
NASA
NASA
AMS-02
AMS-02
On Phone
Question from Media

1
00:00:06,630 --> 00:00:05,349
hi i'm trent perato public affairs

2
00:00:08,390 --> 00:00:06,640
officer at nasa headquarters in

3
00:00:09,990 --> 00:00:08,400
washington i'd like to welcome you to

4
00:00:11,830 --> 00:00:10,000
today's news conference to discuss the

5
00:00:14,150 --> 00:00:11,840
first results of the alpha magnetic

6
00:00:15,910 --> 00:00:14,160
spectrometer experiment ams is a

7
00:00:18,630 --> 00:00:15,920
state-of-the-art cosmic ray particle

8
00:00:20,870 --> 00:00:18,640
physics detector located on the exterior

9
00:00:22,710 --> 00:00:20,880
of the international space station for

10
00:00:24,870 --> 00:00:22,720
those joining us online you can find out

11
00:00:26,470 --> 00:00:24,880
more information about ams in the

12
00:00:29,509 --> 00:00:26,480
international space station at

13
00:00:32,790 --> 00:00:31,109

slash station

14
00:00:34,870 --> 00:00:32,800
as for the order of events today we have

15
00:00:36,549 --> 00:00:34,880
four speakers joining us each will

16
00:00:38,630 --> 00:00:36,559
provide brief remarks and then we'll

17
00:00:40,549 --> 00:00:38,640
open the floor and phone lines for

18
00:00:41,910 --> 00:00:40,559
questions and answers i'd like to take a

19
00:00:43,910 --> 00:00:41,920
brief moment to just welcome and

20
00:00:46,150 --> 00:00:43,920
introduce the speakers here in

21
00:00:48,310 --> 00:00:46,160
washington we have william gerstenmaier

22
00:00:51,350 --> 00:00:48,320
nasa associate administrator for human

23
00:00:53,750 --> 00:00:51,360
exploration and operations

24
00:00:56,229 --> 00:00:53,760
here also we have michael solomon

25
00:00:59,349 --> 00:00:56,239
program manager for ams at the u.s

26
00:01:02,069 --> 00:00:59,359
department of energy's office of science

27
00:01:03,189 --> 00:01:02,079
and mark cistelli nasa's ams program

28
00:01:05,189 --> 00:01:03,199
manager

29
00:01:06,950 --> 00:01:05,199
now joining us by video link from the

30
00:01:09,429 --> 00:01:06,960
european organization for nuclear

31
00:01:11,590 --> 00:01:09,439
research or cern in geneva switzerland

32
00:01:13,350 --> 00:01:11,600
is ams principal investigator and nobel

33
00:01:16,070 --> 00:01:13,360
laureate samuel ting of the

34
00:01:18,469 --> 00:01:16,080
massachusetts institute of technology

35
00:01:20,390 --> 00:01:18,479
and with that we'll have opening remarks

36
00:01:22,630 --> 00:01:20,400
and i'll hand the discussion over to mr

37
00:01:24,230 --> 00:01:22,640
gerstenmaier bill

38
00:01:28,469 --> 00:01:24,240

thank you trent it's

39
00:01:30,950 --> 00:01:28,479
my honor and privilege to be here today

40
00:01:32,469 --> 00:01:30,960
some days that my job is really great

41
00:01:34,230 --> 00:01:32,479
and this is one of those days when my

42
00:01:36,950 --> 00:01:34,240
job is really great and the reason it's

43
00:01:39,350 --> 00:01:36,960
great is i get to to recognize a team

44
00:01:41,990 --> 00:01:39,360
that has put many many years of hard

45
00:01:44,550 --> 00:01:42,000
work into an activity and they finally

46
00:01:46,230 --> 00:01:44,560
get to see the fruits of all that labor

47
00:01:48,789 --> 00:01:46,240
all those hours of putting this

48
00:01:51,350 --> 00:01:48,799
instrument together to actually see it

49
00:01:52,870 --> 00:01:51,360
come together to get good results and

50
00:01:54,469 --> 00:01:52,880
not just first light but to actually

51
00:01:56,469 --> 00:01:54,479
have the first paper published and to

52
00:01:58,789 --> 00:01:56,479
have that discussion occur today and

53
00:01:59,990 --> 00:01:58,799
cern with professor ting so

54
00:02:01,749 --> 00:02:00,000
i'm so

55
00:02:03,749 --> 00:02:01,759
happy to be here with this group that i

56
00:02:05,590 --> 00:02:03,759
know how much dedication how much work

57
00:02:07,109 --> 00:02:05,600
they've put into this effort and to see

58
00:02:09,270 --> 00:02:07,119
this wonderful instrument yield the

59
00:02:11,830 --> 00:02:09,280
results that professor ting talked about

60
00:02:13,830 --> 00:02:11,840
earlier today is just outstanding

61
00:02:16,309 --> 00:02:13,840
i look at this as maybe the first of

62
00:02:17,910 --> 00:02:16,319
many of these events i think the data

63
00:02:20,630 --> 00:02:17,920

that he shows today and the data he

64
00:02:22,070 --> 00:02:20,640
talked about today is is intriguing is

65
00:02:23,510 --> 00:02:22,080
very interesting there'll be more

66
00:02:25,589 --> 00:02:23,520
discussions on it from those that can

67
00:02:27,510 --> 00:02:25,599
describe it better than i can but i

68
00:02:28,790 --> 00:02:27,520
think it's just kind of the beginning of

69
00:02:31,350 --> 00:02:28,800
other great things that will come from

70
00:02:33,509 --> 00:02:31,360
this instrument onboard space station

71
00:02:35,030 --> 00:02:33,519
space station is a really nice platform

72
00:02:37,190 --> 00:02:35,040
well suited for this instrument it

73
00:02:38,949 --> 00:02:37,200
allows for a long long duration of

74
00:02:40,150 --> 00:02:38,959
observation time which is important to

75
00:02:42,790 --> 00:02:40,160
this instrument

76
00:02:44,550 --> 00:02:42,800
we can essentially use decades of

77
00:02:46,869 --> 00:02:44,560
observation time which will help reduce

78
00:02:48,790 --> 00:02:46,879
the statistics and certain low frequency

79
00:02:50,790 --> 00:02:48,800
events and station is a great platform

80
00:02:53,110 --> 00:02:50,800
for that so the station is a good

81
00:02:54,869 --> 00:02:53,120
platform this is a good

82
00:02:55,910 --> 00:02:54,879
a good indication of some of the results

83
00:02:58,070 --> 00:02:55,920
that are going to come from space

84
00:03:00,949 --> 00:02:58,080
station in the future so i'm again very

85
00:03:02,949 --> 00:03:00,959
excited to be here so again i'd like to

86
00:03:04,070 --> 00:03:02,959
thank sam and his team for all the work

87
00:03:05,670 --> 00:03:04,080
they've done for this truly

88
00:03:07,990 --> 00:03:05,680

international team that has brought

89
00:03:09,910 --> 00:03:08,000
these first results to us today i'd also

90
00:03:11,670 --> 00:03:09,920
like to take a special chance to thank

91
00:03:13,990 --> 00:03:11,680
doe for their involvement and their

92
00:03:15,670 --> 00:03:14,000
support of this activity without them

93
00:03:17,670 --> 00:03:15,680
this instrument would not be on orbit

94
00:03:19,509 --> 00:03:17,680
today so they hung through a lot of

95
00:03:21,509 --> 00:03:19,519
tough times with us they worked through

96
00:03:24,550 --> 00:03:21,519
a lot of integration issues with us and

97
00:03:26,229 --> 00:03:24,560
doe was a tremendous supporter of this

98
00:03:29,030 --> 00:03:26,239
activity all the way to where we are

99
00:03:31,030 --> 00:03:29,040
today so congratulations to them as well

100
00:03:33,430 --> 00:03:31,040
as the ams team so with that i'll

101
00:03:35,430 --> 00:03:33,440
conclude my remarks and and turn it over

102
00:03:36,789 --> 00:03:35,440
to the next speaker great thank you very

103
00:03:38,470 --> 00:03:36,799
much i understand we're having just a

104
00:03:40,470 --> 00:03:38,480
bit of technical difficulty in our

105
00:03:42,869 --> 00:03:40,480
connection to geneva law so as we try to

106
00:03:45,430 --> 00:03:42,879
reset that let's go ahead and start with

107
00:03:47,030 --> 00:03:45,440
michael solomon uh for for a bit of

108
00:03:48,630 --> 00:03:47,040
information on some of the results that

109
00:03:51,110 --> 00:03:48,640
came out today before we hear from

110
00:03:53,830 --> 00:03:51,120
professor ting i'd just like to put the

111
00:03:56,149 --> 00:03:53,840
the issue of these exciting ams results

112
00:03:58,470 --> 00:03:56,159
which you'll hear about shortly into a

113
00:03:59,670 --> 00:03:58,480

larger context in our global search for

114
00:04:01,589 --> 00:03:59,680
dark matter

115
00:04:03,190 --> 00:04:01,599
as you know the question what is dark

116
00:04:05,589 --> 00:04:03,200
matter is considered to be one of the

117
00:04:07,270 --> 00:04:05,599
most important questions in physics our

118
00:04:09,190 --> 00:04:07,280
standard model of particle physics

119
00:04:11,429 --> 00:04:09,200
highly successful predicted the higgs

120
00:04:13,670 --> 00:04:11,439
boson which was recently discovered has

121
00:04:15,589 --> 00:04:13,680
no place for dark matter what that means

122
00:04:17,590 --> 00:04:15,599
is if we detect dark matter and learn

123
00:04:19,670 --> 00:04:17,600
something about its nature we'll have

124
00:04:22,629 --> 00:04:19,680
made a major impact to our understanding

125
00:04:24,710 --> 00:04:22,639
of physics and nature itself

126
00:04:25,909 --> 00:04:24,720
so what is dark matter and how do we

127
00:04:27,909 --> 00:04:25,919
detect it

128
00:04:30,390 --> 00:04:27,919
we know that we live in a sea of dark

129
00:04:32,629 --> 00:04:30,400
matter our galaxy is embedded in a huge

130
00:04:34,950 --> 00:04:32,639
roughly spherical halo of dark matter

131
00:04:36,790 --> 00:04:34,960
particles we know that dark matter

132
00:04:38,790 --> 00:04:36,800
interacts gravitationally that's how it

133
00:04:40,469 --> 00:04:38,800
was first detected but we also know

134
00:04:42,710 --> 00:04:40,479
apparently that it doesn't interact with

135
00:04:44,790 --> 00:04:42,720
light hence the term dark matter and it

136
00:04:47,110 --> 00:04:44,800
doesn't experience the strong or nuclear

137
00:04:49,749 --> 00:04:47,120
interaction so how does it interact with

138
00:04:51,670 --> 00:04:49,759

nature a class of models predicts that

139
00:04:53,830 --> 00:04:51,680
dark matter will interact with atomic

140
00:04:56,629 --> 00:04:53,840
matter in a manner very similar to the

141
00:04:58,469 --> 00:04:56,639
way neutrinos do which means every once

142
00:05:00,550 --> 00:04:58,479
in a while there will be a rare

143
00:05:02,469 --> 00:05:00,560
interaction with an atomic nucleus that

144
00:05:04,790 --> 00:05:02,479
we can detect

145
00:05:06,870 --> 00:05:04,800
how do we find dark matter well there

146
00:05:08,150 --> 00:05:06,880
are three complementary methods of

147
00:05:09,749 --> 00:05:08,160
detection

148
00:05:10,390 --> 00:05:09,759
and i want to mention the department of

149
00:05:12,150 --> 00:05:10,400
energy

150
00:05:15,110 --> 00:05:12,160
supports efforts in all three of these

151
00:05:17,590 --> 00:05:15,120
methods of detection one is to look in

152
00:05:19,510 --> 00:05:17,600
accelerators accelerator collisions at

153
00:05:20,790 --> 00:05:19,520
high energies produce a wide variety of

154
00:05:24,310 --> 00:05:20,800
particles

155
00:05:26,310 --> 00:05:24,320
relatives are produced in such

156
00:05:28,390 --> 00:05:26,320
collisions searches have been made for

157
00:05:30,629 --> 00:05:28,400
these they've not been found so

158
00:05:32,790 --> 00:05:30,639
accelerator experiments have not yet

159
00:05:35,189 --> 00:05:32,800
yielded any evidence for dark matter

160
00:05:37,430 --> 00:05:35,199
direct searches for dark matter we live

161
00:05:38,710 --> 00:05:37,440
in a sea of dark matter particles deep

162
00:05:40,790 --> 00:05:38,720
underground

163
00:05:42,950 --> 00:05:40,800

all over the world are many experiments

164
00:05:44,390 --> 00:05:42,960
searching for those interactions those

165
00:05:46,950 --> 00:05:44,400
rare interactions of dark matter

166
00:05:49,270 --> 00:05:46,960
particles with detectors

167
00:05:51,270 --> 00:05:49,280
if there are some interactions that are

168
00:05:53,670 --> 00:05:51,280
seen and there are several we can

169
00:05:55,029 --> 00:05:53,680
actually learn about the characteristics

170
00:05:56,150 --> 00:05:55,039
of dark matter

171
00:05:58,070 --> 00:05:56,160
to date

172
00:06:00,390 --> 00:05:58,080
underground direct searches for dark

173
00:06:02,309 --> 00:06:00,400
matter have yielded no conclusive

174
00:06:04,150 --> 00:06:02,319
results that leaves us with the third

175
00:06:06,070 --> 00:06:04,160
and final method for dark matter

176
00:06:08,790 --> 00:06:06,080
detection and that is through the

177
00:06:11,350 --> 00:06:08,800
indirect observation of the products of

178
00:06:13,590 --> 00:06:11,360
dark matters when they annihilate in

179
00:06:16,150 --> 00:06:13,600
interstellar space

180
00:06:17,830 --> 00:06:16,160
class of models makes this prediction

181
00:06:20,390 --> 00:06:17,840
that occasionally dark matter particles

182
00:06:23,510 --> 00:06:20,400
will annihilate each other and produce

183
00:06:26,710 --> 00:06:23,520
high energy photons gamma rays and high

184
00:06:28,070 --> 00:06:26,720
energy electrons and positrons

185
00:06:29,590 --> 00:06:28,080
there have been searches for all of

186
00:06:31,830 --> 00:06:29,600
these

187
00:06:33,990 --> 00:06:31,840
searches for gamma rays from the

188
00:06:36,309 --> 00:06:34,000

galactic center resulting from dark

189
00:06:38,469 --> 00:06:36,319
matter annihilations have been done with

190
00:06:40,469 --> 00:06:38,479
ground-based instruments and space

191
00:06:42,710 --> 00:06:40,479
space-based instruments such as the

192
00:06:45,110 --> 00:06:42,720
fermi gamma-ray space telescope which is

193
00:06:46,950 --> 00:06:45,120
also a doe nasa

194
00:06:49,110 --> 00:06:46,960
collaboration

195
00:06:52,070 --> 00:06:49,120
and nothing has been found that leaves

196
00:06:54,469 --> 00:06:52,080
us with positrons cosmic ray positrons

197
00:06:56,390 --> 00:06:54,479
there have been a number of experiments

198
00:06:58,230 --> 00:06:56,400
done balloon experiments and space

199
00:07:01,589 --> 00:06:58,240
experiments that have looked

200
00:07:04,390 --> 00:07:01,599
at the spectrum of cosmic ray positrons

201
00:07:05,830 --> 00:07:04,400
if there exists a new source of

202
00:07:07,830 --> 00:07:05,840
positrons such as through the

203
00:07:09,670 --> 00:07:07,840
annihilation of dark matter we would

204
00:07:12,390 --> 00:07:09,680
expect to see it in the fraction of

205
00:07:15,189 --> 00:07:12,400
cosmic ray positrons that we see and in

206
00:07:17,589 --> 00:07:15,199
fact such an increase has been observed

207
00:07:19,830 --> 00:07:17,599
first a couple decades ago by balloons

208
00:07:22,469 --> 00:07:19,840
more recently with the italian space

209
00:07:26,150 --> 00:07:22,479
satellite pamela and then more recently

210
00:07:29,909 --> 00:07:26,160
with the fermi gamma-ray space telescope

211
00:07:32,309 --> 00:07:29,919
ams has put its it has made a major

212
00:07:34,230 --> 00:07:32,319
impact on this final method of detection

213
00:07:36,150 --> 00:07:34,240

cosmic ray positrons

214
00:07:38,710 --> 00:07:36,160
these other experiments have in fact

215
00:07:40,070 --> 00:07:38,720
observed this type of increase that one

216
00:07:43,189 --> 00:07:40,080
would expect from dark matter

217
00:07:45,670 --> 00:07:43,199
annihilation what ams has done is made a

218
00:07:48,390 --> 00:07:45,680
high precision measurement of the

219
00:07:49,990 --> 00:07:48,400
spectrum and it's detected spectral

220
00:07:52,230 --> 00:07:50,000
features which

221
00:07:53,830 --> 00:07:52,240
perhaps in the future can provide us

222
00:07:56,469 --> 00:07:53,840
with additional information on the

223
00:07:59,189 --> 00:07:56,479
nature of this excess now i have to say

224
00:08:01,830 --> 00:07:59,199
it's very important to say there may be

225
00:08:04,070 --> 00:08:01,840
a very common prosaic explanation for

226
00:08:06,230 --> 00:08:04,080
this excess it could be due to pulsars

227
00:08:09,110 --> 00:08:06,240
for example we don't know

228
00:08:11,510 --> 00:08:09,120
the fact is ams has made a high

229
00:08:13,189 --> 00:08:11,520
precision measurement and in the future

230
00:08:15,430 --> 00:08:13,199
with more statistics we're going to

231
00:08:17,270 --> 00:08:15,440
learn more about the nature of this

232
00:08:20,710 --> 00:08:17,280
excess and

233
00:08:25,990 --> 00:08:20,720
if nature is kind we might have a very

234
00:08:29,670 --> 00:08:27,510
thank you very much by the way excuse me

235
00:08:32,469 --> 00:08:29,680
i'm sorry i would like to take this

236
00:08:35,110 --> 00:08:32,479
opportunity to congratulate the ams

237
00:08:37,750 --> 00:08:35,120
international collaboration on

238
00:08:39,909 --> 00:08:37,760

producing a flawlessly performing

239
00:08:41,990 --> 00:08:39,919
experiment and i would also like to

240
00:08:42,790 --> 00:08:42,000
thank nasa for

241
00:08:43,990 --> 00:08:42,800
its

242
00:08:47,110 --> 00:08:44,000
superb

243
00:08:48,870 --> 00:08:47,120
uh performance in getting the ams onto

244
00:08:51,350 --> 00:08:48,880
the international space station and

245
00:08:53,430 --> 00:08:51,360
helping with the continued operations

246
00:08:54,710 --> 00:08:53,440
thank you great thank you mike uh we'll

247
00:08:57,350 --> 00:08:54,720
continue here in washington with our

248
00:09:06,829 --> 00:08:57,360
next speaker mark cistilli mark

249
00:09:11,269 --> 00:09:09,590
yeah okay i chose this image because

250
00:09:13,590 --> 00:09:11,279
this was taken roughly about two years

251
00:09:16,949 --> 00:09:13,600
ago when ams was first being stalled at

252
00:09:18,150 --> 00:09:16,959
that time uh it's fair to say that ams

253
00:09:20,470 --> 00:09:18,160
started a

254
00:09:23,910 --> 00:09:20,480
science voyage of exploration into our

255
00:09:25,750 --> 00:09:23,920
galaxy and beyond uh like all voyages of

256
00:09:27,030 --> 00:09:25,760
exploration we had our share of

257
00:09:28,550 --> 00:09:27,040
columbuses

258
00:09:30,710 --> 00:09:28,560
and i think it's only fair

259
00:09:33,590 --> 00:09:30,720
to acknowledge some of those uh

260
00:09:36,389 --> 00:09:33,600
both past and the few in the present

261
00:09:41,030 --> 00:09:36,399
going back some 19 years

262
00:09:44,070 --> 00:09:41,040
okay uh d we are people like wilmot hess

263
00:09:46,230 --> 00:09:44,080

john o'fallon had the scientific insight

264
00:09:48,949 --> 00:09:46,240
to select ams as a concept from

265
00:09:50,310 --> 00:09:48,959
professor ting in that same time frame

266
00:09:53,110 --> 00:09:50,320
roughly speaking former nasa

267
00:09:55,350 --> 00:09:53,120
administrator dan golden had the vision

268
00:09:57,910 --> 00:09:55,360
to see that ams was perfect for the

269
00:09:59,829 --> 00:09:57,920
space station

270
00:10:03,030 --> 00:09:59,839
at this time and in the past there are

271
00:10:04,870 --> 00:10:03,040
many very fine engineers at the nasa

272
00:10:07,750 --> 00:10:04,880
johnson space center

273
00:10:09,269 --> 00:10:07,760
trent martin ken bolwick

274
00:10:11,110 --> 00:10:09,279
chris tut

275
00:10:13,670 --> 00:10:11,120
tim urban phil mott

276
00:10:17,590 --> 00:10:13,680
many others okay whose tireless

277
00:10:19,910 --> 00:10:17,600
dedication over many many years made ams

278
00:10:23,190 --> 00:10:19,920
possible and was made possible the

279
00:10:26,470 --> 00:10:23,200
ability to take an experiment that prior

280
00:10:28,389 --> 00:10:26,480
was done in vast underground facilities

281
00:10:30,949 --> 00:10:28,399
okay and then be packaged and be able to

282
00:10:33,670 --> 00:10:30,959
put on the space station okay

283
00:10:35,910 --> 00:10:33,680
at the kennedy space center okay again

284
00:10:38,470 --> 00:10:35,920
many fine engineers that worked for many

285
00:10:39,829 --> 00:10:38,480
many months to take the ams and it's

286
00:10:41,670 --> 00:10:39,839
very unique center for handling

287
00:10:43,030 --> 00:10:41,680
requirements and prepared for the space

288
00:10:44,310 --> 00:10:43,040

shuttle ride

289
00:10:46,230 --> 00:10:44,320
at the marshall

290
00:10:49,350 --> 00:10:46,240
space flight center right now as we

291
00:10:51,750 --> 00:10:49,360
speak a team of dedicated engineers are

292
00:10:53,509 --> 00:10:51,760
working to keep ams operational and

293
00:10:56,949 --> 00:10:53,519
coordinate the ams

294
00:10:58,230 --> 00:10:56,959
with the control center at the cern

295
00:11:00,470 --> 00:10:58,240
and

296
00:11:02,069 --> 00:11:00,480
we can all take pride

297
00:11:04,470 --> 00:11:02,079
in what they are doing

298
00:11:05,990 --> 00:11:04,480
and as michael said a moment ago we're

299
00:11:08,630 --> 00:11:06,000
looking essentially at a glimpse of the

300
00:11:10,710 --> 00:11:08,640
future here and make no mistake about it

301
00:11:12,069 --> 00:11:10,720
there will be other glimpses from ams in

302
00:11:14,470 --> 00:11:12,079
the future to come

303
00:11:16,949 --> 00:11:14,480
this is a long-term program suited for a

304
00:11:18,949 --> 00:11:16,959
long-term vehicle the space station this

305
00:11:20,389 --> 00:11:18,959
is what station was built for and

306
00:11:22,150 --> 00:11:20,399
essentially amos is going to essentially

307
00:11:23,750 --> 00:11:22,160
carry through this

308
00:11:25,110 --> 00:11:23,760
i have no more

309
00:11:26,870 --> 00:11:25,120
great thank you very much and i am

310
00:11:28,949 --> 00:11:26,880
pleased to say we have a connection with

311
00:11:33,990 --> 00:11:28,959
cern in geneva so let's go there for

312
00:11:34,000 --> 00:11:38,710
good afternoon

313
00:11:44,069 --> 00:11:41,430

ms took 18 years to

314
00:11:46,310 --> 00:11:44,079
16 years to build

315
00:11:50,470 --> 00:11:46,320
what is made possible

316
00:11:52,389 --> 00:11:50,480
is through the strong support of nasa

317
00:11:54,710 --> 00:11:52,399
particularly

318
00:11:57,190 --> 00:11:54,720
then golding

319
00:11:59,430 --> 00:11:57,200
your guest gaston

320
00:12:01,910 --> 00:11:59,440
george abbey

321
00:12:03,430 --> 00:12:01,920
and many many others

322
00:12:06,230 --> 00:12:03,440
also from the

323
00:12:08,710 --> 00:12:06,240
department of energy

324
00:12:10,870 --> 00:12:08,720
office of for high energy physics

325
00:12:13,110 --> 00:12:10,880
jim secrets

326
00:12:14,790 --> 00:12:13,120
mike solomon

327
00:12:16,550 --> 00:12:14,800
dennis colvar

328
00:12:19,590 --> 00:12:16,560
and many others

329
00:12:21,509 --> 00:12:19,600
i swear us from mit from the school of

330
00:12:23,590 --> 00:12:21,519
science

331
00:12:25,190 --> 00:12:23,600
mark kessner and from the laboratory of

332
00:12:27,110 --> 00:12:25,200
nuclear science

333
00:12:28,389 --> 00:12:27,120
many many

334
00:12:29,910 --> 00:12:28,399
people

335
00:12:33,430 --> 00:12:29,920
work together

336
00:12:38,629 --> 00:12:36,710
physicists from germany

337
00:12:42,470 --> 00:12:38,639
under the leadership of

338
00:12:44,389 --> 00:12:42,480

professor cher professor lucas meyer

339
00:12:46,790 --> 00:12:44,399
from italy

340
00:12:48,550 --> 00:12:46,800
professor roberto battisto

341
00:12:50,870 --> 00:12:48,560
we did an enormous amount of work for

342
00:12:52,550 --> 00:12:50,880
ims

343
00:12:54,710 --> 00:12:52,560
from switzerland

344
00:12:59,110 --> 00:12:54,720
maurice spokane

345
00:13:00,949 --> 00:12:59,120
from spain my good friend manuel aguilar

346
00:13:02,470 --> 00:13:00,959
i'm from taiwan

347
00:13:04,870 --> 00:13:02,480
a.c lee

348
00:13:06,550 --> 00:13:04,880
and also from many universities

349
00:13:07,430 --> 00:13:06,560
in china

350
00:13:12,790 --> 00:13:07,440
in

351
00:13:16,310 --> 00:13:15,190
the observation

352
00:13:24,949 --> 00:13:16,320
of

353
00:13:24,959 --> 00:13:30,389
what ams has done what i reported today

354
00:13:39,269 --> 00:13:31,509
is

355
00:13:42,710 --> 00:13:39,279
good

356
00:13:46,389 --> 00:13:42,720
resolution and high statistics

357
00:13:48,710 --> 00:13:46,399
i've been as i said today in my talk

358
00:13:50,710 --> 00:13:48,720
i've been doing physics and accelerator

359
00:13:53,670 --> 00:13:50,720
for many many years

360
00:13:55,990 --> 00:13:53,680
uh the seldom

361
00:13:58,949 --> 00:13:56,000
anyone the accelerator to do a one

362
00:14:00,870 --> 00:13:58,959
percent experiment

363
00:14:02,389 --> 00:14:00,880

to do an experiment

364
00:14:04,310 --> 00:14:02,399
in space

365
00:14:07,030 --> 00:14:04,320
with a

366
00:14:09,110 --> 00:14:07,040
accuracy of one percent

367
00:14:11,350 --> 00:14:09,120
it's really quite difficult

368
00:14:13,269 --> 00:14:11,360
it's really made possible

369
00:14:15,189 --> 00:14:13,279
because of the existence of space

370
00:14:17,750 --> 00:14:15,199
station

371
00:14:20,230 --> 00:14:17,760
i'm because the support of nasa from

372
00:14:21,990 --> 00:14:20,240
cern i'm from the participating

373
00:14:24,230 --> 00:14:22,000
countries

374
00:14:26,790 --> 00:14:24,240
so

375
00:14:28,230 --> 00:14:26,800
this this is a very happy day for all of

376
00:14:30,470 --> 00:14:28,240
us

377
00:14:31,829 --> 00:14:30,480
as i mentioned before

378
00:14:35,110 --> 00:14:31,839
in my talk

379
00:14:39,110 --> 00:14:35,120
us we now discover many features

380
00:14:42,829 --> 00:14:39,120
of the of the rise of the spectrum

381
00:14:45,509 --> 00:14:42,839
in a short time the higher energy

382
00:14:47,990 --> 00:14:45,519
point how they behave

383
00:14:49,509 --> 00:14:48,000
how they drop off how quickly the drop

384
00:14:51,590 --> 00:14:49,519
pop

385
00:14:53,110 --> 00:14:51,600
will be

386
00:14:55,910 --> 00:14:53,120
revealed

387
00:14:57,750 --> 00:14:55,920
many people ask me lecture today why i

388
00:15:00,230 --> 00:14:57,760

don't announce it now

389
00:15:01,910 --> 00:15:00,240
and the answer is very simple

390
00:15:03,189 --> 00:15:01,920
i cannot control

391
00:15:06,389 --> 00:15:03,199
statistics

392
00:15:07,509 --> 00:15:06,399
it really depends on how long it took up

393
00:15:09,030 --> 00:15:07,519
to get

394
00:15:10,069 --> 00:15:09,040
enough events

395
00:15:13,430 --> 00:15:10,079
to make a

396
00:15:15,509 --> 00:15:13,440
definitive statement

397
00:15:17,910 --> 00:15:15,519
we of course

398
00:15:21,430 --> 00:15:17,920
at the same time

399
00:15:23,670 --> 00:15:21,440
measure many other things such as

400
00:15:25,350 --> 00:15:23,680
electron spectrum

401
00:15:27,030 --> 00:15:25,360
position spectrum

402
00:15:28,870 --> 00:15:27,040
proton spectrum

403
00:15:31,269 --> 00:15:28,880
helium spectrum

404
00:15:31,990 --> 00:15:31,279
nuclei spectrum

405
00:15:35,350 --> 00:15:32,000
so

406
00:15:38,790 --> 00:15:35,360
there will be enormous amount of data

407
00:15:39,670 --> 00:15:38,800
that's coming out very soon

408
00:15:42,470 --> 00:15:39,680
but

409
00:15:45,990 --> 00:15:42,480
i do want to take this opportunity

410
00:15:48,949 --> 00:15:46,000
to thank nasa again and particularly mr

411
00:15:54,870 --> 00:15:51,189
and

412
00:15:57,269 --> 00:15:54,880
turn martin marx stelli kim baldwin

413
00:16:00,870 --> 00:15:57,279

for make this possible

414
00:16:02,550 --> 00:16:00,880
so i'm happy to answer any questions

415
00:16:03,990 --> 00:16:02,560
great thank you very much dr ting so

416
00:16:05,430 --> 00:16:04,000
before we begin the q a just a quick

417
00:16:06,710 --> 00:16:05,440
reminder that you can find out more

418
00:16:09,069 --> 00:16:06,720
information about ams and the

419
00:16:11,829 --> 00:16:09,079
international space station at

420
00:16:13,350 --> 00:16:11,839
www.nasa.gov station you can find the

421
00:16:14,790 --> 00:16:13,360
ways to connect with us on social media

422
00:16:17,110 --> 00:16:14,800
and follow the conversation there at

423
00:16:18,790 --> 00:16:17,120
nasa.gov connect

424
00:16:20,230 --> 00:16:18,800
so we'll now move on to the question and

425
00:16:21,670 --> 00:16:20,240
answer session a quick reminder for

426
00:16:23,350 --> 00:16:21,680
those in the audience just please wait

427
00:16:24,470 --> 00:16:23,360
until we get a microphone to you please

428
00:16:26,629 --> 00:16:24,480
identify yourself in your media

429
00:16:27,829 --> 00:16:26,639
affiliation for those joining by phone

430
00:16:29,829 --> 00:16:27,839
you can signal the operator that you

431
00:16:31,829 --> 00:16:29,839
have a question by pushing the star one

432
00:16:33,829 --> 00:16:31,839
keys on your telephone and i understand

433
00:16:35,829 --> 00:16:33,839
we have our first question by phone from

434
00:16:38,550 --> 00:16:35,839
seth bornstein of the associated press

435
00:16:43,670 --> 00:16:40,389
yes thank you so much

436
00:16:46,870 --> 00:16:43,680
um this is for dr ting or maybe if if he

437
00:16:48,310 --> 00:16:46,880
can't er if there's an issue mr

438
00:16:50,150 --> 00:16:48,320

mr solomon

439
00:16:52,389 --> 00:16:50,160
i guess trying to compare the

440
00:16:53,590 --> 00:16:52,399
differences between these results and

441
00:16:57,910 --> 00:16:53,600
pamela

442
00:17:00,230 --> 00:16:57,920
and fermi is it fair i mean these aren't

443
00:17:02,069 --> 00:17:00,240
the first results obviously that show

444
00:17:04,870 --> 00:17:02,079
what would be the footprints of dark

445
00:17:06,870 --> 00:17:04,880
matter or a more prosaic

446
00:17:09,029 --> 00:17:06,880
answer are these

447
00:17:11,590 --> 00:17:09,039
i know they're more precise do they add

448
00:17:13,829 --> 00:17:11,600
more heft i mean why are these more

449
00:17:16,390 --> 00:17:13,839
important than the other ones are they

450
00:17:19,110 --> 00:17:16,400
more substantial more significant

451
00:17:20,710 --> 00:17:19,120
um i guess that's what i'm trying to get

452
00:17:22,549 --> 00:17:20,720
why is this

453
00:17:24,789 --> 00:17:22,559
better data than

454
00:17:26,230 --> 00:17:24,799
does this does this bolster the case for

455
00:17:28,710 --> 00:17:26,240
dark matter

456
00:17:33,190 --> 00:17:30,549
so i'll answer this question

457
00:17:34,950 --> 00:17:33,200
can you hear me

458
00:17:35,909 --> 00:17:34,960
yes yes i can

459
00:17:37,110 --> 00:17:35,919
yes

460
00:17:39,750 --> 00:17:37,120
uh

461
00:17:41,669 --> 00:17:39,760
i can only comment on ams experiment

462
00:17:45,669 --> 00:17:41,679
it has an accuracy

463
00:17:50,950 --> 00:17:45,679

for most of the data of one percent

464
00:17:58,390 --> 00:17:52,470
unmatched

465
00:17:58,400 --> 00:18:02,789
it is this fine feature

466
00:18:07,029 --> 00:18:05,029
set the difference

467
00:18:08,150 --> 00:18:07,039
between us and the rest of the

468
00:18:10,230 --> 00:18:08,160
experiment

469
00:18:12,150 --> 00:18:10,240
as i just mentioned

470
00:18:15,029 --> 00:18:12,160
just like you look at phenomena with

471
00:18:17,990 --> 00:18:15,039
your eye or with the electron microscope

472
00:18:20,549 --> 00:18:18,000
you see different things

473
00:18:25,029 --> 00:18:20,559
we see the spectrum increase

474
00:18:29,110 --> 00:18:27,190
this becomes slower and slower and

475
00:18:31,110 --> 00:18:29,120
slower

476
00:18:32,710 --> 00:18:31,120
when you increa when you move to higher

477
00:18:37,669 --> 00:18:32,720
energy

478
00:18:41,110 --> 00:18:39,029
the

479
00:18:43,750 --> 00:18:41,120
position

480
00:18:45,990 --> 00:18:43,760
to electron ratio

481
00:18:46,870 --> 00:18:46,000
is an isotropic

482
00:18:48,789 --> 00:18:46,880
it

483
00:18:51,430 --> 00:18:48,799
is isotropic

484
00:18:54,630 --> 00:18:51,440
meaning there's no fixed direction it

485
00:18:58,070 --> 00:18:57,190
these

486
00:19:00,549 --> 00:18:58,080
are

487
00:19:03,669 --> 00:19:00,559
some unique features

488
00:19:09,029 --> 00:19:03,679

in addition with us because we're so

489
00:19:11,590 --> 00:19:09,039
fine data we do not see any sharp peaks

490
00:19:14,789 --> 00:19:11,600
and we see the slope increases

491
00:19:16,950 --> 00:19:14,799
and seems to gradually

492
00:19:18,789 --> 00:19:16,960
flatten out

493
00:19:21,510 --> 00:19:18,799
with more data

494
00:19:24,870 --> 00:19:21,520
we will soon know

495
00:19:26,950 --> 00:19:24,880
when it drops off how quickly drop off

496
00:19:28,310 --> 00:19:26,960
and then we will know

497
00:19:29,110 --> 00:19:28,320
what we see

498
00:19:30,630 --> 00:19:29,120
is

499
00:19:32,549 --> 00:19:30,640
from

500
00:19:35,110 --> 00:19:32,559
dark matter collisions

501
00:19:37,190 --> 00:19:35,120
or from pulsars

502
00:19:42,470 --> 00:19:37,200
and this we should know which or

503
00:19:42,480 --> 00:19:46,950
okay anything to add here in washington

504
00:19:51,510 --> 00:19:49,669
um i i would just echo what sam said he

505
00:19:54,150 --> 00:19:51,520
said it very well

506
00:19:56,549 --> 00:19:54,160
what we're seeing with pamela and other

507
00:19:58,470 --> 00:19:56,559
instruments is a coarse

508
00:20:01,029 --> 00:19:58,480
measure of the spectrum

509
00:20:04,470 --> 00:20:01,039
a very clear increase in the positron

510
00:20:07,270 --> 00:20:04,480
fraction but the detail of the spectrum

511
00:20:09,270 --> 00:20:07,280
is what really provides us with

512
00:20:11,750 --> 00:20:09,280
valuable information and that's coming

513
00:20:13,350 --> 00:20:11,760

from the ams instrument

514
00:20:15,909 --> 00:20:13,360
we're learning more about the spectrum

515
00:20:17,029 --> 00:20:15,919
with ams

516
00:20:17,990 --> 00:20:17,039
let's go ahead and take one more from

517
00:20:19,669 --> 00:20:18,000
the phone bridge and then we'll come

518
00:20:22,789 --> 00:20:19,679
here to the audience at nasa

519
00:20:25,270 --> 00:20:22,799
headquarters next up alan boyle msnbc

520
00:20:30,470 --> 00:20:27,590
well thank you this is probably for dr

521
00:20:33,510 --> 00:20:30,480
king as well you mentioned uh the

522
00:20:36,070 --> 00:20:33,520
drop off that would be expected in the

523
00:20:38,149 --> 00:20:36,080
uh fraction of positrons and i don't

524
00:20:40,470 --> 00:20:38,159
think that that drop-off has been seen

525
00:20:43,350 --> 00:20:40,480
in the observations so far does that

526
00:20:46,070 --> 00:20:43,360
give you pause uh or do you feel as if

527
00:20:50,070 --> 00:20:46,080
it's just too early uh that the drop-off

528
00:20:55,110 --> 00:20:52,230
when i give the seminar today

529
00:20:58,230 --> 00:20:55,120
many people ask me what is the behavior

530
00:21:02,070 --> 00:20:58,240
of the next point and the point beyond

531
00:21:04,950 --> 00:21:02,080
and i said

532
00:21:07,590 --> 00:21:04,960
us many years to build this detector

533
00:21:10,070 --> 00:21:07,600
we want to publish your data

534
00:21:12,470 --> 00:21:10,080
when there are enough statistics

535
00:21:15,029 --> 00:21:12,480
and so when there's a drop-off

536
00:21:17,590 --> 00:21:15,039
there's no doubt it has dropped out and

537
00:21:18,310 --> 00:21:17,600
also we want to know how quickly drop

538
00:21:19,270 --> 00:21:18,320

off

539
00:21:24,470 --> 00:21:19,280
how

540
00:21:27,350 --> 00:21:24,480
the way it drops off

541
00:21:28,710 --> 00:21:27,360
that tells you whether it's dark matter

542
00:21:32,149 --> 00:21:28,720
collision

543
00:21:35,510 --> 00:21:32,159
or from puzzles and this we should know

544
00:21:38,710 --> 00:21:37,029
good any uh anything to add here in

545
00:21:40,470 --> 00:21:38,720
washington

546
00:21:42,230 --> 00:21:40,480
okay let's go here in the audience our

547
00:21:44,789 --> 00:21:42,240
question

548
00:21:47,270 --> 00:21:44,799
hi i'm miriam cramer i'm with space.com

549
00:21:49,750 --> 00:21:47,280
um and i'm just wondering uh so i know

550
00:21:52,390 --> 00:21:49,760
that the ams was actually canceled i

551
00:21:53,510 --> 00:21:52,400
think in um in 2005 before it ended up

552
00:21:55,350 --> 00:21:53,520
going on

553
00:21:57,590 --> 00:21:55,360
up on the last

554
00:21:59,590 --> 00:21:57,600
endeavor shuttle launch and i'm just

555
00:22:00,789 --> 00:21:59,600
curious um and this is for anybody who'd

556
00:22:02,549 --> 00:22:00,799
like to answer it

557
00:22:05,110 --> 00:22:02,559
sort of what does that mean either to

558
00:22:12,070 --> 00:22:05,120
you personally or sort of to the agency

559
00:22:16,789 --> 00:22:15,190
like i can just say that

560
00:22:21,270 --> 00:22:16,799
i don't know i guess it teaches us

561
00:22:25,029 --> 00:22:23,270
there were times when we were uncertain

562
00:22:26,789 --> 00:22:25,039
about exactly what the future was going

563
00:22:29,029 --> 00:22:26,799

to be

564
00:22:30,870 --> 00:22:29,039
we knew the quality of science was was

565
00:22:32,710 --> 00:22:30,880
pretty strong and was pretty important

566
00:22:35,669 --> 00:22:32,720
and the team hung in there as i

567
00:22:37,990 --> 00:22:35,679
described earlier and kept kind of

568
00:22:39,590 --> 00:22:38,000
pursuing their passion their dreams and

569
00:22:41,990 --> 00:22:39,600
pretty uncertain and turbulent

570
00:22:45,909 --> 00:22:42,000
circumstances and but they kept moving

571
00:22:47,270 --> 00:22:45,919
forward all the teams and and eventually

572
00:22:48,789 --> 00:22:47,280
things worked out and we got the

573
00:22:50,310 --> 00:22:48,799
instrument on orbit and you get to see

574
00:22:52,549 --> 00:22:50,320
the results today so i think there's

575
00:22:54,390 --> 00:22:52,559
probably a message to all of us when it

576
00:22:56,789 --> 00:22:54,400
looks kind of dark and doesn't look like

577
00:22:57,590 --> 00:22:56,799
there's a clear path forward

578
00:22:59,750 --> 00:22:57,600
you know

579
00:23:02,070 --> 00:22:59,760
fix your eyes on that point out in the

580
00:23:04,230 --> 00:23:02,080
future and continue moving forward and

581
00:23:05,590 --> 00:23:04,240
keep following your passion and maybe

582
00:23:07,190 --> 00:23:05,600
things will break the right way and

583
00:23:08,630 --> 00:23:07,200
you'll get to see the results in the end

584
00:23:09,990 --> 00:23:08,640
and then maybe they're just a tad

585
00:23:10,950 --> 00:23:10,000
sweeter that way than they would have

586
00:23:15,190 --> 00:23:10,960
been

587
00:23:17,430 --> 00:23:15,200
turbulent uh path to the to the results

588
00:23:19,029 --> 00:23:17,440

and i'd like to add that you know doi

589
00:23:22,950 --> 00:23:19,039
has been supporting this experiment

590
00:23:23,990 --> 00:23:22,960
since inception i guess in the mid 1990s

591
00:23:26,870 --> 00:23:24,000
and

592
00:23:28,630 --> 00:23:26,880
our our interaction with nasa has been

593
00:23:31,510 --> 00:23:28,640
uh fantastic there have been little

594
00:23:40,549 --> 00:23:31,520
glitches but the end product is here for

595
00:23:44,789 --> 00:23:42,470
yeah dr tank sound like dr ting wanted

596
00:23:48,149 --> 00:23:44,799
to add something yeah

597
00:23:53,430 --> 00:23:51,350
we were moving off we were moved off the

598
00:23:54,470 --> 00:23:53,440
manifest

599
00:23:56,950 --> 00:23:54,480
in

600
00:24:01,590 --> 00:23:56,960
october

601
00:24:05,830 --> 00:24:04,470
i made a mistake coming to nasa

602
00:24:08,149 --> 00:24:05,840
headquarters

603
00:24:10,870 --> 00:24:08,159
meet the administrator

604
00:24:14,870 --> 00:24:12,870
i guess i didn't do my presentation to

605
00:24:17,990 --> 00:24:14,880
where i was told your project is

606
00:24:22,710 --> 00:24:19,909
but

607
00:24:24,470 --> 00:24:22,720
even though it was cancelled

608
00:24:26,549 --> 00:24:24,480
doe

609
00:24:28,630 --> 00:24:26,559
continued

610
00:24:32,390 --> 00:24:28,640
support us

611
00:24:35,510 --> 00:24:32,400
in addition most importantly the spanish

612
00:24:36,789 --> 00:24:35,520
the germans the italians the swiss

613
00:24:39,990 --> 00:24:36,799

everybody

614
00:24:42,549 --> 00:24:40,000
believe the experiment is so important

615
00:24:44,230 --> 00:24:42,559
we are going to carry it out like mr

616
00:24:46,390 --> 00:24:44,240
gastermeyer said

617
00:24:49,350 --> 00:24:46,400
i also want to mention

618
00:24:51,029 --> 00:24:49,360
even when we were canceled we continued

619
00:24:53,350 --> 00:24:51,039
to receive support

620
00:24:56,390 --> 00:24:53,360
from mr gaster meyer and from johnson

621
00:24:58,950 --> 00:24:56,400
space center which what made it

622
00:25:00,789 --> 00:24:58,960
possible today

623
00:25:02,710 --> 00:25:00,799
great thank you very much let's go uh

624
00:25:07,190 --> 00:25:02,720
back to the phone line now with jeff

625
00:25:11,750 --> 00:25:09,110
hi there guys um

626
00:25:14,630 --> 00:25:11,760
my question is mainly for dr ting does

627
00:25:16,710 --> 00:25:14,640
he believe that he's seen the first

628
00:25:18,230 --> 00:25:16,720
signs of dark matter today

629
00:25:20,230 --> 00:25:18,240
and does he believe

630
00:25:22,230 --> 00:25:20,240
that ams will eventually be able to

631
00:25:26,390 --> 00:25:22,240
definitively show whether this was dark

632
00:25:31,990 --> 00:25:29,510
yes i can answer you

633
00:25:34,310 --> 00:25:32,000
what we have shown today

634
00:25:38,230 --> 00:25:34,320
only represents

635
00:25:39,269 --> 00:25:38,240
less than 10 of the data

636
00:25:40,630 --> 00:25:39,279
and so

637
00:25:42,390 --> 00:25:40,640
with a

638
00:25:43,750 --> 00:25:42,400

longer

639
00:25:45,590 --> 00:25:43,760
right

640
00:25:47,029 --> 00:25:45,600
data collection time

641
00:25:49,190 --> 00:25:47,039
eventually

642
00:25:52,470 --> 00:25:49,200
we will go to

643
00:25:53,430 --> 00:25:52,480
energy of trillion electron volt scale

644
00:25:55,430 --> 00:25:53,440
um

645
00:25:58,390 --> 00:25:55,440
i think

646
00:26:01,830 --> 00:25:58,400
with the ms there's no question

647
00:26:07,669 --> 00:26:01,840
we are going to solve this problem

648
00:26:11,909 --> 00:26:09,510
okay let's go back to the phone line

649
00:26:15,269 --> 00:26:11,919
again with caroline johnson of the

650
00:26:17,510 --> 00:26:15,279
boston globe caroline

651
00:26:19,110 --> 00:26:17,520
thanks for taking my question um i was

652
00:26:20,549 --> 00:26:19,120
wondering if doc

653
00:26:22,470 --> 00:26:20,559
could answer

654
00:26:25,990 --> 00:26:22,480
how much more data do you think you need

655
00:26:27,669 --> 00:26:26,000
how many more years or months

656
00:26:29,990 --> 00:26:27,679
of events

657
00:26:34,070 --> 00:26:30,000
is to detect definitively whether it's

658
00:26:36,149 --> 00:26:35,110
carolyn

659
00:26:40,549 --> 00:26:36,159
nice to

660
00:26:45,029 --> 00:26:42,070
we do not know

661
00:26:49,110 --> 00:26:45,039
because it really doesn't depend on us

662
00:26:51,909 --> 00:26:50,549
if

663
00:26:54,630 --> 00:26:51,919

there's a short

664
00:26:59,909 --> 00:26:54,640
sudden quick drop off

665
00:27:02,230 --> 00:26:59,919
of the spectrum this means we have found

666
00:27:04,710 --> 00:27:02,240
the origin of dark matter

667
00:27:07,669 --> 00:27:04,720
in which case we will like very few

668
00:27:08,390 --> 00:27:07,679
events because the spectrum will drop

669
00:27:10,310 --> 00:27:08,400
off

670
00:27:13,190 --> 00:27:10,320
very quickly

671
00:27:15,750 --> 00:27:13,200
if the excess compound pulsars then is

672
00:27:18,310 --> 00:27:15,760
going to drop up very slowly then we're

673
00:27:21,990 --> 00:27:18,320
going to collect quite a few more events

674
00:27:25,830 --> 00:27:22,000
at very high energies i think the next

675
00:27:28,789 --> 00:27:25,840
year or two we will know much better

676
00:27:30,310 --> 00:27:28,799
we have some information now of course

677
00:27:32,149 --> 00:27:30,320
but

678
00:27:34,389 --> 00:27:32,159
with

679
00:27:36,789 --> 00:27:34,399
not enough statistics

680
00:27:39,430 --> 00:27:36,799
it's probably better

681
00:27:40,549 --> 00:27:39,440
we do this carefully and systematically

682
00:27:43,350 --> 00:27:40,559
make sure

683
00:27:48,389 --> 00:27:43,360
what we announced is really correct it's

684
00:27:52,230 --> 00:27:50,230
okay our next question comes from mark

685
00:27:55,909 --> 00:27:52,240
matthews of the orlando sentinel go

686
00:28:00,549 --> 00:27:58,470
thanks guys i appreciate the question um

687
00:28:02,950 --> 00:28:00,559
this next question is for for anyone on

688
00:28:05,269 --> 00:28:02,960

the panel i was uh looking for someone

689
00:28:07,590 --> 00:28:05,279
to help explain the relationship here

690
00:28:09,669 --> 00:28:07,600
between the findings announced today

691
00:28:17,510 --> 00:28:09,679
and the presence of anti-matter in the

692
00:28:21,669 --> 00:28:19,590
i can answer that or professor tinkhan

693
00:28:25,830 --> 00:28:21,679
let me throw my head in first i don't

694
00:28:29,909 --> 00:28:28,549
okay dr ting

695
00:28:36,389 --> 00:28:29,919
i think uh

696
00:28:40,630 --> 00:28:38,789
okay our next question comes from monica

697
00:28:43,190 --> 00:28:40,640
young at sky and telescope magazine go

698
00:28:45,110 --> 00:28:43,200
ahead monica

699
00:28:47,350 --> 00:28:45,120
hi thanks for taking my question uh i'm

700
00:28:49,909 --> 00:28:47,360
wondering if you can speak spanx at this

701
00:28:51,430 --> 00:28:49,919
point on what mass range of

702
00:28:54,230 --> 00:28:51,440
better particles

703
00:29:00,149 --> 00:28:54,240
we would have and if those would be

704
00:29:03,430 --> 00:29:02,310
i couldn't hear the question i'm sorry

705
00:29:05,350 --> 00:29:03,440
would you mind repeating the question

706
00:29:07,510 --> 00:29:05,360
monica

707
00:29:16,389 --> 00:29:07,520
uh certainly yeah um i'm

708
00:29:20,230 --> 00:29:17,909
you're cutting out just a bit so try it

709
00:29:22,389 --> 00:29:20,240
try it one more time

710
00:29:25,590 --> 00:29:22,399
oh sorry about that um i'm wondering

711
00:29:28,310 --> 00:29:25,600
about fast rain or metaphorical if the

712
00:29:31,190 --> 00:29:28,320
observations are able to

713
00:29:33,269 --> 00:29:31,200

okay so the mass range of the particles

714
00:29:36,230 --> 00:29:33,279
is is the gist of the question if it's

715
00:29:38,389 --> 00:29:36,240
confirmed if it's confirmed

716
00:29:40,549 --> 00:29:38,399
we should be able to

717
00:29:45,350 --> 00:29:40,559
look to the mass range close to 1

718
00:29:48,630 --> 00:29:46,389
okay

719
00:29:50,950 --> 00:29:48,640
let's move on

720
00:29:52,070 --> 00:29:50,960
did you hear me yes we we copy your

721
00:29:54,630 --> 00:29:52,080
answer

722
00:29:58,470 --> 00:29:54,640
uh next is john uh heil prin from the

723
00:30:02,310 --> 00:29:59,350
thank you

724
00:30:04,310 --> 00:30:02,320
uh i'm wondering if the uh drop-off

725
00:30:10,549 --> 00:30:04,320
is more indicative of dark matter or

726
00:30:13,990 --> 00:30:11,590
we

727
00:30:16,310 --> 00:30:14,000
this moment

728
00:30:18,470 --> 00:30:16,320
have not decided

729
00:30:21,990 --> 00:30:18,480
how to phrase this

730
00:30:24,630 --> 00:30:22,000
because we don't have enough

731
00:30:29,590 --> 00:30:26,789
with time

732
00:30:32,470 --> 00:30:29,600
we should be able to tell you

733
00:30:34,230 --> 00:30:32,480
whether it's drop-off very quickly

734
00:30:35,510 --> 00:30:34,240
in which case would be dark matter

735
00:30:38,789 --> 00:30:35,520
collision

736
00:30:42,149 --> 00:30:38,799
means we have found dark matter

737
00:30:48,630 --> 00:30:42,159
or it will operate slowly which means

738
00:30:53,510 --> 00:30:51,510

okay anything to add here in washington

739
00:30:55,269 --> 00:30:53,520
okay uh let's go for one follow-up by

740
00:30:57,509 --> 00:30:55,279
seth bornstein associated press go ahead

741
00:30:59,909 --> 00:30:57,519
seth

742
00:31:01,190 --> 00:30:59,919
thank you uh dr ting i'm sorry to keep

743
00:31:04,470 --> 00:31:01,200
pushing

744
00:31:06,950 --> 00:31:04,480
uh but in terms of at the moment are you

745
00:31:08,950 --> 00:31:06,960
do you feel what you know now more

746
00:31:11,509 --> 00:31:08,960
bolsters the case

747
00:31:14,470 --> 00:31:11,519
that this is dark matter or does it more

748
00:31:17,190 --> 00:31:14,480
bolster the case that is

749
00:31:18,870 --> 00:31:17,200
ulsars i mean right now

750
00:31:21,190 --> 00:31:18,880
which are you more

751
00:31:24,950 --> 00:31:21,200
which does this help more which are you

752
00:31:30,630 --> 00:31:27,830
for experimental physicists

753
00:31:34,070 --> 00:31:30,640
it is extremely important

754
00:31:36,789 --> 00:31:34,080
not to have preconceived ideas

755
00:31:39,590 --> 00:31:36,799
and you analyze the data and see what

756
00:31:41,029 --> 00:31:39,600
you get that's right so

757
00:31:43,590 --> 00:31:41,039
better i

758
00:31:46,310 --> 00:31:43,600
do not have any preference because you

759
00:31:48,470 --> 00:31:46,320
have a preference you analyze your data

760
00:31:52,950 --> 00:31:48,480
according to your preference

761
00:31:55,990 --> 00:31:54,710
okay before we begin to wrap and take

762
00:31:57,269 --> 00:31:56,000
the last few questions by phone let me

763
00:31:58,470 --> 00:31:57,279

just do a quick check in the audience

764
00:32:01,110 --> 00:31:58,480
and and just see if we have any

765
00:32:03,110 --> 00:32:01,120
additional questions here

766
00:32:07,669 --> 00:32:03,120
seeing none let's go to matthew francis

767
00:32:11,669 --> 00:32:10,549
hi and thank you um my question has to

768
00:32:14,950 --> 00:32:11,679
do with

769
00:32:17,110 --> 00:32:14,960
the results from the uh the data are

770
00:32:19,830 --> 00:32:17,120
showing a remarkable amount of

771
00:32:22,549 --> 00:32:19,840
isotropy meaning that the flux of

772
00:32:24,630 --> 00:32:22,559
positrons is coming from all directions

773
00:32:27,430 --> 00:32:24,640
now correct me if i'm wrong but it seems

774
00:32:29,590 --> 00:32:27,440
to me that if these are truly from

775
00:32:32,230 --> 00:32:29,600
dark matter annihilation shouldn't there

776
00:32:33,990 --> 00:32:32,240
be strong anisotropy

777
00:32:36,149 --> 00:32:34,000
particularly from

778
00:32:42,470 --> 00:32:36,159
say central galactic region can you

779
00:32:47,830 --> 00:32:44,789
most of the people believe

780
00:32:49,350 --> 00:32:47,840
dark dark matter is distributed

781
00:32:51,269 --> 00:32:49,360
uniformly

782
00:32:53,669 --> 00:32:51,279
throughout the cosmos

783
00:32:56,389 --> 00:32:53,679
and therefore their collision

784
00:32:58,549 --> 00:32:56,399
will produce isotopic positive

785
00:33:00,789 --> 00:32:58,559
distributions

786
00:33:03,350 --> 00:33:00,799
pulsars on the other hand

787
00:33:04,389 --> 00:33:03,360
has a fixed direction

788
00:33:06,710 --> 00:33:04,399

and so

789
00:33:09,750 --> 00:33:06,720
it tends to

790
00:33:11,190 --> 00:33:09,760
give you positrons in a given direction

791
00:33:12,710 --> 00:33:11,200
and therefore

792
00:33:18,230 --> 00:33:12,720
would be

793
00:33:25,190 --> 00:33:20,230
okay our next question comes from todd

794
00:33:25,200 --> 00:33:28,710
thanks very much

795
00:33:28,720 --> 00:33:31,430
can you hear me

796
00:33:31,440 --> 00:33:35,110
yes i can hear you

797
00:33:38,789 --> 00:33:36,070
thanks

798
00:33:41,110 --> 00:33:38,799
i'm wondering uh just

799
00:33:42,950 --> 00:33:41,120
trying to boil this down are you

800
00:33:46,230 --> 00:33:42,960
recording today that you think you've

801
00:33:49,830 --> 00:33:46,240
seen the first evidence of dark matter

802
00:33:50,549 --> 00:33:49,840
and that you're confident that the ams

803
00:33:54,590 --> 00:33:50,559
will

804
00:33:57,509 --> 00:33:54,600
enable you to sort the issue out or

805
00:34:00,870 --> 00:33:57,519
definitively detect dark matter in the

806
00:34:06,950 --> 00:34:03,750
i said our evidence

807
00:34:10,230 --> 00:34:06,960
support the existence of dark matter but

808
00:34:12,790 --> 00:34:10,240
could not rule out

809
00:34:13,589 --> 00:34:12,800
the origin come from poland

810
00:34:15,990 --> 00:34:13,599
but

811
00:34:18,470 --> 00:34:16,000
i'm confident

812
00:34:20,310 --> 00:34:18,480
with enough time because we will be on

813
00:34:22,069 --> 00:34:20,320

the space station for the lifetime of

814
00:34:27,349 --> 00:34:22,079
the space station

815
00:34:27,359 --> 00:34:31,109
hopefully quickly

816
00:34:34,950 --> 00:34:33,510
okay let's go to uh back to npr and jeff

817
00:34:38,790 --> 00:34:34,960
broomfield for a follow-up we'll make

818
00:34:44,149 --> 00:34:41,669
sure um as i'm sure dr king and maybe

819
00:34:45,750 --> 00:34:44,159
some others are aware a lot of well not

820
00:34:48,149 --> 00:34:45,760
a lot of people but there are critics of

821
00:34:50,550 --> 00:34:48,159
ams they say that the two billion dollar

822
00:34:53,030 --> 00:34:50,560
price tag isn't really um

823
00:34:55,750 --> 00:34:53,040
worth you know the result we're seeing

824
00:34:57,349 --> 00:34:55,760
today which is non-definitive detection

825
00:34:59,109 --> 00:34:57,359
of dark matter i'd just like to give you

826
00:35:04,470 --> 00:34:59,119
guys an opportunity to respond to that

827
00:35:04,480 --> 00:35:06,950
well

828
00:35:11,270 --> 00:35:08,069
this

829
00:35:12,630 --> 00:35:11,280
is the beginning

830
00:35:15,589 --> 00:35:12,640
of our

831
00:35:19,750 --> 00:35:17,750
physical review letters

832
00:35:22,230 --> 00:35:19,760
today inform me

833
00:35:23,430 --> 00:35:22,240
they will put all data on the front

834
00:35:25,589 --> 00:35:23,440
cover

835
00:35:27,109 --> 00:35:25,599
and also

836
00:35:28,870 --> 00:35:27,119
announce us

837
00:35:31,910 --> 00:35:28,880
to be

838
00:35:39,030 --> 00:35:35,829

editor's choice and view viewpoint so

839
00:35:40,390 --> 00:35:39,040
every different person is entitled to

840
00:35:43,670 --> 00:35:40,400
their opinion

841
00:35:45,510 --> 00:35:43,680
but the important thing is

842
00:35:47,910 --> 00:35:45,520
ams is there now

843
00:35:49,670 --> 00:35:47,920
we are collecting data

844
00:35:52,550 --> 00:35:49,680
we will be collecting data for the

845
00:35:56,550 --> 00:35:52,560
lifetime of the space station

846
00:36:01,109 --> 00:35:59,109
accuracy and with its

847
00:36:03,589 --> 00:36:01,119
sensitivity

848
00:36:05,030 --> 00:36:03,599
we will explore

849
00:36:09,670 --> 00:36:05,040
a region

850
00:36:14,230 --> 00:36:10,870
anything to add

851
00:36:17,190 --> 00:36:14,240
yeah um i i'd like to add that the cost

852
00:36:19,030 --> 00:36:17,200
of the space station is um is born not

853
00:36:22,069 --> 00:36:19,040
only by the united states but many

854
00:36:24,950 --> 00:36:22,079
international uh collaborators uh 15

855
00:36:28,630 --> 00:36:24,960
other nations contribute to the cost of

856
00:36:32,550 --> 00:36:28,640
the of the ams excuse me um

857
00:36:33,910 --> 00:36:32,560
the u.s contribution uh for ams is

858
00:36:37,670 --> 00:36:33,920
comparable

859
00:36:39,589 --> 00:36:37,680
to the costs that we bear for other dark

860
00:36:40,710 --> 00:36:39,599
matter experiments

861
00:36:44,470 --> 00:36:40,720
so

862
00:36:46,710 --> 00:36:44,480
our program at doe is balanced between

863
00:36:49,670 --> 00:36:46,720

these three different ways of searching

864
00:36:54,790 --> 00:36:49,680
for dark matter with comparable expenses

865
00:36:59,030 --> 00:36:56,550
great let's take one last question by

866
00:37:01,750 --> 00:36:59,040
phone from ken cramer of universe today

867
00:37:05,829 --> 00:37:04,470
hi thanks for taking my question um for

868
00:37:07,750 --> 00:37:05,839
professor ting

869
00:37:09,990 --> 00:37:07,760
there are different detectors on the ams

870
00:37:13,270 --> 00:37:10,000
i wonder if any of the detectors were

871
00:37:15,589 --> 00:37:13,280
more helpful than others in gathering

872
00:37:18,470 --> 00:37:15,599
the data or or were they all equally

873
00:37:24,069 --> 00:37:20,630
this is a very good question

874
00:37:26,230 --> 00:37:24,079
we have many detectors

875
00:37:28,470 --> 00:37:26,240
we have

876
00:37:31,589 --> 00:37:28,480
designed these detectors

877
00:37:34,230 --> 00:37:31,599
to be complementary to each other

878
00:37:37,589 --> 00:37:34,240
and so that every signal we see is

879
00:37:39,750 --> 00:37:37,599
verified by a different detector in this

880
00:37:41,349 --> 00:37:39,760
way what dual

881
00:37:46,630 --> 00:37:41,359
of uh

882
00:37:51,349 --> 00:37:48,790
okay so we will take a one last question

883
00:37:53,510 --> 00:37:51,359
here in the audience for miriam go ahead

884
00:37:56,550 --> 00:37:53,520
hi thanks uh miriam with space.com again

885
00:37:58,870 --> 00:37:56,560
um i'm just wondering uh how the ams

886
00:38:01,990 --> 00:37:58,880
data compares to what it was predicted

887
00:38:04,150 --> 00:38:02,000
to uh to find when it was designed um

888
00:38:05,990 --> 00:38:04,160

and is the instrument sort of fulfilling

889
00:38:09,589 --> 00:38:06,000
the goals that uh

890
00:38:15,510 --> 00:38:12,710
i couldn't hear the question i'm sorry

891
00:38:16,870 --> 00:38:15,520
um could you repeat it

892
00:38:18,790 --> 00:38:16,880
hi um

893
00:38:21,990 --> 00:38:18,800
i'm just wondering how the ams data

894
00:38:24,550 --> 00:38:22,000
compares to what was predicted um or if

895
00:38:26,150 --> 00:38:24,560
if this was sort of out of the blue um

896
00:38:27,670 --> 00:38:26,160
and uh

897
00:38:30,630 --> 00:38:27,680
is the instrument sort of fulfilling the

898
00:38:33,829 --> 00:38:30,640
goals uh that you would hoped for when

899
00:38:36,950 --> 00:38:33,839
it was designed initially

900
00:38:42,870 --> 00:38:40,390
when we first designed the detector

901
00:38:45,349 --> 00:38:42,880
we have hoped

902
00:38:47,030 --> 00:38:45,359
to have a sensitivity of one percent

903
00:38:48,950 --> 00:38:47,040
accuracy

904
00:38:51,670 --> 00:38:48,960
and to have a very good

905
00:38:52,710 --> 00:38:51,680
resolution

906
00:38:55,190 --> 00:38:52,720
and

907
00:38:58,470 --> 00:38:55,200
we are very happy

908
00:39:01,510 --> 00:38:58,480
we managed to achieve this goal as i

909
00:39:05,270 --> 00:39:01,520
mentioned at the beginning

910
00:39:09,349 --> 00:39:07,750
it's normally not reached

911
00:39:11,990 --> 00:39:09,359
in accelerators

912
00:39:15,030 --> 00:39:12,000
detectors on the ground to do this in

913
00:39:17,430 --> 00:39:15,040

space really it's a very challenging

914
00:39:18,390 --> 00:39:17,440
thing so we are very happy

915
00:39:22,550 --> 00:39:18,400
we have

916
00:39:27,109 --> 00:39:24,550
great any any final thoughts from here

917
00:39:28,790 --> 00:39:27,119
in washington

918
00:39:30,150 --> 00:39:28,800
good okay well that's gonna end today's

919
00:39:31,910 --> 00:39:30,160
media conference then you can find out

920
00:39:33,109 --> 00:39:31,920
more information about ams and the

921
00:39:35,030 --> 00:39:33,119
international space station at

922
00:39:36,550 --> 00:39:35,040
www.nasa.gov

923
00:39:39,230 --> 00:39:36,560
station you can find all the ways to

924
00:39:42,069 --> 00:39:39,240
connect with us on social media at

925
00:39:44,069 --> 00:39:42,079
www.nasa.gov connect i'd like to thank

926
00:39:45,990 --> 00:39:44,079
all of our speakers for joining us today