphic

259
00:10:13,990 --> 00:10:10,959
please

260
00:10:15,910 --> 00:10:14,000
so this shows you uh one of the key

261
00:10:19,590 --> 00:10:15,920
nustar technologies which has been

262
00:10:23,110 --> 00:10:19,600
developed i should say by nasa over the

263
00:10:25,269 --> 00:10:23,120

last 15 years by my team funded by

264
00:10:27,030 --> 00:10:25,279
research and analysis programs and the

265
00:10:29,829 --> 00:10:27,040
balloon program

266
00:10:31,910 --> 00:10:29,839
we were able to develop these very novel

267
00:10:35,110 --> 00:10:31,920
optics now it doesn't look anything of

268
00:10:37,269 --> 00:10:35,120
course like a an optical telescope

269
00:10:38,470 --> 00:10:37,279
optical light unlike

270
00:10:40,870 --> 00:10:38,480
x-rays

271
00:10:43,990 --> 00:10:40,880
it will reflect off a mirror at any

272
00:10:46,470 --> 00:10:44,000
angle whereas x-rays only reflect at

273
00:10:48,470 --> 00:10:46,480
very glancing angles that means the

274
00:10:51,350 --> 00:10:48,480
reflectors or the mirrors have to be

275
00:10:52,550 --> 00:10:51,360
placed almost parallel to the incoming

276
00:10:53,829 --> 00:10:52,560
x-ray beam

277
00:10:56,150 --> 00:10:53,839
and so to

278
00:10:59,509 --> 00:10:56,160
intercept a lot of x-rays what we have

279
00:11:01,910 --> 00:10:59,519
to do is nest hundreds of shells inside

280
00:11:05,829 --> 00:11:01,920
one another like russian dolls so that

281
00:11:08,389 --> 00:11:05,839
we can intercept a large fraction of the

282
00:11:11,430 --> 00:11:08,399
x-rays coming into the telescope so

283
00:11:13,750 --> 00:11:11,440
nustar has in fact 133 of these shells

284
00:11:16,470 --> 00:11:13,760
not only that we have to coat these

285
00:11:19,910 --> 00:11:16,480
shells with special reflective coatings

286
00:11:21,829 --> 00:11:19,920
that consist of hundreds of layers of

287
00:11:23,670 --> 00:11:21,839
thin films they're kind of like the

288
00:11:24,470 --> 00:11:23,680

anti-reflective coatings on your glasses

289
00:11:25,990 --> 00:11:24,480
but

290
00:11:28,870 --> 00:11:26,000
they work to

291
00:11:30,870 --> 00:11:28,880
enforce the reflection and these films

292
00:11:33,350 --> 00:11:30,880
are only a few atoms thick okay and

293
00:11:36,949 --> 00:11:33,360
there's hundreds of them on each surface

294
00:11:39,910 --> 00:11:36,959
but by doing this we're able to extend

295
00:11:42,790 --> 00:11:39,920
up to significantly higher energies uh

296
00:11:44,310 --> 00:11:42,800
the x-rays that we can focus

297
00:11:47,030 --> 00:11:44,320
so with that

298
00:11:48,710 --> 00:11:47,040
i'd like to have dan stern the new star

299
00:11:50,550 --> 00:11:48,720
project scientist

300
00:11:53,670 --> 00:11:50,560
tell us a little bit more about the new

301
00:11:56,150 --> 00:11:53,680
star science program thank you fiona

302
00:11:58,310 --> 00:11:56,160
if our eyes could see x-rays our galaxy

303
00:12:00,310 --> 00:11:58,320
would be lit up with black holes neutron

304
00:12:01,670 --> 00:12:00,320
stars and supernovae

305
00:12:03,750 --> 00:12:01,680
i'm going to talk about a range of

306
00:12:06,150 --> 00:12:03,760
science investigations that nustar will

307
00:12:08,150 --> 00:12:06,160
undertake within our own galaxy so much

308
00:12:10,230 --> 00:12:08,160
closer than those supermassive black

309
00:12:12,389 --> 00:12:10,240
holes billions of light years away that

310
00:12:14,150 --> 00:12:12,399
fiona spoke about

311
00:12:15,509 --> 00:12:14,160
we have a range of programs within our

312
00:12:20,470 --> 00:12:15,519
galaxy

313
00:12:23,030 --> 00:12:20,480

massive galaxies has a supermassive

314
00:12:25,350 --> 00:12:23,040
black hole at its center ours is called

315
00:12:27,829 --> 00:12:25,360
sagittarius a star and weighs about four

316
00:12:29,990 --> 00:12:27,839
million times as much as the sun

317
00:12:32,310 --> 00:12:30,000
and sometime in the early fall we'll

318
00:12:34,310 --> 00:12:32,320
take part in some coordinated campaigns

319
00:12:36,470 --> 00:12:34,320
with telescopes all over the planet and

320
00:12:38,550 --> 00:12:36,480
in space watching the black hole in the

321
00:12:41,190 --> 00:12:38,560
center of our galaxy we'll work with

322
00:12:43,030 --> 00:12:41,200
chandra at the lower energy x-rays and

323
00:12:45,269 --> 00:12:43,040
nasa's fermi telescope at higher

324
00:12:48,150 --> 00:12:45,279
energies and some very large telescopes

325
00:12:50,069 --> 00:12:48,160
in hawaii chile new mexico and we'll

326
00:12:51,910 --> 00:12:50,079
watch the flickering of the black hole

327
00:12:54,230 --> 00:12:51,920
in the center of our galaxy and watch it

328
00:12:56,389 --> 00:12:54,240
as it feeds and learn both how black

329
00:12:59,509 --> 00:12:56,399
holes grow and what the environment

330
00:13:01,350 --> 00:12:59,519
around the black hole is

331
00:13:03,590 --> 00:13:01,360
another key part of the new star science

332
00:13:06,470 --> 00:13:03,600
program is studying supernova explosions

333
00:13:08,870 --> 00:13:06,480
within our galaxy and the local universe

334
00:13:11,269 --> 00:13:08,880
supernovae are very energetic events um

335
00:13:13,430 --> 00:13:11,279
the most massive stars in the galaxy

336
00:13:15,829 --> 00:13:13,440
burn their fuel quickly and then when

337
00:13:18,150 --> 00:13:15,839
they look when they've used up all their

338
00:13:19,030 --> 00:13:18,160

fuel they become unstable and so the

339
00:13:20,710 --> 00:13:19,040
mass

340
00:13:22,310 --> 00:13:20,720
and all the and the gravity is pushing

341
00:13:24,069 --> 00:13:22,320
inward and they no longer have pressure

342
00:13:25,990 --> 00:13:24,079
pushing out from the fusion and the

343
00:13:28,550 --> 00:13:26,000
energy production so the star actually

344
00:13:29,750 --> 00:13:28,560
collapses bounces back and has a big

345
00:13:33,110 --> 00:13:29,760
explosion

346
00:13:35,670 --> 00:13:33,120
can i start my first graphic please

347
00:13:37,430 --> 00:13:35,680
so this shows a simulation of a star it

348
00:13:38,790 --> 00:13:37,440
runs out of fuel it collapses and then

349
00:13:40,069 --> 00:13:38,800
it explodes

350
00:13:41,990 --> 00:13:40,079
spitting out

351
00:13:44,150 --> 00:13:42,000
material that used to be within the star

352
00:13:45,910 --> 00:13:44,160
into the cosmos

353
00:13:49,509 --> 00:13:45,920
one of the most amazing results from

354
00:13:52,230 --> 00:13:49,519
astronomy is that we are all star stuff

355
00:13:54,629 --> 00:13:52,240
the carbon in our bodies the

356
00:13:57,030 --> 00:13:54,639
silicon in our computers the gold silver

357
00:13:59,590 --> 00:13:57,040
platinum in our jewelry all of that was

358
00:14:02,230 --> 00:13:59,600
formed within stars and it's these huge

359
00:14:04,470 --> 00:14:02,240
cosmic explosions like supernovae that

360
00:14:07,269 --> 00:14:04,480
spit that out into the cosmos

361
00:14:10,150 --> 00:14:07,279
these remnants explode out at

362
00:14:11,670 --> 00:14:10,160
thousands of miles per second

363
00:14:13,509 --> 00:14:11,680

and much like

364
00:14:15,430 --> 00:14:13,519
a bomb squad might look at the remnants

365
00:14:18,310 --> 00:14:15,440
of an explosion and trying to understand

366
00:14:20,389 --> 00:14:18,320
how that explosion happened nustar

367
00:14:22,629 --> 00:14:20,399
scientists will look at these remnants

368
00:14:24,550 --> 00:14:22,639
from supernovae and try and build back

369
00:14:27,750 --> 00:14:24,560
the physics of the explosion which are

370
00:14:29,269 --> 00:14:27,760
not so well understood currently

371
00:14:31,509 --> 00:14:29,279
nustar will look at

372
00:14:33,990 --> 00:14:31,519
some supernova remnants that went off in

373
00:14:35,990 --> 00:14:34,000
our galaxy historically over the past

374
00:14:38,069 --> 00:14:36,000
few hundred years

375
00:14:40,710 --> 00:14:38,079
typically a galaxy like the milky way

376
00:14:42,870 --> 00:14:40,720
has a supernova go off every 30 years or

377
00:14:45,750 --> 00:14:42,880
so it's been about 100 years since we

378
00:14:47,590 --> 00:14:45,760
know one went off in our galaxy so we're

379
00:14:49,509 --> 00:14:47,600
really crossing our fingers that over

380
00:14:51,990 --> 00:14:49,519
the next couple years while new stars up

381
00:14:54,389 --> 00:14:52,000
in orbit a new supernova will go off in

382
00:14:56,949 --> 00:14:54,399
our galaxy and we'll slew over as fast

383
00:14:59,189 --> 00:14:56,959
as we can within about 24 hours and

384
00:15:02,550 --> 00:14:59,199
start studying this explosion from the

385
00:15:04,310 --> 00:15:02,560
earliest stages

386
00:15:06,389 --> 00:15:04,320
another part of the new star program is

387
00:15:08,230 --> 00:15:06,399
to study the remnants of the explosion

388
00:15:09,829 --> 00:15:08,240

so the very core of the star is left

389
00:15:13,430 --> 00:15:09,839
behind

390
00:15:14,790 --> 00:15:13,440
hole

391
00:15:18,949 --> 00:15:14,800
smaller

392
00:15:21,350 --> 00:15:18,959
a neutron star which is essentially just

393
00:15:23,269 --> 00:15:21,360
a huge nucleus of an atom weighing as

394
00:15:25,829 --> 00:15:23,279
much as the sun and the size of

395
00:15:28,069 --> 00:15:25,839
manhattan these are very exotic very

396
00:15:29,110 --> 00:15:28,079
extreme sources very strong magnetic

397
00:15:30,790 --> 00:15:29,120
fields

398
00:15:32,710 --> 00:15:30,800
and nustar will study the high energy

399
00:15:34,310 --> 00:15:32,720
emission from them and get a better

400
00:15:36,550 --> 00:15:34,320
understanding of the physics of these

401
00:15:38,150 --> 00:15:36,560
exotic objects

402
00:15:40,310 --> 00:15:38,160
finally nustar will also do some

403
00:15:42,790 --> 00:15:40,320
observations within our own solar system

404
00:15:45,189 --> 00:15:42,800
can you bring up the next slide please

405
00:15:47,189 --> 00:15:45,199
so here's a picture of the sun

406
00:15:49,110 --> 00:15:47,199
nustar has a range of programs studying

407
00:15:51,430 --> 00:15:49,120
the sun we'll spend about two weeks of

408
00:15:53,910 --> 00:15:51,440
our two-year baseline mission studying

409
00:15:56,230 --> 00:15:53,920
the sun we'll study very large flares

410
00:15:58,710 --> 00:15:56,240
also called coronal mass ejections that

411
00:15:59,910 --> 00:15:58,720
happen sporadically across the surface

412
00:16:01,509 --> 00:15:59,920
of the sun

413
00:16:03,590 --> 00:16:01,519

and then we'll also study

414
00:16:06,389 --> 00:16:03,600
small flares and micro flares and nano

415
00:16:08,629 --> 00:16:06,399
flares on the surface of the sun

416
00:16:11,030 --> 00:16:08,639
the sun is surrounded by this corona or

417
00:16:12,870 --> 00:16:11,040
atmosphere of million degree gas which

418
00:16:15,350 --> 00:16:12,880
we don't really understand how it

419
00:16:17,430 --> 00:16:15,360
maintains that temperature how it forms

420
00:16:20,790 --> 00:16:17,440
one of the dominant theories explaining

421
00:16:23,269 --> 00:16:20,800
it is nano flares but no telescope prior

422
00:16:25,910 --> 00:16:23,279
to new stars have the sensitivity to see

423
00:16:28,069 --> 00:16:25,920
whether nano flares actually exist so in

424
00:16:30,230 --> 00:16:28,079
a few hours of observations newscenter

425
00:16:31,910 --> 00:16:30,240
will answer this long-standing question

426
00:16:35,189 --> 00:16:31,920
that solar physicists have been

427
00:16:37,110 --> 00:16:35,199
scratching their heads about for years

428
00:16:39,350 --> 00:16:37,120
the new star science team consists of

429
00:16:40,790 --> 00:16:39,360
about a hundred people around the planet

430
00:16:42,629 --> 00:16:40,800
and we're all eagerly awaiting the

431
00:16:44,629 --> 00:16:42,639
launch in about two weeks from now and

432
00:16:46,470 --> 00:16:44,639
then our first science data about a

433
00:16:48,150 --> 00:16:46,480
month after that

434
00:16:50,389 --> 00:16:48,160
new star will be the first mission

435
00:16:53,189 --> 00:16:50,399
focusing these high energy this high

436
00:16:55,189 --> 00:16:53,199
energy light and much like galileo 400

437
00:16:57,430 --> 00:16:55,199
years ago was the first one to focus

438
00:16:59,749 --> 00:16:57,440

optical light or visible light nustar

439
00:17:02,230 --> 00:16:59,759
will be the first mission to focus these

440
00:17:05,110 --> 00:17:02,240
high energy x-rays and we expect amazing

441
00:17:07,350 --> 00:17:05,120
discoveries from it i'll next turn the

442
00:17:10,069 --> 00:17:07,360
speaker over to yunjin kim the project

443
00:17:11,829 --> 00:17:10,079
manager from nustar who's also at jpl

444
00:17:13,990 --> 00:17:11,839
and he'll talk about what to expect over

445
00:17:15,990 --> 00:17:14,000
the next couple of weeks thank you then

446
00:17:18,710 --> 00:17:16,000
so let me start with the

447
00:17:20,710 --> 00:17:18,720
current new star status so as a fiona

448
00:17:23,350 --> 00:17:20,720
explained there is a

449
00:17:25,429 --> 00:17:23,360
optics and then spacecraft and that is

450
00:17:27,829 --> 00:17:25,439
connected by 10 meter mast

451
00:17:29,110 --> 00:17:27,839
there is a configuration in space so on

452
00:17:31,270 --> 00:17:29,120
the ground

453
00:17:33,830 --> 00:17:31,280
the mast is stowed

454
00:17:34,950 --> 00:17:33,840
so next graphics please as you can see

455
00:17:37,029 --> 00:17:34,960
that

456
00:17:37,990 --> 00:17:37,039
the mass is stowed you can see the top

457
00:17:40,070 --> 00:17:38,000
there's a

458
00:17:42,789 --> 00:17:40,080
optics and the bottom that you can see

459
00:17:44,230 --> 00:17:42,799
is the spacecraft so when it's all

460
00:17:45,909 --> 00:17:44,240
stowed

461
00:17:49,190 --> 00:17:45,919
the height of the spacecraft is

462
00:17:51,510 --> 00:17:49,200
approximately uh two meters uh just

463
00:17:52,470 --> 00:17:51,520

shorter than the height of karim after

464
00:17:55,990 --> 00:17:52,480
jabar

465
00:17:58,870 --> 00:17:56,000
and that spacecraft compared with the uh

466
00:18:01,350 --> 00:17:58,880
the launch vehicle is a tiny so right

467
00:18:03,430 --> 00:18:01,360
now the new star spacecraft is

468
00:18:05,830 --> 00:18:03,440
integrated with the

469
00:18:08,630 --> 00:18:05,840
paris launch vehicle at vandenberg air

470
00:18:10,710 --> 00:18:08,640
force base in california

471
00:18:12,950 --> 00:18:10,720
so the next step is to take the pegasus

472
00:18:14,950 --> 00:18:12,960
launch vehicle with the new start in it

473
00:18:17,750 --> 00:18:14,960
will be integrated with the l-1011

474
00:18:21,510 --> 00:18:17,760
airplane so on

475
00:18:23,590 --> 00:18:21,520
june june 2nd this coming saturday

476
00:18:25,909 --> 00:18:23,600
the pegasus will be installed underneath

477
00:18:29,430 --> 00:18:25,919
the l-1011 airplane

478
00:18:32,310 --> 00:18:29,440
on june 5th uh l-1011 will take off from

479
00:18:35,190 --> 00:18:32,320
vandenberg air force base and it we new

480
00:18:37,350 --> 00:18:35,200
start arrives at quad lane on june 6.

481
00:18:40,870 --> 00:18:37,360
the current launch date is june 13th

482
00:18:43,029 --> 00:18:40,880
with the two backup days 14th and 15th

483
00:18:45,430 --> 00:18:43,039
and the reason that um

484
00:18:47,669 --> 00:18:45,440
neustar launches from kwajalein squadron

485
00:18:48,870 --> 00:18:47,679
is very close to equator so if it is

486
00:18:50,310 --> 00:18:48,880
here is earth

487
00:18:51,430 --> 00:18:50,320
the new star will rotate around the

488
00:18:53,510 --> 00:18:51,440

equator

489
00:18:54,870 --> 00:18:53,520
to avoid the interference from charged

490
00:18:57,750 --> 00:18:54,880
particle

491
00:18:59,590 --> 00:18:57,760
that is trapped by its magnetic field so

492
00:19:02,310 --> 00:18:59,600
let me describe to you what happens on

493
00:19:05,270 --> 00:19:02,320
launch date so very early in the morning

494
00:19:07,909 --> 00:19:05,280
quadrant time l-1011 will take off so

495
00:19:10,150 --> 00:19:07,919
remember that under 10-11

496
00:19:12,070 --> 00:19:10,160
we have a past launch vehicle inside we

497
00:19:15,029 --> 00:19:12,080
have a new star spacecraft

498
00:19:17,750 --> 00:19:15,039
so when l1011 gets the drop point it

499
00:19:21,029 --> 00:19:17,760
actually drops the pegasus

500
00:19:24,630 --> 00:19:21,039
the launch vehicle about five seconds

501
00:19:26,310 --> 00:19:24,640
until the first stage ignition happens

502
00:19:28,870 --> 00:19:26,320
the pegasus is a

503
00:19:30,630 --> 00:19:28,880
three-stage rocket that means that

504
00:19:32,710 --> 00:19:30,640
there are three ignitions before new

505
00:19:35,110 --> 00:19:32,720
star reaches the desired orbit in

506
00:19:38,070 --> 00:19:35,120
approximately 800 seconds

507
00:19:42,230 --> 00:19:38,080
so the movie please

508
00:19:44,310 --> 00:19:42,240
so l-1011 at 41 000 feet and five second

509
00:19:51,029 --> 00:19:44,320
drop with the autopilot on

510
00:19:51,039 --> 00:19:56,470
and second stage ignition

511
00:20:01,430 --> 00:19:58,230
then we have a fairing separation and

512
00:20:05,190 --> 00:20:03,909
can you stop the video please

513
00:20:07,830 --> 00:20:05,200

thank you

514
00:20:09,590 --> 00:20:07,840
uh so at at this point uh new studies

515
00:20:11,190 --> 00:20:09,600
are separated from pegasus launch

516
00:20:13,190 --> 00:20:11,200
vehicle so the first thing that new

517
00:20:15,270 --> 00:20:13,200
style will do is to contact ground

518
00:20:17,909 --> 00:20:15,280
station saying that i'm here i'm here

519
00:20:19,350 --> 00:20:17,919
i'm ready to operate uh and then as a

520
00:20:21,430 --> 00:20:19,360
fiona mentioned

521
00:20:23,909 --> 00:20:21,440
the the blue color they're showing

522
00:20:26,549 --> 00:20:23,919
in the picture is a solar ray so solar

523
00:20:28,950 --> 00:20:26,559
rays automatically deployed

524
00:20:30,149 --> 00:20:28,960
to charge the spacecraft battery and

525
00:20:33,029 --> 00:20:30,159
then we start

526
00:20:35,350 --> 00:20:33,039
what we call the spacecraft checkout so

527
00:20:37,430 --> 00:20:35,360
during the special checkup period

528
00:20:39,990 --> 00:20:37,440
we check out all the specific components

529
00:20:42,230 --> 00:20:40,000
to make sure they are working

530
00:20:44,710 --> 00:20:42,240
in about one week after launch we

531
00:20:48,789 --> 00:20:44,720
deployed the mast

532
00:20:51,029 --> 00:20:48,799
and as fiona described that the optics

533
00:20:53,669 --> 00:20:51,039
and detector requires about 10 meter

534
00:20:55,990 --> 00:20:53,679
separation we accomplished by deploying

535
00:20:57,350 --> 00:20:56,000
the mast so let's deploy the mast

536
00:20:59,750 --> 00:20:57,360
restart the

537
00:21:01,909 --> 00:20:59,760
video please

538
00:21:03,990 --> 00:21:01,919

so as you can see the later when when it

539
00:21:06,710 --> 00:21:04,000
deploys there's some segment comes out

540
00:21:08,549 --> 00:21:06,720
what we call the bay and each segment

541
00:21:10,390 --> 00:21:08,559
comes out and locks

542
00:21:13,669 --> 00:21:10,400
so each segment comes out locks there

543
00:21:14,870 --> 00:21:13,679
there are 56 bays

544
00:21:17,270 --> 00:21:14,880
to be

545
00:21:20,230 --> 00:21:17,280
coming out and locked to fully extend

546
00:21:22,390 --> 00:21:20,240
the mast so this mass technology was

547
00:21:23,669 --> 00:21:22,400
originally developed for international

548
00:21:26,070 --> 00:21:23,679
space station

549
00:21:27,270 --> 00:21:26,080
it was also used for a space shuttle

550
00:21:33,830 --> 00:21:27,280
mission

551
00:21:36,470 --> 00:21:33,840
in 2000 the new star is the first space

552
00:21:39,350 --> 00:21:36,480
telescope that utilized

553
00:21:42,470 --> 00:21:39,360
this technology so now after mass is

554
00:21:44,789 --> 00:21:42,480
deployed the optics and detector is at

555
00:21:47,029 --> 00:21:44,799
right location to make a high resolution

556
00:21:48,950 --> 00:21:47,039
x-ray image so we can start the

557
00:21:51,909 --> 00:21:48,960
instrument calibration which lasts

558
00:21:54,310 --> 00:21:51,919
approximately three weeks so after

559
00:21:56,470 --> 00:21:54,320
instrument calibration is completed

560
00:21:58,630 --> 00:21:56,480
new style is ready to listen to what

561
00:21:59,990 --> 00:21:58,640
x-ray universe has to tell us

562
00:22:01,190 --> 00:22:00,000
back to you jd

563
00:22:02,390 --> 00:22:01,200

thank you jin

564
00:22:04,310 --> 00:22:02,400
and with that we'll get started with the

565
00:22:06,149 --> 00:22:04,320
question and answer session because we

566
00:22:08,070 --> 00:22:06,159
have quite a few people that are joining

567
00:22:09,350 --> 00:22:08,080
us today from a variety of locations

568
00:22:11,510 --> 00:22:09,360
reporters will be limited to one

569
00:22:13,510 --> 00:22:11,520
question and one follow-up if time

570
00:22:14,870 --> 00:22:13,520
permits we'll go around and ask a second

571
00:22:16,950 --> 00:22:14,880
set of questions

572
00:22:18,630 --> 00:22:16,960
we'll start with the beginning

573
00:22:20,950 --> 00:22:18,640
and if you would identify yourself and

574
00:22:22,630 --> 00:22:20,960
your media affiliation and if possible

575
00:22:24,710 --> 00:22:22,640
target your question to a specific

576
00:22:25,909 --> 00:22:24,720
panelist to avoid any confusion

577
00:22:27,669 --> 00:22:25,919
for those who would like to ask a

578
00:22:29,830 --> 00:22:27,679
question on the phone bridge push the

579
00:22:31,669 --> 00:22:29,840
star one keys on your telephone to be

580
00:22:34,870 --> 00:22:31,679
placed in the queue and once again to

581
00:22:38,549 --> 00:22:34,880
use twitter send your questions to

582
00:22:40,470 --> 00:22:38,559
ask nasa and with that let's begin

583
00:22:42,310 --> 00:22:40,480
i believe we have one question here on

584
00:22:44,070 --> 00:22:42,320
via the twitter sphere already from g

585
00:22:46,390 --> 00:22:44,080
done pt

586
00:22:48,549 --> 00:22:46,400
he asked is there a black hole at the

587
00:22:50,390 --> 00:22:48,559
center of every galaxy

588
00:22:54,630 --> 00:22:50,400

and if not what is allowing every star

589
00:22:56,710 --> 00:22:54,640
to maintain an orbit around its center

590
00:22:59,830 --> 00:22:56,720
sure i can take that question

591
00:23:02,630 --> 00:22:59,840
uh well as far as we can tell there is a

592
00:23:05,590 --> 00:23:02,640
massive black hole at the center of

593
00:23:06,789 --> 00:23:05,600
every massive galaxy so galaxies that

594
00:23:09,029 --> 00:23:06,799
are

595
00:23:11,029 --> 00:23:09,039
like the milky way

596
00:23:14,230 --> 00:23:11,039
the very smallest

597
00:23:17,190 --> 00:23:14,240
galaxies it's still a bit a matter of

598
00:23:19,350 --> 00:23:17,200
debate but as it turns out the mass of

599
00:23:21,430 --> 00:23:19,360
the black hole is only about one-one

600
00:23:23,789 --> 00:23:21,440
thousandths times the mass of all the

601
00:23:27,750 --> 00:23:23,799
stars in the galaxy so it's really the

602
00:23:30,470 --> 00:23:27,760
gravitation of of all the stars that uh

603
00:23:34,870 --> 00:23:30,480
bind the galaxy together and make the

604
00:23:42,230 --> 00:23:37,270
okay we're going now to the telephone

605
00:23:47,190 --> 00:23:44,630
hi thanks for taking my question um i

606
00:23:50,070 --> 00:23:47,200
think this is for fiona

607
00:23:51,990 --> 00:23:50,080
um i was just wondering if the delay

608
00:23:54,070 --> 00:23:52,000
earlier from the original launch date if

609
00:23:56,549 --> 00:23:54,080
that had any impact to the science or

610
00:23:57,510 --> 00:23:56,559
the cost of the mission

611
00:23:59,430 --> 00:23:57,520
okay

612
00:24:01,029 --> 00:23:59,440
i can take that so let me just say that

613
00:24:03,269 --> 00:24:01,039

you know we've been developing new star

614
00:24:05,590 --> 00:24:03,279
for what is it five or six years

615
00:24:08,149 --> 00:24:05,600
now building the mission and the delay

616
00:24:10,789 --> 00:24:08,159
was a few months so from my perspective

617
00:24:12,549 --> 00:24:10,799
it's been a career and a few months is

618
00:24:15,029 --> 00:24:12,559
uh not a big deal

619
00:24:17,190 --> 00:24:15,039
from the science perspective it really

620
00:24:19,669 --> 00:24:17,200
didn't affect much we've chosen slightly

621
00:24:22,230 --> 00:24:19,679
different calibration targets but

622
00:24:24,149 --> 00:24:22,240
the science program is unchanged and i

623
00:24:27,430 --> 00:24:24,159
think i'll let paul hertz take the the

624
00:24:29,830 --> 00:24:27,440
question about the uh the cost

625
00:24:31,909 --> 00:24:29,840
thanks uh yes there obviously is a

626
00:24:34,950 --> 00:24:31,919
little bit of increased cost

627
00:24:37,830 --> 00:24:34,960
to keep the pre-launch team together as

628
00:24:40,070 --> 00:24:37,840
we're moving towards the launch date

629
00:24:41,909 --> 00:24:40,080
and so the launch delay uh raised the

630
00:24:43,510 --> 00:24:41,919
cost of the mission by several million

631
00:24:48,710 --> 00:24:43,520
dollars out of the

632
00:24:51,269 --> 00:24:48,720
120 something uh total uh cost today 865

633
00:24:55,990 --> 00:24:51,279
life cycle costs okay so so it's um a

634
00:24:59,750 --> 00:24:57,350
okay we're going back to the telephone

635
00:25:03,350 --> 00:24:59,760
bridge now with dan leone from space

636
00:25:07,029 --> 00:25:04,870
hi everybody thanks for throwing this

637
00:25:09,350 --> 00:25:07,039
together could you confirm the final

638
00:25:11,350 --> 00:25:09,360

development cost once more and then uh

639
00:25:13,029 --> 00:25:11,360
my original question is when are you

640
00:25:15,190 --> 00:25:13,039
going to be up for an extended mission

641
00:25:17,830 --> 00:25:15,200
review

642
00:25:21,590 --> 00:25:17,840
uh nustar will be eligible to to

643
00:25:23,350 --> 00:25:21,600
participate in the 2014 senior review at

644
00:25:25,510 --> 00:25:23,360
which time we'll make a decision as to

645
00:25:29,750 --> 00:25:25,520
whether to extend their mission into

646
00:25:33,350 --> 00:25:31,510
thank you paul we're now going back to

647
00:25:45,669 --> 00:25:33,360
the telephone bridge with the aviation

648
00:25:45,679 --> 00:25:51,750
hello mike you're with us

649
00:25:54,870 --> 00:25:53,510
all right hello another twitter question

650
00:25:58,230 --> 00:25:54,880
here

651
00:26:00,390 --> 00:25:58,240
is it going to be available to the

652
00:26:02,870 --> 00:26:00,400
general public

653
00:26:04,870 --> 00:26:02,880
yeah i can take that question so the the

654
00:26:08,310 --> 00:26:04,880
data comes down

655
00:26:10,630 --> 00:26:08,320
to a ground station uh in melinda kenya

656
00:26:11,830 --> 00:26:10,640
that's operated by the italian space

657
00:26:13,510 --> 00:26:11,840
agency

658
00:26:15,990 --> 00:26:13,520
from there it gets sent to our mission

659
00:26:18,390 --> 00:26:16,000
operations center at uc berkeley and

660
00:26:19,430 --> 00:26:18,400
then goes on to the science center

661
00:26:25,669 --> 00:26:19,440
at

662
00:26:28,390 --> 00:26:25,679
all um

663
00:26:29,510 --> 00:26:28,400

right then we send it to a permanent

664
00:26:30,230 --> 00:26:29,520
archive

665
00:26:32,789 --> 00:26:30,240
at

666
00:26:34,630 --> 00:26:32,799
nasa goddard space flight center and

667
00:26:37,029 --> 00:26:34,640
that archive will make

668
00:26:38,549 --> 00:26:37,039
the data available to

669
00:26:40,230 --> 00:26:38,559
astronomers

670
00:26:43,830 --> 00:26:40,240
around the world well actually to anyone

671
00:26:47,590 --> 00:26:45,190
all right we're going to go back to the

672
00:26:50,950 --> 00:26:47,600
telephone bridge now with the registers

673
00:26:54,230 --> 00:26:53,190
hello thanks for taking the question

674
00:26:55,830 --> 00:26:54,240
um

675
00:26:57,350 --> 00:26:55,840
i've despite some more details on the

676
00:26:59,590 --> 00:26:57,360
mask technology that was used to

677
00:27:01,909 --> 00:26:59,600
separate telescopes from its rocket

678
00:27:03,990 --> 00:27:01,919
stages that it was developed on the iss

679
00:27:07,029 --> 00:27:04,000
and also the circuit station for me you

680
00:27:08,630 --> 00:27:07,039
can give somebody

681
00:27:11,110 --> 00:27:08,640
i can take that but i didn't hear the

682
00:27:14,549 --> 00:27:11,120
question very clearly uh so anybody can

683
00:27:19,669 --> 00:27:17,350
oh i'm sorry um i was after more detail

684
00:27:21,510 --> 00:27:19,679
of the development work on the mast that

685
00:27:23,110 --> 00:27:21,520
was apparently carried out on the iss

686
00:27:26,549 --> 00:27:23,120
and also for the space shuttle mission

687
00:27:29,110 --> 00:27:26,559
yes i can take that question uh so the

688
00:27:31,510 --> 00:27:29,120

as you saw that the mast has a lot of

689
00:27:33,669 --> 00:27:31,520
component in there it was developed by

690
00:27:34,870 --> 00:27:33,679
atk golita

691
00:27:35,990 --> 00:27:34,880
so

692
00:27:37,430 --> 00:27:36,000
first uh

693
00:27:38,389 --> 00:27:37,440
the

694
00:27:41,190 --> 00:27:38,399
spec

695
00:27:43,269 --> 00:27:41,200
the iss international space station mass

696
00:27:44,789 --> 00:27:43,279
is a 30 meters

697
00:27:48,310 --> 00:27:44,799
and

698
00:27:50,710 --> 00:27:48,320
the srtm shoulder radar topology mission

699
00:27:53,190 --> 00:27:50,720
mast was a scaled version of that that

700
00:27:54,230 --> 00:27:53,200
actually was a 60 meters

701
00:27:56,310 --> 00:27:54,240
so

702
00:27:58,870 --> 00:27:56,320
it's the same company build it

703
00:28:00,389 --> 00:27:58,880
and what we did is we took the

704
00:28:03,269 --> 00:28:00,399
design of a

705
00:28:06,149 --> 00:28:03,279
srtm mast which is a 60 meters and

706
00:28:09,590 --> 00:28:06,159
scaled down to 10 meters so we built it

707
00:28:11,830 --> 00:28:09,600
uh very early a prototype uh actually

708
00:28:15,029 --> 00:28:11,840
it's a protoflight but we built it first

709
00:28:18,549 --> 00:28:15,039
and did the deployment test and we did a

710
00:28:20,389 --> 00:28:18,559
lot of uh testing uh and some recycling

711
00:28:21,430 --> 00:28:20,399
and testing and vibration tests for the

712
00:28:24,149 --> 00:28:21,440
mast

713
00:28:27,350 --> 00:28:24,159

uh so we're confident that the mass will

714
00:28:29,430 --> 00:28:27,360
work nicely in fact the

715
00:28:31,909 --> 00:28:29,440
ground is actually the worst place to

716
00:28:34,070 --> 00:28:31,919
deploy this mass because of gravity

717
00:28:35,909 --> 00:28:34,080
so we built this uh what we call the

718
00:28:37,990 --> 00:28:35,919
gravity uploader

719
00:28:40,870 --> 00:28:38,000
to do a many deployment tests i think we

720
00:28:42,870 --> 00:28:40,880
are over 20 times we deployed the mass

721
00:28:45,269 --> 00:28:42,880
fully deployed the mast

722
00:28:47,190 --> 00:28:45,279
and then we did a vibration and then

723
00:28:49,510 --> 00:28:47,200
deployed it again before it actually

724
00:28:52,710 --> 00:28:49,520
installed on spacecraft

725
00:28:54,470 --> 00:28:52,720
so that's the development cycle and uh

726
00:28:56,630 --> 00:28:54,480
the currently

727
00:28:58,710 --> 00:28:56,640
we want to make sure that

728
00:29:01,430 --> 00:28:58,720
mass is actually working

729
00:29:03,350 --> 00:29:01,440
after we deliver the

730
00:29:04,789 --> 00:29:03,360
spacecraft we did the first motion test

731
00:29:06,789 --> 00:29:04,799
so several motion

732
00:29:09,669 --> 00:29:06,799
one bay has been one or two way it's

733
00:29:11,750 --> 00:29:09,679
been deployed so that's the kind of

734
00:29:15,750 --> 00:29:11,760
the development work that we did

735
00:29:18,470 --> 00:29:16,870
thank you

736
00:29:24,630 --> 00:29:18,480
we're now going back to the telephone

737
00:29:29,510 --> 00:29:27,990
yes uh this is a question for dan stern

738
00:29:32,789 --> 00:29:29,520

and perhaps

739
00:29:34,870 --> 00:29:32,799
dr hertz um

740
00:29:37,269 --> 00:29:34,880
there has been um

741
00:29:40,389 --> 00:29:37,279
oh okay uh i'm sorry uh

742
00:29:43,029 --> 00:29:40,399
are you hearing me yes

743
00:29:46,549 --> 00:29:45,669
nasa science missions have had miserable

744
00:29:50,630 --> 00:29:46,559
luck

745
00:29:54,950 --> 00:29:50,640
with shrouds uh not separating is there

746
00:29:55,830 --> 00:29:54,960
such a shroud involved in a new star and

747
00:29:57,990 --> 00:29:55,840
uh

748
00:30:00,070 --> 00:29:58,000
how do you feel about it

749
00:30:03,110 --> 00:30:00,080
i'll take that question so yes the

750
00:30:05,830 --> 00:30:03,120
pegasus rocket does have a shroud um and

751
00:30:08,070 --> 00:30:05,840
uh the pegasus design has been studied

752
00:30:10,470 --> 00:30:08,080
very carefully by both the manufacturer

753
00:30:13,110 --> 00:30:10,480
orbital sciences and nasa it's been

754
00:30:15,029 --> 00:30:13,120
tested extensively and we're all very

755
00:30:19,750 --> 00:30:15,039
confident that the shroud will deploy

756
00:30:24,070 --> 00:30:22,070
thanks paul we have a twitter question

757
00:30:26,230 --> 00:30:24,080
here from

758
00:30:29,190 --> 00:30:26,240
oh my god

759
00:30:31,110 --> 00:30:29,200
what'll be uh it is uh specifically to

760
00:30:33,830 --> 00:30:31,120
paul will nustar be used in conjunction

761
00:30:38,389 --> 00:30:36,070
um well that's an interesting question

762
00:30:39,669 --> 00:30:38,399
um to the best of my knowledge as a

763
00:30:42,549 --> 00:30:39,679

scientist

764
00:30:44,310 --> 00:30:42,559
we have no expectations that if there

765
00:30:46,310 --> 00:30:44,320
were um

766
00:30:48,149 --> 00:30:46,320
intelligent life elsewhere in the galaxy

767
00:30:50,149 --> 00:30:48,159
or in the universe that they would be

768
00:30:52,710 --> 00:30:50,159
sending out signals at the wavelengths

769
00:30:55,029 --> 00:30:52,720
that nustar will be sensitive at so

770
00:30:56,950 --> 00:30:55,039
there's no expectation that it would be

771
00:31:00,070 --> 00:30:56,960
useful in that particular

772
00:31:04,549 --> 00:31:01,830
thanks paul we have one more on the

773
00:31:06,230 --> 00:31:04,559
twitter line from one little becca

774
00:31:08,149 --> 00:31:06,240
as a follow-up to our data question we

775
00:31:12,630 --> 00:31:08,159
ask will the data be fairly easy to

776
00:31:16,630 --> 00:31:14,710
well in some ways i have to say we hope

777
00:31:19,509 --> 00:31:16,640
not because that means we're finding

778
00:31:22,389 --> 00:31:19,519
unexpected unusual things but if you're

779
00:31:24,470 --> 00:31:22,399
just asking the straightforward question

780
00:31:25,750 --> 00:31:24,480
is it is it very complicated to make an

781
00:31:27,669 --> 00:31:25,760
image

782
00:31:30,230 --> 00:31:27,679
no it's fairly straightforward to make

783
00:31:32,710 --> 00:31:30,240
an image to make a picture with nustar

784
00:31:35,990 --> 00:31:32,720
we have to displace the individual

785
00:31:38,070 --> 00:31:36,000
x-rays that we detect uh onto place them

786
00:31:39,590 --> 00:31:38,080
onto the sky

787
00:31:41,509 --> 00:31:39,600
back project them

788
00:31:43,350 --> 00:31:41,519

and that's a fairly straightforward

789
00:31:45,430 --> 00:31:43,360
process we have all the software ready

790
00:31:47,830 --> 00:31:45,440
to go so we'll have our first light

791
00:31:49,909 --> 00:31:47,840
images available from nustar very

792
00:31:52,230 --> 00:31:49,919
shortly after we take them and and if

793
00:31:55,190 --> 00:31:52,240
anybody goes to the uh the nustar

794
00:31:57,269 --> 00:31:55,200
website or the the archive website they

795
00:32:00,549 --> 00:31:57,279
can download those images themselves is

796
00:32:02,710 --> 00:32:00,559
that correct that's absolutely right

797
00:32:08,630 --> 00:32:02,720
great we now go back to the telephone

798
00:32:16,389 --> 00:32:11,350
could i get somebody

799
00:32:24,789 --> 00:32:17,909
hey dan if we can get you to repeat the

800
00:32:28,870 --> 00:32:26,789
i'm here would somebody please repeat

801
00:32:30,710 --> 00:32:28,880
the final development cost it was

802
00:32:34,789 --> 00:32:30,720
unclear on the phone earlier because of

803
00:32:39,669 --> 00:32:36,710
go ahead uh

804
00:32:42,230 --> 00:32:39,679
the life cycle cost uh is at the end

805
00:32:46,230 --> 00:32:42,240
there's 170 approximately 270 million

806
00:32:50,789 --> 00:32:48,230
don't say that what that includes

807
00:32:52,950 --> 00:32:50,799
oh that the 170 million dollar includes

808
00:32:55,909 --> 00:32:52,960
the project development as you can see

809
00:32:58,389 --> 00:32:55,919
the spacecraft and instrument

810
00:32:59,830 --> 00:32:58,399
and all other system engineering and

811
00:33:02,070 --> 00:32:59,840
management

812
00:33:04,470 --> 00:33:02,080
and the science operations and it

813
00:33:05,669 --> 00:33:04,480

includes the launch vehicle as well as

814
00:33:10,789 --> 00:33:05,679
the

815
00:33:14,789 --> 00:33:12,310
all right appreciate that we've got a

816
00:33:15,990 --> 00:33:14,799
question here from santix

817
00:33:20,549 --> 00:33:16,000
uh

818
00:33:21,750 --> 00:33:20,559
horizon if not how close to it can it

819
00:33:23,909 --> 00:33:21,760
see

820
00:33:26,230 --> 00:33:23,919
okay i can take that question

821
00:33:28,710 --> 00:33:26,240
we actually can't see all the way to the

822
00:33:30,630 --> 00:33:28,720
event horizon because what happens

823
00:33:33,990 --> 00:33:30,640
is that when you get very close to the

824
00:33:36,230 --> 00:33:34,000
event horizon matter no longer

825
00:33:38,549 --> 00:33:36,240
circulates around the black hole it

826
00:33:41,350 --> 00:33:38,559
starts to fall in very rapidly which

827
00:33:42,710 --> 00:33:41,360
makes it hard to see but the area we can

828
00:33:45,190 --> 00:33:42,720
see is only

829
00:33:47,190 --> 00:33:45,200
about three times the size of the event

830
00:33:50,470 --> 00:33:47,200
horizon itself so it's still very close

831
00:33:54,149 --> 00:33:52,630
all right one more file one more twitter

832
00:33:57,509 --> 00:33:54,159
question here uh

833
00:33:59,590 --> 00:33:57,519
uh i believe a new star is an explorer's

834
00:34:02,070 --> 00:33:59,600
program mission can you explain what

835
00:34:02,950 --> 00:34:02,080
that what explorers is and how it comes

836
00:34:05,110 --> 00:34:02,960
about

837
00:34:07,750 --> 00:34:05,120
okay i'll take that question

838
00:34:10,550 --> 00:34:07,760

the spores program is uh actually nasa's

839
00:34:13,589 --> 00:34:10,560
oldest program explorer one was nasa's

840
00:34:15,270 --> 00:34:13,599
first successful satellite launched

841
00:34:17,909 --> 00:34:15,280
the explorers program

842
00:34:20,550 --> 00:34:17,919
issues calls for proposals to the

843
00:34:21,589 --> 00:34:20,560
science and engineering community and

844
00:34:23,990 --> 00:34:21,599
for

845
00:34:25,750 --> 00:34:24,000
building scientifically meritorious

846
00:34:28,710 --> 00:34:25,760
small missions

847
00:34:31,109 --> 00:34:28,720
and nasa reviews those proposals and

848
00:34:32,310 --> 00:34:31,119
selects the very best one and that's

849
00:34:35,430 --> 00:34:32,320
what we fund

850
00:34:38,310 --> 00:34:35,440
nustar was submitted in um

851
00:34:44,069 --> 00:34:41,990
iii yeah so we think around 2003 um and

852
00:34:46,069 --> 00:34:44,079
was selected

853
00:34:49,190 --> 00:34:46,079
and developed over the years

854
00:34:51,030 --> 00:34:49,200
we're also uh developing um

855
00:34:52,149 --> 00:34:51,040
we we have a

856
00:34:53,349 --> 00:34:52,159
other missions that have been launched

857
00:34:55,030 --> 00:34:53,359
in the explorer series and are still

858
00:34:57,750 --> 00:34:55,040
operating in space include the swift

859
00:34:59,349 --> 00:34:57,760
mission uh which is up there now and uh

860
00:35:01,990 --> 00:34:59,359
the explorer program will be launching a

861
00:35:05,030 --> 00:35:02,000
solar telescope called iris

862
00:35:06,790 --> 00:35:05,040
early next year

863
00:35:08,950 --> 00:35:06,800

all right thanks paul and that's going

864
00:35:12,550 --> 00:35:08,960
to do it for today's new star

865
00:35:14,550 --> 00:35:12,560
11 14 or l14 briefing i'd like to

866
00:35:16,470 --> 00:35:14,560
thank our panelists for joining us today

867
00:35:19,030 --> 00:35:16,480
i'm sure you look forward as we do to a

868
00:35:20,550 --> 00:35:19,040
successful launch coming on june 13th

869
00:35:22,630 --> 00:35:20,560
and to find out more about the new star

870
00:35:26,150 --> 00:35:22,640
mission or any of nasa's projects you

871
00:35:28,150 --> 00:35:26,160
can visit us on the web at www.nasa.gov

872
00:35:30,470 --> 00:35:28,160
or along any of our social media

873
00:35:33,190 --> 00:35:30,480
projects such as facebook twitter