



SILICON
VALLEY
LIVE



SILICON
VALLEY

AMES RESEARCH CENTER

1
00:00:00,500 --> 00:00:02,900
>> TEN, NINE, EIGHT,

2
00:00:02,900 --> 00:00:06,900
SEVEN, SIX, FIVE, FOUR,

3
00:00:06,900 --> 00:00:09,500
THREE, TWO, ONE.

4
00:00:10,540 --> 00:00:25,280
[MUSIC]

5
00:00:29,329 --> 00:00:31,431
>> WHAT'S UP EVERYBODY?

6
00:00:31,431 --> 00:00:32,332
YOU'RE WATCHING

7
00:00:32,332 --> 00:00:34,067
"NASA IN SILICON VALLEY LIVE"

8
00:00:34,067 --> 00:00:36,136
FOR OCTOBER 25, 2018.

9
00:00:36,136 --> 00:00:37,170
I'M YOUR HOST,

10
00:00:37,170 --> 00:00:38,204
DANIELLE CARMICHAEL.

11
00:00:38,204 --> 00:00:39,706
AND IF YOU DON'T KNOW,

12
00:00:39,706 --> 00:00:41,207
"NASA IN SILICON VALLEY LIVE"

13
00:00:41,207 --> 00:00:42,475

IT'S A CONVERSATIONAL SHOW

14

00:00:42,475 --> 00:00:43,510

OUT OF NASA'S

15

00:00:43,510 --> 00:00:44,577

AMES RESEARCH CENTER

16

00:00:44,577 --> 00:00:45,745

WITH THE VARIOUS SCIENTISTS,

17

00:00:45,745 --> 00:00:47,080

RESEARCHERS, ENGINEERS

18

00:00:47,080 --> 00:00:48,148

AND ALL-AROUND COOL PEOPLE

19

00:00:48,148 --> 00:00:49,082

AT NASA.

20

00:00:49,082 --> 00:00:50,016

WHERE WE TALK ABOUT

21

00:00:50,016 --> 00:00:50,984

ALL THE NERDY NEWS THAT

22

00:00:50,984 --> 00:00:52,085

YOU NEED TO KNOW ABOUT.

23

00:00:52,085 --> 00:00:53,019

AND I'M HERE WITH

24

00:00:53,019 --> 00:00:54,254

MY CO-HOST, ABBY.

25

00:00:54,254 --> 00:00:55,922

>> HEY! THANKS, DANIELLE.

26

00:00:55,922 --> 00:00:57,257

HI, I'M ABBY TABOR.

27

00:00:57,257 --> 00:00:58,558

WELCOME BACK, THANKS

28

00:00:58,558 --> 00:00:59,993

FOR JOINING US AGAIN.

29

00:00:59,993 --> 00:01:02,862

UM, I WANTED TO TELL EVERYBODY

30

00:01:02,862 --> 00:01:04,230

THAT YOU CAN WATCH US IN

31

00:01:04,230 --> 00:01:05,331

A BUNCH OF DIFFERENT PLACES.

32

00:01:05,331 --> 00:01:06,699

SO, WE ARE SIMULTANEOUSLY

33

00:01:06,699 --> 00:01:08,468

LIVE ON TWITCH, YOUTUBE,

34

00:01:08,468 --> 00:01:09,502

AND FACEBOOK.

35

00:01:09,502 --> 00:01:10,770

BUT IF YOU WANNA PARTICIPATE

36

00:01:10,770 --> 00:01:12,005

IN THE CHAT, YOU NEED

37

00:01:12,005 --> 00:01:13,273

TO JOIN US ON TWITCH.

38

00:01:13,273 --> 00:01:15,942

SO, THAT'S TWITCH.TV/NASA.

39

00:01:15,942 --> 00:01:17,944
BUT IF YOU MISS US LIVE,

40

00:01:17,944 --> 00:01:19,446
THAT'S OKAY BECAUSE WE'LL HAVE

41

00:01:19,446 --> 00:01:20,914
THE VIDEO ON DEMAND LATER,

42

00:01:20,914 --> 00:01:22,882
INCLUDING ON NASA TV.

43

00:01:22,882 --> 00:01:25,452
AND IF YOU PREFER YOUR

44

00:01:25,452 --> 00:01:28,121
N-NERDY NASA NEWS ALL AUDIO,

45

00:01:28,121 --> 00:01:30,323
YOU CAN JOIN US ON THE POSTCAST.

46

00:01:30,323 --> 00:01:31,424
YOU CAN FIND THE AUDIO VERSION

47

00:01:31,424 --> 00:01:32,926
LATER ON PODCAST SERVICES

48

00:01:32,926 --> 00:01:34,527
THROUGHOUT THE SOLAR SYSTEM

49

00:01:34,527 --> 00:01:36,262
AND BEYOND!

50

00:01:36,262 --> 00:01:37,831
SO, DANIELLE, WHY DON'T YOU

51
00:01:37,831 --> 00:01:39,299
TELL 'EM WHAT WE'RE UP TO TODAY?

52
00:01:39,299 --> 00:01:40,200
IT'S A LITTLE BIT DIFFERENT

53
00:01:40,200 --> 00:01:41,100
THIS TIME.

54
00:01:41,100 --> 00:01:41,935
>> THAT'S RIGHT!

55
00:01:41,935 --> 00:01:42,735
SO WE'RE ACTUALLY GOING

56
00:01:42,735 --> 00:01:43,970
TO BE HOLDING OUR FIRST-EVER

57
00:01:43,970 --> 00:01:45,271
HALLOWEEN COSTUME

58
00:01:45,271 --> 00:01:46,906
AND COSPLAY CONTEXT.

59
00:01:46,906 --> 00:01:50,710
>> YEAH! NASA-INSPIRED COSTUME

60
00:01:50,710 --> 00:01:52,412
AND COSPLAY CONTEXT.

61
00:01:52,412 --> 00:01:53,813
SO, IF YOU'RE A NASA FAN

62
00:01:53,813 --> 00:01:55,215
AND, LIKE ME, YOU FAILED

63
00:01:55,215 --> 00:01:56,783

TO GET A HALLOWEEN COSTUME

64

00:01:56,783 --> 00:01:58,117

TOGETHER BEFORE NOW,

65

00:01:58,117 --> 00:01:59,319

YOU'RE IN LUCK BECAUSE

66

00:01:59,319 --> 00:02:00,386

WE'RE GOING TO SHOW YOU

67

00:02:00,386 --> 00:02:02,856

A BUNCH OF NASA-INSPIRED LOOKS

68

00:02:02,856 --> 00:02:04,357

AND WE'RE GONNA BRAINSTORM

69

00:02:04,357 --> 00:02:05,625

HOW YOU COULD RECREATE

70

00:02:05,625 --> 00:02:08,261

THOSE LOOKS AT HOME. SO--

71

00:02:08,261 --> 00:02:09,629

>> SO, IF YOU DO END UP

72

00:02:09,629 --> 00:02:10,897

USING ANY OF THESE LOOKS

73

00:02:10,897 --> 00:02:12,632

OR YOU WEAR ANY OF

74

00:02:12,632 --> 00:02:14,200

OUR SPACE-THEMED COSTUMES

75

00:02:14,200 --> 00:02:15,969

FOR HALLOWEEN, WE WANNA SEE IT.

76

00:02:15,969 --> 00:02:17,170

SO, YOU CAN SHARE

77

00:02:17,170 --> 00:02:18,638

YOUR NASA-INSPIRED COSTUMES

78

00:02:18,638 --> 00:02:20,473

WITH US ON SOCIAL MEDIA USING

79

00:02:20,473 --> 00:02:23,042

THE HASHTAG #NASACOSTUME.

80

00:02:23,042 --> 00:02:25,879

SO, ABBY, WHAT ARE YOU WEARING?

81

00:02:25,879 --> 00:02:27,747

>> ALL RIGHT, SO, YOU MIGHT

82

00:02:27,747 --> 00:02:29,816

REMEMBER NASA'S KEPLER SPACE

83

00:02:29,816 --> 00:02:30,850

TELESCOPE, RIGHT?

84

00:02:30,850 --> 00:02:32,685

SO, KEPLER IS A MISSION

85

00:02:32,685 --> 00:02:35,054

THAT WE LED HERE AT AMES.

86

00:02:35,054 --> 00:02:37,257

UM, AND IT IS THAT

87

00:02:37,257 --> 00:02:38,391

SPACE TELESCOPE THAT IS

88

00:02:38,391 --> 00:02:40,059

OUT THERE FINDING PLANETS.

89

00:02:40,059 --> 00:02:41,861

SO, IT'S BEEN STARING AT STARS

90

00:02:41,861 --> 00:02:44,464

AROUND THE GALAXY FINDING

91

00:02:44,464 --> 00:02:45,798

OTHER PLANETS CIRCLING

92

00:02:45,798 --> 00:02:47,500

OTHER STARS BESIDES OUR SUN.

93

00:02:47,500 --> 00:02:48,635

EXOPLANETS.

94

00:02:48,635 --> 00:02:50,003

SO, WHAT I AM IS I GOT

95

00:02:50,003 --> 00:02:51,170

A LITTLE KEPLER HERE,

96

00:02:51,170 --> 00:02:52,438

AND I'VE GOT MY STARFIELD

97

00:02:52,438 --> 00:02:55,208

AND I AM THE CONCEPT OF KEPLER'S

98

00:02:55,208 --> 00:02:56,743

DISCOVERY OF OTHER WORLDS.

99

00:02:56,743 --> 00:02:57,677

>> OKAY.

100

00:02:57,677 --> 00:02:58,578

>> WHAT ABOUT YOU?

101
00:02:58,578 --> 00:03:00,113
>> UH, SO, I AM DRESSED UP

102
00:03:00,113 --> 00:03:01,581
AS THE LEGENDARY FLIGHT

103
00:03:01,581 --> 00:03:02,749
DIRECTOR, GENE KRANZ.

104
00:03:02,749 --> 00:03:03,650
>> NICE.

105
00:03:03,650 --> 00:03:04,984
SO, REMIND US ABOUT HIM?

106
00:03:04,984 --> 00:03:06,886
>> SO, HE ACTUALLY HELPED WRITE

107
00:03:06,886 --> 00:03:08,688
THE GO NO-GO PROCEDURES THAT

108
00:03:08,688 --> 00:03:10,490
WE STILL USE TODAY THAT ALLOWS

109
00:03:10,490 --> 00:03:12,025
MISSIONS TO DETERMINE IF

110
00:03:12,025 --> 00:03:13,226
THEY'RE GONNA BE GO AS PLANNED

111
00:03:13,226 --> 00:03:14,160
OR IF THEY'RE ABORTED.

112
00:03:14,160 --> 00:03:15,028
>> OKAY.

113
00:03:15,028 --> 00:03:16,195

>> AND ALSO, AS FLIGHT

114

00:03:16,195 --> 00:03:18,464
DIRECTOR DURING APOLLO 13,

115

00:03:18,464 --> 00:03:19,866
HIM AND HIS TEAM ACTUALLY

116

00:03:19,866 --> 00:03:21,267
HELPED THE ASTRONAUTS SAFELY

117

00:03:21,267 --> 00:03:22,468
RETURN BACK TO EARTH.

118

00:03:22,468 --> 00:03:23,870
>> WOW, THAT ONE, APOLLO 13.

119

00:03:23,870 --> 00:03:24,904
>> IT WAS PRETTY COOL.

120

00:03:24,904 --> 00:03:25,939
>> NOTHING LESS. AMAZING.

121

00:03:25,939 --> 00:03:26,773
>> NOTHING, NOTHING.

122

00:03:26,773 --> 00:03:28,308
HE'S ALSO FAMOUSLY, UH,

123

00:03:28,308 --> 00:03:30,276
ATTRIBUTED TO THE "FAILURE IS

124

00:03:30,276 --> 00:03:32,579
NOT AN OPTION" BUT, FUN FACT,

125

00:03:32,579 --> 00:03:34,414
THAT ACTUALLY WAS NOT HIM.

126

00:03:34,414 --> 00:03:35,315

>> OH, FOR REAL?

127

00:03:35,315 --> 00:03:36,115

>> MM-HMM.

128

00:03:36,115 --> 00:03:36,849

>> HE GETS CREDIT FOR IT,

129

00:03:36,849 --> 00:03:37,584

BUT NO.

130

00:03:37,584 --> 00:03:38,318

>> HE DOES. HE DOES.

131

00:03:38,318 --> 00:03:39,118

>> INTERESTING, INTERESTING.

132

00:03:39,118 --> 00:03:40,019

ALL RIGHT.

133

00:03:40,019 --> 00:03:40,753

WELL, YOU WANNA SEE

134

00:03:40,753 --> 00:03:41,521

SOME MORE NASA LOOKS?

135

00:03:41,521 --> 00:03:42,255

>> YEAH, LET'S GO FOR IT.

136

00:03:42,255 --> 00:03:42,989

>> SHOULD WE GET INTO IT?

137

00:03:42,989 --> 00:03:43,656

>> LET'S GO FOR IT.

138

00:03:43,656 --> 00:03:44,424

>> ALL RIGHT, ALL RIGHT.

139

00:03:44,424 --> 00:03:45,258
SO, WE'RE GONNA HEAD INTO

140

00:03:45,258 --> 00:03:46,526
OUR FIRST CATEGORY.

141

00:03:46,526 --> 00:03:47,794
WHICH IS CALLED

142

00:03:47,794 --> 00:03:49,262
"EVERYDAY NASA LOOKS."

143

00:03:49,262 --> 00:03:50,196
SO THESE ARE OUTFITS YOU'D

144

00:03:50,196 --> 00:03:51,164
SEE OUR RESEARCHERS WEARING

145

00:03:51,164 --> 00:03:53,566
IN THE LAB OR OUT IN THE FIELD

146

00:03:53,566 --> 00:03:54,767
AND AROUND THE CENTER WHEN

147

00:03:54,767 --> 00:03:56,102
THEY'RE DOIN' THEIR RESEARCH.

148

00:03:56,102 --> 00:03:58,137
SO, LEAVE YOUR COMMENTS

149

00:03:58,137 --> 00:03:59,339
IN THE CHAT IF YOU LIKE

150

00:03:59,339 --> 00:04:00,273
WHAT YOU SEE OR IF YOU

151
00:04:00,273 --> 00:04:01,140
HAVE ANY QUESTIONS.

152
00:04:01,140 --> 00:04:02,075
AND LET'S WELCOME

153
00:04:02,075 --> 00:04:04,010
OUR FIRST GUEST TO THE SET.

154
00:04:04,010 --> 00:04:06,946
COME ON OUT, EGGLE.

155
00:04:10,883 --> 00:04:07,981
HEY, HEY!

156
00:04:10,883 --> 00:04:15,088
>> LOOK AT YOU.

157
00:04:15,088 --> 00:04:16,255
NICE.

158
00:04:16,255 --> 00:04:17,156
COME ON UP HERE.

159
00:04:17,156 --> 00:04:19,292
>> COME ON AND JOIN US.

160
00:04:19,292 --> 00:04:21,494
>> YOU LOOK AMAZING.

161
00:04:21,494 --> 00:04:22,829
>> HI, THERE.

162
00:04:22,829 --> 00:04:23,830
>> WELCOME, WELCOME.

163
00:04:23,830 --> 00:04:25,298

SO, LET'S START OFF BY

164

00:04:25,298 --> 00:04:26,532

TELLIN' US, WHAT'S YOUR NAME?

165

00:04:26,532 --> 00:04:28,434

AND WHAT YOU DO HERE AT AMES.

166

00:04:28,434 --> 00:04:29,736

>> SO, MY NAME IS

167

00:04:29,736 --> 00:04:31,604

EGLE CEKANAVICIUTE.

168

00:04:31,604 --> 00:04:33,673

I AM A CONTRACTOR SCIENTIST

169

00:04:33,673 --> 00:04:36,542

IN THE RADIATION BIOPHYSICS LAB

170

00:04:36,542 --> 00:04:38,711

AT, UH, SPACE BIOSCIENCES

171

00:04:38,711 --> 00:04:40,013

DIVISION HERE AT AMES.

172

00:04:40,013 --> 00:04:41,114

>> OKAY.

173

00:04:41,114 --> 00:04:43,149

>> AND I STUDY THE DAMAGE

174

00:04:43,149 --> 00:04:45,752

THAT IS DONE BY SPACE RADIATION

175

00:04:45,752 --> 00:04:47,387

TO THE HUMAN BODY

176
00:04:47,387 --> 00:04:49,589
AND WHAT DETERMINES SENSITIVITY

177
00:04:49,589 --> 00:04:50,390
TO RADIATION.

178
00:04:50,390 --> 00:04:51,257
>> MMM, OKAY.

179
00:04:51,257 --> 00:04:53,559
>> OKAY. SO WHAT'S GOING ON

180
00:04:53,559 --> 00:04:54,761
WITH YOUR COSTUME

181
00:04:54,761 --> 00:04:55,928
THAT YOU HAVE HERE?

182
00:04:55,928 --> 00:04:57,997
IT'S PRETTY INTERESTING.

183
00:04:57,997 --> 00:04:59,465
>> RIGHT, SO, I'M WEARING

184
00:04:59,465 --> 00:05:01,968
YOUR STANDARD LAB COSTUME

185
00:05:01,968 --> 00:05:03,403
FOR WORKING WITH, UH,

186
00:05:03,403 --> 00:05:04,837
SOME SORT OF MORE SENSITIVE

187
00:05:04,837 --> 00:05:06,072
OR DANGEROUS SAMPLES

188
00:05:06,072 --> 00:05:07,640

SUCH AS HUMAN BLOOD.

189

00:05:07,640 --> 00:05:08,441

>> OKAY.

190

00:05:08,441 --> 00:05:09,308

>> BECAUSE THIS IS WHAT

191

00:05:09,308 --> 00:05:10,309

WE WORK ON.

192

00:05:10,309 --> 00:05:11,878

WE'RE COLLECTING CELLS

193

00:05:11,878 --> 00:05:14,247

FROM LOTS OF HEALTHY PEOPLE,

194

00:05:14,247 --> 00:05:16,049

EXPOSING THEM TO SIMULATED

195

00:05:16,049 --> 00:05:17,784

SPACE RADIATION BECAUSE WE

196

00:05:17,784 --> 00:05:19,152

CAN'T FLY THEM TO THE MOON

197

00:05:19,152 --> 00:05:20,486

OR MARS YET, SO WE HAVE

198

00:05:20,486 --> 00:05:21,821

TO SIMULATE THOSE CONDITIONS

199

00:05:21,821 --> 00:05:22,989

HERE ON EARTH.

200

00:05:22,989 --> 00:05:23,823

>> ALL RIGHT.

201

00:05:23,823 --> 00:05:24,691

>> AND THEN WE'RE STUDYING

202

00:05:24,691 --> 00:05:25,558

WHAT HAPPENS TO THESE CELLS.

203

00:05:25,558 --> 00:05:26,626

>> OKAY.

204

00:05:26,626 --> 00:05:27,794

>> FINDING OUT THAT

205

00:05:27,794 --> 00:05:28,995

DIFFERENT PEOPLE HAVE

206

00:05:28,995 --> 00:05:30,763

VERY DIFFERENT SENSITIVITY.

207

00:05:30,763 --> 00:05:31,664

>> OKAY, INTERESTING.

208

00:05:31,664 --> 00:05:32,465

>> AND RESPONSE TO

209

00:05:32,465 --> 00:05:33,866

THE SAME AMOUNT OF RADIATION,

210

00:05:33,866 --> 00:05:35,268

THE SAME DOSE.

211

00:05:35,268 --> 00:05:36,769

SOME PEOPLE WILL HAVE, YOU KNOW,

212

00:05:36,769 --> 00:05:38,971

20% OF THEIR CELLS DIE.

213

00:05:38,971 --> 00:05:40,039

OTHER PEOPLE MAY HAVE

214

00:05:40,039 --> 00:05:41,107
60% OF THEIR CELLS DIE.

215

00:05:41,107 --> 00:05:42,108
>> AH, RIGHT.

216

00:05:42,108 --> 00:05:42,875
>> OKAY.

217

00:05:42,875 --> 00:05:43,676
>> NOW, THE QUESTION IS,

218

00:05:43,676 --> 00:05:45,244
WHAT DETERMINES THAT?

219

00:05:45,244 --> 00:05:46,746
AND CAN WE FIND IT OUT

220

00:05:46,746 --> 00:05:49,215
AND TAP INTO IT TO DEVELOP,

221

00:05:49,215 --> 00:05:50,516
UH, COUNTER MEASURES.

222

00:05:50,516 --> 00:05:51,617
BASICALLY, THERAPIES.

223

00:05:51,617 --> 00:05:52,452
>> OKAY.

224

00:05:52,452 --> 00:05:53,252
>> IMPROVE ASTRONAUT

225

00:05:53,252 --> 00:05:53,986
SENSITIVITY.

226

00:05:53,986 --> 00:05:54,754

>> YEAH.

227

00:05:54,754 --> 00:05:55,988

>> SO, THIS IS WHAT YOU WEAR.

228

00:05:55,988 --> 00:05:56,956

>> FABULOUS.

229

00:05:56,956 --> 00:05:59,625

>> WHEN YOU ARE WORKING WITH

230

00:05:59,625 --> 00:06:01,527

BLOOD SAMPLES IN THE LAB.

231

00:06:01,527 --> 00:06:03,830

GOGGLES, WHITE COAT, GLOVES.

232

00:06:03,830 --> 00:06:05,698

OBVIOUSLY, VERY CLEAN GLOVES,

233

00:06:05,698 --> 00:06:06,699

NOT TAKEN FROM THE LAB.

234

00:06:06,699 --> 00:06:07,500

>> YEAH, YEAH.

235

00:06:07,500 --> 00:06:08,301

>> IT'S A FRESH PAIR.

236

00:06:08,301 --> 00:06:09,102

>> AND IF YOU'RE NOT IN

237

00:06:09,102 --> 00:06:09,869

THE HOOD, YOU'RE WEARING

238

00:06:09,869 --> 00:06:10,570

THIS MASK.

239

00:06:10,570 --> 00:06:11,237

>> FABULOUS.

240

00:06:11,237 --> 00:06:12,672

>> BUT IT'S VERY HARD

241

00:06:12,672 --> 00:06:14,607

TO SPEAK IN IT.

242

00:06:14,607 --> 00:06:15,441

>> I ALREADY HAVE A QUICK

243

00:06:15,441 --> 00:06:16,309

QUESTION FOR YOU.

244

00:06:16,309 --> 00:06:18,010

DO YOU LOVE YOUR JOB?

245

00:06:18,010 --> 00:06:19,378

>> OF COURSE I LOVE MY JOB!

246

00:06:19,378 --> 00:06:20,279

WHO WOULDN'T?

247

00:06:20,279 --> 00:06:21,247

>> IT LOOKS THAT WAY.

248

00:06:21,247 --> 00:06:23,015

I HAD A FEELING.

249

00:06:23,015 --> 00:06:24,350

FANTASTIC!

250

00:06:24,350 --> 00:06:26,319

>> SO, IF OUR VIEWERS AT HOME

251
00:06:26,319 --> 00:06:28,054
WANTED TO RECREATE YOUR OUTFIT,

252
00:06:28,054 --> 00:06:28,855
LIKE, WHAT COULD--

253
00:06:28,855 --> 00:06:29,956
WHAT COULD WE DO?

254
00:06:29,956 --> 00:06:30,957
>> WELL, THIS OUTFIT IS

255
00:06:30,957 --> 00:06:32,391
SO BORING COMPARED TO

256
00:06:32,391 --> 00:06:33,392
A LOT OF OTHERS.

257
00:06:33,392 --> 00:06:34,293
I MEAN, IT'S NOT EVEN

258
00:06:34,293 --> 00:06:35,228
A SPACE SUIT,

259
00:06:35,228 --> 00:06:36,162
IT'S NOT A FLIGHT SUIT.

260
00:06:36,162 --> 00:06:38,397
YOU GO TO A DOCTOR'S OFFICE

261
00:06:38,397 --> 00:06:40,233
OR YOU GO TO CLEANING SUPPLIES

262
00:06:40,233 --> 00:06:41,868
AND GET YOUR GLOVES ON.

263
00:06:41,868 --> 00:06:43,402

TRY TO FIND SOME GLASSES

264

00:06:43,402 --> 00:06:44,804
TO SERVE AS GOGGLES.

265

00:06:44,804 --> 00:06:45,805
AND, YOU KNOW, SOMETHING

266

00:06:45,805 --> 00:06:47,273
LIKE THIS HAT OR THE MASK,

267

00:06:47,273 --> 00:06:48,608
YOU CAN JUST MAKE IT YOURSELF.

268

00:06:48,608 --> 00:06:50,076
>> ALL RIGHT.

269

00:06:50,076 --> 00:06:52,311
>> OKAY, WELL, THANK YOU.

270

00:06:52,311 --> 00:06:53,346
THANK YOU, EGLE.

271

00:06:53,346 --> 00:06:54,781
IT HAS BEEN A PLEASURE

272

00:06:54,781 --> 00:06:55,982
HAVIN' YOU ON THE SHOW.

273

00:06:55,982 --> 00:06:57,884
>> YEAH, WE'LL SEE YOU

274

00:06:57,884 --> 00:06:58,918
A BIT LATER.

275

00:06:58,918 --> 00:06:59,786
>> WE WILL, WE WILL.

276

00:06:59,786 --> 00:07:00,520

>> THANK YOU VERY MUCH.

277

00:07:00,520 --> 00:07:01,254

>> 'CAUSE WE GOTTA SEE

278

00:07:01,254 --> 00:07:02,188

THE OTHER CONTENDERS AND WE'LL

279

00:07:02,188 --> 00:07:03,956

BRING YOU BACK OUT IN A BIT.

280

00:07:03,956 --> 00:07:04,690

>> THANK YOU.

281

00:07:04,690 --> 00:07:05,825

>> EXCELLENT.

282

00:07:05,825 --> 00:07:08,928

>> OKAY. AND UP NEXT,

283

00:07:08,928 --> 00:07:11,063

UH, I WOULD LIKE TO WELCOME

284

00:07:11,063 --> 00:07:12,165

OUR NEXT GUESTS,

285

00:07:12,165 --> 00:07:14,000

UH, CAROLINE AND EMMA.

286

00:07:14,000 --> 00:07:16,169

WHY DON'T YOU GUYS COME ON OUT?

287

00:07:16,969 --> 00:07:18,004

[MUSIC]

288

00:07:18,004 --> 00:07:18,871

>> OH, MAN!

289

00:07:18,871 --> 00:07:21,174

>> OH, HO, HO!

290

00:07:21,174 --> 00:07:23,409

>> I HAVE NOT SEEN THESE BEFORE,

291

00:07:23,409 --> 00:07:26,279

THIS IS AWESOME.

292

00:07:26,279 --> 00:07:27,880

LADIES, YOU RULE.

293

00:07:27,880 --> 00:07:29,215

>> LADIES, WHY DON'T YOU

294

00:07:29,215 --> 00:07:32,418

PLEASE COME JOIN US?

295

00:07:32,418 --> 00:07:34,620

>> SO COOL! OH, MY GOD.

296

00:07:34,620 --> 00:07:35,621

I WAS PRETTY HAPPY WITH

297

00:07:35,621 --> 00:07:36,789

MY T-SHIRT WITH SOME STARS

298

00:07:36,789 --> 00:07:38,357

GLUED ON IT UNTIL YOU GUYS

299

00:07:38,357 --> 00:07:39,325

WALKED IN.

300

00:07:39,325 --> 00:07:41,761

>> I'M A HUGE FAN, LOOKS GREAT.

301
00:07:41,761 --> 00:07:42,895
>> THANK YOU.

302
00:07:42,895 --> 00:07:44,664
>> WELL, FIRST THINGS FIRST.

303
00:07:44,664 --> 00:07:45,698
COULD YOU LADIES PLEASE

304
00:07:45,698 --> 00:07:47,133
INTRODUCE YOURSELVES AND TELL US

305
00:07:47,133 --> 00:07:49,368
WHAT YOU DO HERE AT AMES?

306
00:07:49,368 --> 00:07:50,636
>> OKAY, I'LL START.

307
00:07:50,636 --> 00:07:51,871
I'M CAROLINE PARWORTH.

308
00:07:51,871 --> 00:07:53,372
I'M A POST-DOCTORAL RESEARCHER

309
00:07:53,372 --> 00:07:55,775
AT NASA AMES AND I WORK

310
00:07:55,775 --> 00:07:57,076
ON THE ALPHA JET

311
00:07:57,076 --> 00:07:58,244
ATMOSPHERIC EXPERIMENT,

312
00:07:58,244 --> 00:08:00,046
ALSO KNOWN AS AJAX.

313
00:08:00,046 --> 00:08:00,847

>> AJAX.

314

00:08:00,847 --> 00:08:01,848

>> AND, UH, WE USE,

315

00:08:01,848 --> 00:08:03,482

UH, RESEARCH AIRCRAFT TO

316

00:08:03,482 --> 00:08:05,084

TAKE MEASUREMENTS OF GASSES

317

00:08:05,084 --> 00:08:06,686

IN THE WESTERN US.

318

00:08:06,686 --> 00:08:07,587

>> OKAY.

319

00:08:07,587 --> 00:08:08,621

>> SOME OF THOSE GASES MAY

320

00:08:08,621 --> 00:08:10,056

INCLUDE GREENHOUSE GASES LIKE

321

00:08:10,056 --> 00:08:11,557

CARBON DIOXIDE AND METHANE.

322

00:08:11,557 --> 00:08:12,558

>> OKAY.

323

00:08:12,558 --> 00:08:14,460

>> ALSO, GASES THAT CAN

324

00:08:14,460 --> 00:08:16,395

INFLUENCE AIR QUALITY, HEALTH.

325

00:08:16,395 --> 00:08:17,330

>> OH, YEAH.

326

00:08:17,330 --> 00:08:18,831

>> SO, OZONE AND FORMALDEHYDE.

327

00:08:18,831 --> 00:08:21,000

>> OKAY, SO AIR POLLUTION STUFF?

328

00:08:21,000 --> 00:08:22,635

>> YEAH. AND WE TAKE

329

00:08:22,635 --> 00:08:24,303

THESE MEASUREMENTS SO WE

330

00:08:24,303 --> 00:08:26,038

CAN VALIDATE EARTH-OBSERVING

331

00:08:26,038 --> 00:08:29,108

SATELLITES AND, YEAH.

332

00:08:29,108 --> 00:08:29,942

>> YEAH.

333

00:08:29,942 --> 00:08:31,010

>> OKAY. THAT'S PRETTY COOL.

334

00:08:31,010 --> 00:08:31,878

WHAT ABOUT YOU?

335

00:08:31,878 --> 00:08:32,712

>> I'M EMMA YATES, I'M

336

00:08:32,712 --> 00:08:33,713

A RESEARCH SCIENTIST

337

00:08:33,713 --> 00:08:35,214

ALSO WORKING WITH AJAX.

338

00:08:35,214 --> 00:08:37,984

AND, UM, I GUESS, PART OF

339

00:08:37,984 --> 00:08:40,453

OUR JOB IS TO WEAR A FLIGHT SUIT

340

00:08:40,453 --> 00:08:41,988

AND TO FLY IN THE AIRCRAFT AND

341

00:08:41,988 --> 00:08:43,623

ACT AS THE IN-SITE SCIENTIST.

342

00:08:43,623 --> 00:08:45,024

BUT MOST OF THE TIME

343

00:08:45,024 --> 00:08:46,993

WE ARE IN THE LAB WORKING

344

00:08:46,993 --> 00:08:47,960

WITH OUR INSTRUMENTS,

345

00:08:47,960 --> 00:08:49,161

MAKING SURE THEY ARE TAKING

346

00:08:49,161 --> 00:08:50,329

MEASUREMENTS ACCURATELY.

347

00:08:50,329 --> 00:08:52,164

AND ALSO ANALYZING DATA

348

00:08:52,164 --> 00:08:53,032

BEHIND A COMPUTER.

349

00:08:53,032 --> 00:08:53,833

>> COOL.

350

00:08:53,833 --> 00:08:55,201

>> YOU KNOW, I THINK WE HAVE

351

00:08:55,201 --> 00:08:56,602

A PHOTO OF YOU GUYS.

352

00:08:56,602 --> 00:08:57,670

SO, BILL, CAN WE GET THAT

353

00:08:57,670 --> 00:09:00,206

BROUGHT UP ON SCREEN?

354

00:09:00,206 --> 00:09:03,609

>> THAT'S ME IN FULL FLIGHT.

355

00:09:03,609 --> 00:09:05,011

YEAH.

356

00:09:05,011 --> 00:09:05,978

>> I JUST WANNA MENTION

357

00:09:05,978 --> 00:09:07,680

THAT WE HAVE A CALL HERE

358

00:09:07,680 --> 00:09:09,181

FOR EMMA AND CAROLINE TO DO

359

00:09:09,181 --> 00:09:10,950

A FEMALE REMAKE OF "TOP GUN."

360

00:09:10,950 --> 00:09:12,485

>> OH, YEAH, I LIKE THAT IDEA.

361

00:09:12,485 --> 00:09:13,152

I LIKE THAT.

362

00:09:13,152 --> 00:09:13,886

>> WE'D LOOK PRETTY COOL

363

00:09:13,886 --> 00:09:14,587

IN THAT, RIGHT?

364

00:09:14,587 --> 00:09:15,288

>> WE'D DEFINITELY PLAY

365

00:09:15,288 --> 00:09:15,821

BEACH VOLLEYBALL.

366

00:09:15,821 --> 00:09:16,489

>> I THINK THAT NEEDS

367

00:09:16,489 --> 00:09:17,156

TO BE DONE.

368

00:09:17,156 --> 00:09:18,858

>> ON CAMPUS. ON BASE.

369

00:09:18,858 --> 00:09:20,459

>> ALL RIGHT, FANTASTIC.

370

00:09:20,459 --> 00:09:21,327

ARE YOU GUYS AT SUCH

371

00:09:21,327 --> 00:09:22,261

A HIGH ALTITUDE THAT YOU NEED

372

00:09:22,261 --> 00:09:24,563

THESE HELMETS AND MASKS?

373

00:09:24,563 --> 00:09:25,398

>> YEAH, IT'S A BIT--

374

00:09:25,398 --> 00:09:26,165

>> IS THAT WHAT IT'S FOR?

375

00:09:26,165 --> 00:09:26,933

>> IT'S A BIT HARD TO BREATHE

376

00:09:26,933 --> 00:09:28,401

IN THE AIRCRAFT, SO, YOU KNOW,

377

00:09:28,401 --> 00:09:30,002

TO DELIVER OXYGEN WHILE--

378

00:09:30,002 --> 00:09:31,237

>> WE-WE'VE FLOWN-- UH,

379

00:09:31,237 --> 00:09:32,104

THE AIRCRAFT'S FLOWN

380

00:09:32,104 --> 00:09:33,005

TO 40,000 FEET WITH

381

00:09:33,005 --> 00:09:33,940

OUR INSTRUMENTS ON BOARD.

382

00:09:33,940 --> 00:09:34,907

BUT TYPICALLY, WE'RE AROUND

383

00:09:34,907 --> 00:09:35,775

28,000 FEET.

384

00:09:35,775 --> 00:09:36,676

>> OH, WOW.

385

00:09:36,676 --> 00:09:37,777

>> THAT'S EIGHT OR NINE

386

00:09:37,777 --> 00:09:38,411

KILOMETERS.

387

00:09:38,411 --> 00:09:39,178

>> OKAY. SO, ARE YOU GUYS

388

00:09:39,178 --> 00:09:40,313

ACTUALLY FLYING THE PLANES

389

00:09:40,313 --> 00:09:42,315
OR DO YOU HAVE A PILOT?

390

00:09:42,315 --> 00:09:43,182
>> WE HAVE A PILOT.

391

00:09:43,182 --> 00:09:43,950
>> YEAH.

392

00:09:43,950 --> 00:09:44,784
>> IN THE LAST PICTURE YOU SAW

393

00:09:44,784 --> 00:09:45,918
THOSE TWO-TWO SEATS?

394

00:09:45,918 --> 00:09:46,619
>> OKAY.

395

00:09:46,619 --> 00:09:47,453
>> SO, PILOT IN THE FRONT

396

00:09:47,453 --> 00:09:48,487
AND THEN A SCIENTIST

397

00:09:48,487 --> 00:09:49,322
IN THE BACKSEAT.

398

00:09:49,322 --> 00:09:50,589
WHICH WE TURN OUR INSTRUMENTS

399

00:09:50,589 --> 00:09:52,058
ON AND OFF AND MAKE OBSERVATIONS

400

00:09:52,058 --> 00:09:53,092
ABOUT THE ATMOSPHERE

401
00:09:53,092 --> 00:09:54,160
AND THINGS THAT MIGHT BE

402
00:09:54,160 --> 00:09:55,328
USEFUL FOR ANALYZING DATA.

403
00:09:55,328 --> 00:09:56,162
>> OKAY.

404
00:09:56,162 --> 00:09:57,163
>> SOMETIMES, WE TELL THE PILOT

405
00:09:57,163 --> 00:09:58,497
"MAYBE GO DOWN THAT ROUTE,"

406
00:09:58,497 --> 00:09:59,298
YOU KNOW.

407
00:09:59,298 --> 00:09:59,966
>> OH, YEAH?

408
00:09:59,966 --> 00:10:00,733
>> YEAH, IT DEPENDS.

409
00:10:00,733 --> 00:10:01,434
BUT WE CAN GIVE THEM

410
00:10:01,434 --> 00:10:03,436
SOME GUIDANCE ON--

411
00:10:03,436 --> 00:10:04,470
>> I HAVE A QUESTION.

412
00:10:04,470 --> 00:10:05,271
>> OH, LOOKS LIKE ABBY

413
00:10:05,271 --> 00:10:06,305

HAS A QUESTION.

414

00:10:06,305 --> 00:10:07,206

>> DOES NASA DEVELOP

415

00:10:07,206 --> 00:10:08,574

THE SENSORS USED IN THESE TESTS,

416

00:10:08,574 --> 00:10:10,843

OR ARE THEY OUTSOURCED?

417

00:10:10,843 --> 00:10:11,777

>> MIXTURE OF BOTH.

418

00:10:13,279 --> 00:10:12,478

>> YEAH.

419

00:10:13,279 --> 00:10:14,313

THE-THE GREENHOUSE GAS

420

00:10:14,313 --> 00:10:16,115

INSTRUMENT IS OUTSOURCED.

421

00:10:16,115 --> 00:10:17,917

THE METEOROLOGICAL MEASUREMENT

422

00:10:17,917 --> 00:10:20,486

SYSTEM WAS IN HOUSE AT AMES,

423

00:10:20,486 --> 00:10:22,355

AND THE FORMALDEHYDE SYSTEM

424

00:10:22,355 --> 00:10:24,090

WE HAVE WAS BUILT BY

425

00:10:24,090 --> 00:10:25,891

SOME RESEARCHERS IN GODDARD.

426

00:10:25,891 --> 00:10:26,993

>> IT'S BASED RIGHT IN

427

00:10:26,993 --> 00:10:27,860

THE NASA CENTER, YEAH.

428

00:10:27,860 --> 00:10:28,761

>> A MIXTURE OF BOTH.

429

00:10:28,761 --> 00:10:29,562

>> THAT'S PRETTY COOL.

430

00:10:29,562 --> 00:10:30,529

>> SO, TELL US ABOUT

431

00:10:30,529 --> 00:10:32,264

YOUR COSTUMES.

432

00:10:32,264 --> 00:10:33,399

WELL, NOT REALLY COSTUMES,

433

00:10:33,399 --> 00:10:34,066

'CAUSE YOU ACTUALLY WEAR

434

00:10:34,066 --> 00:10:34,633

THAT BUT--

435

00:10:35,835 --> 00:10:35,267

>> YEAH.

436

00:10:35,835 --> 00:10:36,402

>> WHAT DO WE HAVE GOIN' ON

437

00:10:36,402 --> 00:10:37,003

OVER HERE?

438

00:10:37,003 --> 00:10:37,703

>> UM, IT'S YOUR STANDARD

439

00:10:37,703 --> 00:10:38,304
FLIGHT SUIT.

440

00:10:38,304 --> 00:10:39,005
>> YEP.

441

00:10:39,005 --> 00:10:41,607
>> UM, WITH LOTS OF POCKETS.

442

00:10:41,607 --> 00:10:42,575
BADGE.

443

00:10:42,575 --> 00:10:44,877
UM, IT'S FIREPROOF I GUESS.

444

00:10:46,479 --> 00:10:45,778
>> HELMET.

445

00:10:46,479 --> 00:10:47,213
>> WITH A VISOR

446

00:10:47,213 --> 00:10:47,980
AND A BREATHING MASK.

447

00:10:47,980 --> 00:10:48,714
>> MM-HMM.

448

00:10:48,714 --> 00:10:49,482
IT'S PRETTY SUNNY UP THERE,

449

00:10:49,482 --> 00:10:50,316
SO WE USE THE VISORS A LOT.

450

00:10:50,316 --> 00:10:51,017
>> OH, YEAH.

451
00:10:51,017 --> 00:10:52,218
>> OKAY. SO, WHAT ARE YOU GUYS

452
00:10:52,218 --> 00:10:53,419
PUT IN THESE POCKETS?

453
00:10:53,419 --> 00:10:54,120
LIKE, I'M SURE--

454
00:10:54,120 --> 00:10:54,854
>> YEAH, YOU'VE GOT A LOT

455
00:10:54,854 --> 00:10:55,521
OF ZIPPERED POCKETS.

456
00:10:55,521 --> 00:10:56,222
>> OH, YEAH, THERE'S A LOT

457
00:10:56,222 --> 00:10:56,856
OF POCKETS.

458
00:10:56,856 --> 00:10:57,656
>> CAN NEVER HAVE ENOUGH.

459
00:10:57,656 --> 00:10:58,457
>> SO, IF WE'RE IN THE BACKSEAT

460
00:10:58,457 --> 00:10:59,492
WE WANT TO TAKE NOTES

461
00:10:59,492 --> 00:11:00,559
ABOUT TIMING OF THINGS

462
00:11:00,559 --> 00:11:01,727
AND SO, I USUALLY KEEP

463
00:11:01,727 --> 00:11:02,962

A LOT OF PENS THERE

464

00:11:02,962 --> 00:11:04,864

BECAUSE IT'S PRETTY TURBULENT

465

00:11:04,864 --> 00:11:06,432

UP THERE AND YOU CAN LOSE PENS

466

00:11:06,432 --> 00:11:07,700

AND THINGS LIKE THAT.

467

00:11:07,700 --> 00:11:08,901

SO, IT'S GREAT JUST TO HOLD

468

00:11:08,901 --> 00:11:10,903

YOUR PHONE AS WELL AS,

469

00:11:10,903 --> 00:11:12,104

LIKE, PENS.

470

00:11:12,104 --> 00:11:13,572

>> YOU KNOW, SPEAKING OF PHONES,

471

00:11:13,572 --> 00:11:15,608

I THINK-- HEY BILL, CAN WE BRING

472

00:11:15,608 --> 00:11:17,243

UP THIS PHOTO THAT WE HAVE?

473

00:11:17,243 --> 00:11:18,310

>> OH, YEAH, THAT'S-THAT'S

474

00:11:18,310 --> 00:11:19,145

A SELFIE.

475

00:11:19,145 --> 00:11:19,979

>> THAT'S A SELFIE I TOOK

476

00:11:19,979 --> 00:11:22,148
OF MYSELF ON, UH, YEAH,

477

00:11:22,148 --> 00:11:23,549
RECENT AIR, UM, FLIGHT

478

00:11:23,549 --> 00:11:24,683
IN THE WINTERTIME.

479

00:11:24,683 --> 00:11:26,052
I THINK LAST YEAR.

480

00:11:26,052 --> 00:11:27,753
>> YOU ARE SO COOL.

481

00:11:27,753 --> 00:11:29,055
>> PRETTY COOL, YEAH.

482

00:11:29,055 --> 00:11:30,222
>> DEFINITELY.

483

00:11:30,222 --> 00:11:31,057
>> YOU ALWAYS GOTTA DO IT

484

00:11:31,057 --> 00:11:31,857
FOR THE 'GRAM, EVEN WHEN

485

00:11:31,857 --> 00:11:32,491
YOU'RE WORKING.

486

00:11:32,491 --> 00:11:33,492
>> YES. YES.

487

00:11:33,492 --> 00:11:34,293
>> ON THAT NOTE, I HAVE

488

00:11:34,293 --> 00:11:35,094

A COMMENT.

489

00:11:35,094 --> 00:11:36,962

CAROL DANVERS.

490

00:11:36,962 --> 00:11:40,199

A MARVEL REFERENCE.

491

00:11:40,199 --> 00:11:42,368

>> SO IF OUR VIEWERS AT HOME

492

00:11:42,368 --> 00:11:43,936

WANTED TO GO AHEAD AND RECREATE

493

00:11:43,936 --> 00:11:45,871

THIS LOOK, WHAT WOULD WE NEED?

494

00:11:45,871 --> 00:11:47,139

>> I THINK YOU NEED TO GO DOWN

495

00:11:47,139 --> 00:11:48,474

TO HOME DEPOT OR WHEREVER

496

00:11:48,474 --> 00:11:49,875

AND GET YOUR COVERALLS.

497

00:11:49,875 --> 00:11:50,709

>> OKAY.

498

00:11:50,709 --> 00:11:51,777

>> YEAH, YOUR HARDWARE STORE

499

00:11:51,777 --> 00:11:52,711

MIGHT HAVE THOSE.

500

00:11:52,711 --> 00:11:53,579

>> YEAH, LIKE A PAINTER SUIT

501
00:11:53,579 --> 00:11:54,547
OR SOMETHING OF THE SORT.

502
00:11:54,547 --> 00:11:56,015
AND THEN A HELMET.

503
00:11:56,015 --> 00:11:57,483
MAYBE MAKE YOUR OWN VISOR

504
00:11:57,483 --> 00:11:58,584
OR MASK.

505
00:11:58,584 --> 00:11:59,919
YOU CAN GET CREATIVE WITH THAT.

506
00:11:59,919 --> 00:12:01,120
>> AND MAKE SOME BADGES,

507
00:12:01,120 --> 00:12:02,021
MAKE SOME LETTERS.

508
00:12:03,489 --> 00:12:02,788
>> YEAH.

509
00:12:03,489 --> 00:12:04,223
>> OKAY. MISSION BADGES.

510
00:12:04,223 --> 00:12:04,924
>> MMM-HMM.

511
00:12:04,924 --> 00:12:05,891
>> COOL. SOUNDS DOABLE.

512
00:12:05,891 --> 00:12:07,460
>> YEAH.

513
00:12:07,460 --> 00:12:08,260

>> AND THAT'S GONNA BE ONE

514

00:12:08,260 --> 00:12:09,628

OF THE COOLEST, I SUSPECT.

515

00:12:09,628 --> 00:12:10,830

BUT, I HAVEN'T SEEN

516

00:12:10,830 --> 00:12:11,664

ALL OF THESE COSTUMES YET.

517

00:12:11,664 --> 00:12:12,498

>> YOU HAVEN'T-- NO.

518

00:12:12,498 --> 00:12:13,232

>> THAT'S CORRECT.

519

00:12:13,232 --> 00:12:14,800

>> I DON'T KNOW WHAT AWAITS US.

520

00:12:14,800 --> 00:12:16,769

AWESOME. SO COOL, YOU GUYS!

521

00:12:16,769 --> 00:12:17,670

>> ALL RIGHT.

522

00:12:17,670 --> 00:12:18,537

>> THANKS FOR JOINING US.

523

00:12:18,537 --> 00:12:19,605

>> THANK YOU FOR JOINING US.

524

00:12:19,605 --> 00:12:20,506

>> THANKS FOR HAVING US.

525

00:12:20,506 --> 00:12:21,307

>> YEAH.

526

00:12:21,307 --> 00:12:22,041

WELL, WE'LL BRING YOU BACK

527

00:12:22,041 --> 00:12:22,708

IN A LITTLE BIT.

528

00:12:22,708 --> 00:12:23,342

>> YEAH.

529

00:12:23,342 --> 00:12:23,909

>> ALL RIGHT.

530

00:12:23,909 --> 00:12:25,411

>> OKAY?

531

00:12:25,411 --> 00:12:26,345

>> AREN'T THEY THE COOLEST?

532

00:12:26,345 --> 00:12:27,680

DID YOU KNOW THAT THEY WERE

533

00:12:27,680 --> 00:12:29,348

THIS COOL? HAVE YOU MET

534

00:12:29,348 --> 00:12:30,316

THESE LADIES BEFORE?

535

00:12:30,316 --> 00:12:31,784

>> UM, ACTUALLY, YES.

536

00:12:31,784 --> 00:12:33,919

I MUST ADMIT WE HAVE GOTTEN

537

00:12:33,919 --> 00:12:34,920

TO MEET EARLIER.

538

00:12:34,920 --> 00:12:35,955

SO, I WAS PRETTY PSYCHED

539

00:12:35,955 --> 00:12:36,922
FOR THEIR COSTUMES.

540

00:12:36,922 --> 00:12:37,690
>> YEAH, THAT WAS

541

00:12:37,690 --> 00:12:38,657
PRETTY AWESOME.

542

00:12:38,657 --> 00:12:41,327
>> ALL RIGHT, SO, UP NEXT

543

00:12:41,327 --> 00:12:43,662
WE HAVE FLIGHT PLANNER

544

00:12:43,662 --> 00:12:44,964
KEN BOWER.

545

00:12:44,964 --> 00:12:45,631
>> OOH.

546

00:12:45,631 --> 00:12:46,365
>> SO, IF KEN IS READY,

547

00:12:46,365 --> 00:12:49,068
WHY DON'T YOU COME ON OUT?

548

00:12:49,068 --> 00:12:49,969
>> OH, NICE!

549

00:12:49,969 --> 00:12:50,970
>> NICE!

550

00:12:50,970 --> 00:12:52,204
WE'VE GOT A LEATHER JACKET.

551
00:12:52,204 --> 00:12:53,672
WE'VE GOT SOME COVERALLS

552
00:12:53,672 --> 00:12:55,207
WITH A BUNCH OF BADGES.

553
00:12:55,207 --> 00:12:57,209
I LIKE THAT. NICE.

554
00:12:57,209 --> 00:12:58,277
>> NICE!

555
00:12:58,277 --> 00:12:59,111
>> COME ON UP!

556
00:12:59,111 --> 00:13:01,647
>> WELL, COME ON DOWN, KEN.

557
00:13:01,647 --> 00:13:02,915
>> AFTERNOON, DANIELLE.

558
00:13:02,915 --> 00:13:03,616
ABBY.

559
00:13:03,616 --> 00:13:04,283
>> WELCOME!

560
00:13:04,283 --> 00:13:05,050
>> HOW ARE YOU?

561
00:13:05,050 --> 00:13:05,684
>> I AM WARM.

562
00:13:05,684 --> 00:13:06,418
>> SO, WHY DON'T YOU START IT

563
00:13:06,418 --> 00:13:07,186

OFF WITH OUR OTHER GUESTS.

564

00:13:07,186 --> 00:13:09,054

UH, WHAT IS YOUR NAME AND WHAT

565

00:13:09,054 --> 00:13:10,589

DO YOU DO HERE AT AMES?

566

00:13:10,589 --> 00:13:11,590

>> MY NAME IS KEN BOWER

567

00:13:11,590 --> 00:13:13,559

AND I PLAN SCIENCE MISSIONS

568

00:13:13,559 --> 00:13:15,261

FOR NASA'S AIRBORNE OBSERVATORY.

569

00:13:15,261 --> 00:13:16,061

>> OKAY.

570

00:13:16,061 --> 00:13:16,829

>> IT'S NAMED SOFIA,

571

00:13:16,829 --> 00:13:17,596

WHICH IS AN ACRONYM FOR

572

00:13:17,596 --> 00:13:18,697

THE STRATOSPHERIC OBSERVATORY

573

00:13:18,697 --> 00:13:20,299

FOR INFRARED ASTRONOMY,

574

00:13:20,299 --> 00:13:21,267

>> OKAY, OKAY.

575

00:13:21,267 --> 00:13:23,202

>> ANOTHER HIGH-FLYING

576
00:13:23,202 --> 00:13:24,770
RESEARCHER AND COSTUME, YEAH?

577
00:13:24,770 --> 00:13:25,838
>> YES, QUITE HIGH.

578
00:13:25,838 --> 00:13:27,173
>> YEAH, UP IN THE STRATOSPHERE.

579
00:13:27,173 --> 00:13:28,174
>> SO, IF YOU CAN BREAK IT

580
00:13:28,174 --> 00:13:29,141
DOWN TO ONE SENTENCE,

581
00:13:29,141 --> 00:13:30,309
WHAT WOULD IT BE?

582
00:13:30,309 --> 00:13:30,976
>> SOFIA?

583
00:13:30,976 --> 00:13:31,744
>> YEAH.

584
00:13:31,744 --> 00:13:33,312
>> SO, UH, MOST OF THE TIME

585
00:13:33,312 --> 00:13:34,413
WE TAKE TELESCOPES AND WE

586
00:13:34,413 --> 00:13:35,414
PUT THEM ON TOP OF MOUNTAINS

587
00:13:35,414 --> 00:13:36,382
SO THERE'S NO CLOUDS

588
00:13:36,382 --> 00:13:37,316

AND LESS SMOG AND STUFF

589

00:13:37,316 --> 00:13:37,983
IN THE WAY.

590

00:13:37,983 --> 00:13:38,717
>> OKAY.

591

00:13:38,717 --> 00:13:39,385
>> THAT'S NOT HIGH ENOUGH

592

00:13:39,385 --> 00:13:40,252
IF YOU WANTED TO DO

593

00:13:40,252 --> 00:13:41,487
INFRARED ASTRONOMY.

594

00:13:41,487 --> 00:13:42,755
SO, WHAT WE DO INSTEAD IS

595

00:13:42,755 --> 00:13:44,089
WE PUT IT INSIDE A JUMBO JET.

596

00:13:44,089 --> 00:13:45,090
WE'RE FLYING IN AN OLD

597

00:13:45,090 --> 00:13:46,792
PAN AM AIRLINES 747.

598

00:13:46,792 --> 00:13:47,626
>> WOW.

599

00:13:47,626 --> 00:13:48,928
>> A REPURPOSED TOOL.

600

00:13:48,928 --> 00:13:51,197
AND WE FLY TO 45,000 FEET

601
00:13:51,197 --> 00:13:52,264
SOMETIMES. SO, WE'RE

602
00:13:52,264 --> 00:13:53,532
THREE TIMES AS HIGH AS ALL

603
00:13:53,532 --> 00:13:54,567
THE GROUND-BASED OBSERVATORIES.

604
00:13:54,567 --> 00:13:55,334
>> OH, WOW.

605
00:13:55,334 --> 00:13:55,968
>> WOW.

606
00:13:55,968 --> 00:13:56,669
>> THREE TIMES.

607
00:13:56,669 --> 00:13:57,369
>> AND FROM THAT, YOU CAN DO

608
00:13:57,369 --> 00:13:58,103
INFRARED ASTRONOMY.

609
00:13:58,103 --> 00:13:59,605
>> OKAY, SO, LET'S BACK UP

610
00:13:59,605 --> 00:14:00,339
A LITTLE FURTHER.

611
00:14:00,339 --> 00:14:01,073
>> SURE.

612
00:14:01,073 --> 00:14:02,441
>> WHAT IS INFRARED ASTRONOMY?

613
00:14:02,441 --> 00:14:03,242

>> SO, THERE'S LOTS OF

614

00:14:03,242 --> 00:14:04,543

KINDS OF LIGHT. OKAY?

615

00:14:04,543 --> 00:14:05,444

WE-WE'RE USED TO LOTS OF COLORS

616

00:14:05,444 --> 00:14:06,745

THAT WE CAN SEE WITH OUR EYES.

617

00:14:06,745 --> 00:14:08,214

THAT'S ONLY A SMALL FRACTION

618

00:14:08,214 --> 00:14:09,281

OF ALL THE LIGHT THERE IS.

619

00:14:09,281 --> 00:14:10,449

THAT'S VISIBLE LIGHT.

620

00:14:10,449 --> 00:14:11,684

THERE'S ALSO INFRARED LIGHT,

621

00:14:11,684 --> 00:14:13,252

ULTRAVIOLET LIGHT, X-RAYS,

622

00:14:13,252 --> 00:14:15,287

RADIO, GAMMA RAYS, MICROWAVES,

623

00:14:15,287 --> 00:14:16,355

ALL THESE OTHER THINGS.

624

00:14:16,355 --> 00:14:17,189

THEY ALL MAKE PART OF

625

00:14:17,189 --> 00:14:18,057

THE SPECTRUM.

626
00:14:18,057 --> 00:14:18,924
AS HUMANS, WE'VE BEEN DOING

627
00:14:18,924 --> 00:14:20,659
ASTRONOMY WITH OUR EYES AS

628
00:14:20,659 --> 00:14:21,660
OUR INSTRUMENTS BY LOOKING

629
00:14:21,660 --> 00:14:23,462
AT THE SKY FOR 10,000 YEARS.

630
00:14:23,462 --> 00:14:24,663
BUT WE'VE BEEN LOOKING AT

631
00:14:24,663 --> 00:14:25,998
THIS TINY SLIVER OF ALL

632
00:14:25,998 --> 00:14:27,132
THE LIGHT THAT IS AVAILABLE.

633
00:14:27,132 --> 00:14:28,133
>> MMM, WOW.

634
00:14:28,133 --> 00:14:29,735
>> SO, ONLY IN THE LAST CENTURY

635
00:14:29,735 --> 00:14:31,036
HAVE WE BEEN ABLE TO BUILD

636
00:14:31,036 --> 00:14:33,138
MORE TOOLS THAT CAN LOOK UP

637
00:14:33,138 --> 00:14:34,473
AND SEE THE SKY WITH

638
00:14:34,473 --> 00:14:35,608

NEW KINDS OF EYES.

639

00:14:35,608 --> 00:14:36,442

>> OKAY.

640

00:14:36,442 --> 00:14:37,176

>> COOL.

641

00:14:37,176 --> 00:14:38,010

>> UNFORTUNATELY, IF YOU LOOK UP

642

00:14:38,010 --> 00:14:39,044

WITH INFRARED EYES, YOU WILL

643

00:14:39,044 --> 00:14:40,279

LOOK UP AND EVERY NIGHT,

644

00:14:40,279 --> 00:14:41,213

EVERYWHERE ON EARTH, IT WILL

645

00:14:41,213 --> 00:14:42,815

BE CLOUDY AND OVERCAST.

646

00:14:42,815 --> 00:14:43,582

YOU'LL NEVER BE ABLE

647

00:14:43,582 --> 00:14:44,383

TO SEE ANYTHING.

648

00:14:44,383 --> 00:14:45,084

>> AW.

649

00:14:45,084 --> 00:14:45,784

>> YOU HAVE--

650

00:14:45,784 --> 00:14:46,452

IT'S THE WATER VAPOR.

651
00:14:46,452 --> 00:14:47,086
>> OH.

652
00:14:47,086 --> 00:14:47,720
>> AH.

653
00:14:47,720 --> 00:14:48,520
>> THE WATER IS THE KILLER.

654
00:14:48,520 --> 00:14:49,255
SO, YOU HAVE TO GET ABOVE

655
00:14:49,255 --> 00:14:50,222
THE MOIST AIR THAT WE LIVE IN

656
00:14:50,222 --> 00:14:51,423
AND GO UP TO THE DRY AIR

657
00:14:51,423 --> 00:14:52,391
IN THE STRATOSPHERE.

658
00:14:52,391 --> 00:14:53,325
AND THEN YOU'RE HIGH ENOUGH

659
00:14:53,325 --> 00:14:54,226
TO DO INFRARED ASTRONOMY.

660
00:14:54,226 --> 00:14:55,027
>> AH.

661
00:14:55,027 --> 00:14:55,728
>> OKAY.

662
00:14:55,728 --> 00:14:56,528
>> WHO KNEW? YEAH.

663
00:14:56,528 --> 00:14:57,263

>> WELL, I THINK WE HAVE

664

00:14:57,263 --> 00:14:58,030

A VIDEO.

665

00:14:58,030 --> 00:14:58,631

>> SURE.

666

00:14:58,631 --> 00:14:59,298

>> YES.

667

00:14:59,298 --> 00:14:59,965

>> OF SOFIA.

668

00:14:59,965 --> 00:15:00,633

COULD WE GO AHEAD AND GET

669

00:15:00,633 --> 00:15:01,267

THAT BROUGHT UP?

670

00:15:01,267 --> 00:15:02,134

>> SO, HERE WE ARE, TAKING OFF

671

00:15:02,134 --> 00:15:03,569

FROM OUR USUAL OPERATIONS BASE

672

00:15:03,569 --> 00:15:04,703

IN PALMDALE, CALIFORNIA.

673

00:15:04,703 --> 00:15:07,172

AND, I SAID IT'S A 747,

674

00:15:07,172 --> 00:15:09,074

IT'S GONNA GET UP PRETTY HIGH.

675

00:15:09,074 --> 00:15:10,309

AND HERE WE HAVE OPENED

676

00:15:10,309 --> 00:15:11,577

THAT BIG GARAGE DOOR.

677

00:15:11,577 --> 00:15:12,978

SO, WE DID SOMETHING THAT,

678

00:15:12,978 --> 00:15:14,246

UH, BOEING NEVER WANTED TO HAVE

679

00:15:14,246 --> 00:15:15,614

HAPPEN TO ONE OF THEIR PLANES.

680

00:15:15,614 --> 00:15:17,783

WE CUT A 16-FOOT-WIDE HOLE

681

00:15:17,783 --> 00:15:18,917

IN THE AIRPLANE,

682

00:15:18,917 --> 00:15:19,885

MOUNTED A GARAGE DOOR

683

00:15:19,885 --> 00:15:21,053

THAT ROTATES OUT OF THE WAY.

684

00:15:21,053 --> 00:15:21,920

AND THEN THERE'S

685

00:15:21,920 --> 00:15:22,821

A TEN-FOOT-DIAMETER

686

00:15:22,821 --> 00:15:23,922

TELESCOPE INSIDE.

687

00:15:23,922 --> 00:15:25,858

AND WE POINT THAT UP IN THE SKY.

688

00:15:25,858 --> 00:15:27,059

UH, RIGHT NOW,

689

00:15:27,059 --> 00:15:27,993

THE TELESCOPE'S COVERED.

690

00:15:27,993 --> 00:15:28,827

YOU CAN'T QUITE SEE IT

691

00:15:28,827 --> 00:15:29,828

BECAUSE THE DAY--

692

00:15:29,828 --> 00:15:30,729

THE SUN IS OUT--

693

00:15:30,729 --> 00:15:32,031

BUT WE ONLY FLY AT NIGHT.

694

00:15:32,031 --> 00:15:32,931

>> OKAY. RIGHT.

695

00:15:32,931 --> 00:15:33,999

I SUPPOSE THAT MAKES SENSE.

696

00:15:33,999 --> 00:15:34,800

>> YES.

697

00:15:34,800 --> 00:15:35,567

>> BUT I WOULDN'T HAVE

698

00:15:35,567 --> 00:15:36,235

THOUGHT OF IT.

699

00:15:36,235 --> 00:15:36,902

>> WE FLY ALL NIGHT.

700

00:15:36,902 --> 00:15:37,569

>> NICE.

701
00:15:37,569 --> 00:15:39,371
NOW, I HAVE THREE QUESTIONS

702
00:15:39,371 --> 00:15:40,105
THAT ARE KIND OF--

703
00:15:40,105 --> 00:15:40,839
>> GREAT!

704
00:15:40,839 --> 00:15:41,807
>> ALL ON A-A SIMILAR TOPIC.

705
00:15:41,807 --> 00:15:42,775
ONE WAS MEANT FOR EMMA

706
00:15:42,775 --> 00:15:44,343
AND CAROLINE-- "WHAT ABOUT

707
00:15:44,343 --> 00:15:45,678
THE GRAVITY FORCE WHEN YOU FLY?"

708
00:15:45,678 --> 00:15:46,679
SO MAYBE THAT'S RELEVANT.

709
00:15:46,679 --> 00:15:48,314
AND SO, OTHERS ARE ASKING

710
00:15:48,314 --> 00:15:49,948
IS IT NOT TOO SHAKY ON A PLANE

711
00:15:49,948 --> 00:15:51,984
TO DO ASTRONOMY AND HOW DO YOU

712
00:15:51,984 --> 00:15:53,819
MITIGATE THE VIBRATIONS?

713
00:15:53,819 --> 00:15:54,987

>> OKAY. ALL-ALL RELATED.

714

00:15:54,987 --> 00:15:55,888

>> ALL RELATED, RIGHT?

715

00:15:55,888 --> 00:15:56,622

YEAH.

716

00:15:56,622 --> 00:15:57,423

>> SO, THAT'S FINE.

717

00:15:57,423 --> 00:15:58,457

UH, A 747 IS NOT

718

00:15:58,457 --> 00:15:59,625

A HIGH-PERFORMANCE FIGHTER JET.

719

00:15:59,625 --> 00:16:00,459

>> THAT IS TRUE.

720

00:16:00,459 --> 00:16:01,327

>> UH, IT'S ONLY PULLING

721

00:16:01,327 --> 00:16:03,128

1.2, 1.3 Gs, NOTHING

722

00:16:03,128 --> 00:16:04,396

SIGNIFICANT FOR US.

723

00:16:04,396 --> 00:16:05,998

SO, THAT IS NOT A BIG ISSUE

724

00:16:05,998 --> 00:16:07,633

IN-INSIDE SOFIA WHEN

725

00:16:07,633 --> 00:16:08,667

WE'RE FLYING AROUND.

726

00:16:08,667 --> 00:16:09,902

BUT, GREAT QUESTION,

727

00:16:09,902 --> 00:16:10,969

IF YOU'VE EVER JUST LOOKED UP

728

00:16:10,969 --> 00:16:12,571

WITH-WITH YOUR OWN BINOCULARS

729

00:16:12,571 --> 00:16:13,572

TRYING TO LOOK AT SATURN

730

00:16:13,572 --> 00:16:14,807

OR SOMETHING, THE THING'S

731

00:16:14,807 --> 00:16:15,841

JUMPIN' ALL OVER THE PLACE!

732

00:16:15,841 --> 00:16:16,809

WELL, IT'S YOU.

733

00:16:16,809 --> 00:16:17,609

YOU'RE THE ONE THAT'S NOT

734

00:16:17,609 --> 00:16:18,544

ABLE TO HOLD YOUR BINOCULARS

735

00:16:18,544 --> 00:16:19,278

STILL ENOUGH.

736

00:16:19,278 --> 00:16:20,045

>> YEAH.

737

00:16:20,045 --> 00:16:20,846

>> SO, YOU WANT YOUR TELESCOPE

738

00:16:20,846 --> 00:16:22,314

TO BE VERY STABLE AND SOLID

739

00:16:22,314 --> 00:16:23,649
AND PUTTING IT ON A MOVING

740

00:16:23,649 --> 00:16:24,817
PLATFORM LIKE AN AIRCRAFT

741

00:16:24,817 --> 00:16:26,051
THAT DOES THIS AND DOES THIS

742

00:16:26,051 --> 00:16:26,985
ALL THE TIME,

743

00:16:26,985 --> 00:16:28,020
DOESN'T SEEM TO WORK.

744

00:16:28,020 --> 00:16:29,588
WELL, WE BUILT A REALLY

745

00:16:29,588 --> 00:16:30,522
GOOD TELESCOPE.

746

00:16:30,522 --> 00:16:31,290
AND WE'RE IN AN INTERNATIONAL

747

00:16:31,290 --> 00:16:32,057
PARTNERSHIP.

748

00:16:32,057 --> 00:16:32,991
IT'S NOT JUST NASA,

749

00:16:32,991 --> 00:16:34,293
THE UNITED STATES, IT'S ALSO

750

00:16:34,293 --> 00:16:36,128
THE GERMAN AEROSPACE AGENCY

751
00:16:36,128 --> 00:16:37,062
THAT'S WORKING WITH US.

752
00:16:37,062 --> 00:16:37,930
>> OH, OKAY.

753
00:16:37,930 --> 00:16:38,964
>> AND, UH, THEY BUILT

754
00:16:38,964 --> 00:16:40,366
A FANTASTIC TELESCOPE.

755
00:16:40,366 --> 00:16:41,300
AND WHEN WE'RE ON BOARD

756
00:16:41,300 --> 00:16:42,234
THAT PLANE AND PEOPLE ARE

757
00:16:42,234 --> 00:16:43,135
LOOKING AT THE OUTPUT

758
00:16:43,135 --> 00:16:44,903
OF THE CAMERA, IT LOOKS LIKE

759
00:16:44,903 --> 00:16:46,004
A STILL SHOT.

760
00:16:46,004 --> 00:16:47,005
IT-- YOU CAN'T TELL THAT

761
00:16:47,005 --> 00:16:47,806
THE PLANE IS MOVING.

762
00:16:47,806 --> 00:16:48,574
>> REALLY?

763
00:16:48,574 --> 00:16:49,475

>> AND YET, I CAN BE IN

764

00:16:49,475 --> 00:16:51,210

THE PLANE WATCHING THINGS HAPPEN

765

00:16:51,210 --> 00:16:52,478

AND THE TELESCOPE IS MOVING

766

00:16:52,478 --> 00:16:53,412

ALL OVER THE PLACE.

767

00:16:53,412 --> 00:16:54,413

>> WHOA. THAT'S PRETTY COOL.

768

00:16:54,413 --> 00:16:55,114

>> SO, IT'S BEAUTIFULLY

769

00:16:55,114 --> 00:16:55,981

STABILIZED.

770

00:16:55,981 --> 00:16:57,015

UH, SO, THE ANSWER IS

771

00:16:57,015 --> 00:16:58,350

"GOOD TOOLS." OKAY?

772

00:16:58,350 --> 00:16:59,385

>> GOOD TOOLS. OKAY. YEAH.

773

00:16:59,385 --> 00:17:00,652

>> OKAY, SO, WHERE EXACTLY

774

00:17:00,652 --> 00:17:02,354

DO YOU GUYS FLY?

775

00:17:02,354 --> 00:17:03,789

>> UH, WE CAN FLY ALL OVER.

776

00:17:03,789 --> 00:17:04,823

WE'RE THE WORLD'S LARGEST

777

00:17:04,823 --> 00:17:06,392

TRANSPORTABLE TELESCOPE.

778

00:17:06,392 --> 00:17:07,159

>> MMM-HMM.

779

00:17:07,159 --> 00:17:07,826

>> OKAY.

780

00:17:07,826 --> 00:17:08,660

>> MOST OF THE TIME WE FLY OUT

781

00:17:08,660 --> 00:17:09,361

OF SOUTHERN CALIFORNIA.

782

00:17:09,361 --> 00:17:09,995

>> RIGHT.

783

00:17:09,995 --> 00:17:11,130

>> AND, UH, BUT WE'VE DEPLOYED

784

00:17:11,130 --> 00:17:12,231

TO DIFFERENT PLACES.

785

00:17:12,231 --> 00:17:13,499

WHEN-WHEN AN EVENT HAPPENS,

786

00:17:13,499 --> 00:17:14,666

LIKE LAST YEAR'S ECLIPSE,

787

00:17:14,666 --> 00:17:16,235

YOU NEED TO BE WHERE IT HAPPENS

788

00:17:16,235 --> 00:17:17,002

IN ORDER TO SEE IT.

789

00:17:17,002 --> 00:17:17,736

>> RIGHT.

790

00:17:17,736 --> 00:17:18,437

>> THAT IS TRUE.

791

00:17:18,437 --> 00:17:19,104

>> AND, UH, WE'VE,

792

00:17:19,104 --> 00:17:19,905

SEVERAL TIMES, CAPTURED EVENTS

793

00:17:19,905 --> 00:17:20,639

THAT YOU HAVE TO BE

794

00:17:20,639 --> 00:17:21,874

AT EXACTLY THE RIGHT SPOT.

795

00:17:21,874 --> 00:17:23,375

THOSE ARE CALLED "OCCULTATIONS."

796

00:17:23,375 --> 00:17:25,277

SO, THAT'S A SHADOW OF PLUTO

797

00:17:25,277 --> 00:17:26,779

OR TRITON FALLING ON THE EARTH.

798

00:17:26,779 --> 00:17:27,546

>> OKAY.

799

00:17:27,546 --> 00:17:28,380

>> AND, SO WE'VE DEPLOYED

800

00:17:28,380 --> 00:17:29,314

TO DIFFERENT PLACES IN ORDER

801
00:17:29,314 --> 00:17:30,616
TO FLY OUR MISSIONS.

802
00:17:30,616 --> 00:17:33,752
AND EVERY SUMMER, WE TRY

803
00:17:33,752 --> 00:17:34,787
TO DO SOMETHIN' THAT YOU CAN

804
00:17:34,787 --> 00:17:35,954
NEVER DO FROM CALIFORNIA.

805
00:17:35,954 --> 00:17:36,755
AND THAT IS TO SEE

806
00:17:36,755 --> 00:17:37,689
THE SOUTHERN SKIES.

807
00:17:37,689 --> 00:17:38,490
>> OHH.

808
00:17:38,490 --> 00:17:39,224
>> AH.

809
00:17:39,224 --> 00:17:40,025
>> SO, WE WILL RELOCATE

810
00:17:40,025 --> 00:17:40,793
OUR BASE OF OPERATIONS FOR

811
00:17:40,793 --> 00:17:41,693
TWO MONTHS TO CHRISTCHURCH,

812
00:17:41,693 --> 00:17:42,428
NEW ZEALAND.

813
00:17:42,428 --> 00:17:43,128

>> OKAY, YEAH.

814

00:17:43,128 --> 00:17:43,796

>> SO, THE EARTH IS

815

00:17:43,796 --> 00:17:44,463

A BIG SPHERE.

816

00:17:44,463 --> 00:17:45,364

WE LIVE UP HERE.

817

00:17:45,364 --> 00:17:46,131

SO, WE CAN ALWAYS SEE

818

00:17:46,131 --> 00:17:47,299

THESE STARS, AND SOMETIMES

819

00:17:47,299 --> 00:17:48,200

WE CAN SEE THESE STARS,

820

00:17:48,200 --> 00:17:49,067

AND SOMETIMES WE CAN SEE

821

00:17:49,067 --> 00:17:49,902

THESE STARS BUT WE CAN NEVER

822

00:17:49,902 --> 00:17:50,903

SEE THESE STARS!

823

00:17:50,903 --> 00:17:51,770

>> NEVER, UNLESS YOU GO

824

00:17:51,770 --> 00:17:52,404

DOWN THERE, YEAH.

825

00:17:52,404 --> 00:17:53,138

>> SO, WE RELOCATE DOWN

826
00:17:53,138 --> 00:17:53,972
TO HERE SO THAT WE CAN SEE

827
00:17:53,972 --> 00:17:54,706
THESE STARS.

828
00:17:54,706 --> 00:17:55,374
>> PRETTY COOL.

829
00:17:55,374 --> 00:17:56,141
>> VERY COOL.

830
00:17:56,141 --> 00:17:56,975
I THINK WE HAVE TIME FOR

831
00:17:56,975 --> 00:17:57,776
A COUPLE MORE QUESTIONS.

832
00:17:57,776 --> 00:17:58,444
>> I THINK WE DO.

833
00:17:58,444 --> 00:17:59,077
>> GREAT!

834
00:17:59,077 --> 00:17:59,745
>> SO I'M GONNA SQUEEZE 'EM

835
00:17:59,745 --> 00:18:00,312
IN THERE.

836
00:18:00,312 --> 00:18:00,946
WELL, HOW OFTEN DO YOU

837
00:18:00,946 --> 00:18:01,647
GO UP ON SOFIA.

838
00:18:01,647 --> 00:18:03,081

UH, I DON'T FLY THAT OFTEN.

839

00:18:03,081 --> 00:18:04,750

I MOSTLY PLAN MISSIONS.

840

00:18:04,750 --> 00:18:05,784

UH, I'M A BACKUP

841

00:18:05,784 --> 00:18:06,718

MISSION DIRECTOR WHEN

842

00:18:06,718 --> 00:18:08,053

THEY NEED SOMEBODY EXTRA.

843

00:18:08,053 --> 00:18:09,988

UH, SO, I'VE FLOWN ABOUT

844

00:18:09,988 --> 00:18:12,157

40 MISSIONS OVER SEVEN YEARS.

845

00:18:12,157 --> 00:18:13,492

UH, WE HAVE PEOPLE THAT HAVE

846

00:18:13,492 --> 00:18:14,827

FLOWN AS MANY AS 200 MISSIONS.

847

00:18:14,827 --> 00:18:15,561

>> MMM-HMM.

848

00:18:15,561 --> 00:18:16,428

>> WE FLEW LAST NIGHT.

849

00:18:16,428 --> 00:18:17,162

>> OH REALLY?

850

00:18:17,162 --> 00:18:17,996

>> WE ARE FLYING TONIGHT.

851
00:18:17,996 --> 00:18:19,364
WE ARE FLYING TOMORROW NIGHT.

852
00:18:19,364 --> 00:18:20,165
>> OKAY.

853
00:18:20,165 --> 00:18:21,233
>> GO TO F-- GO TO, UH, UH,

854
00:18:21,233 --> 00:18:22,401
YOUR FAVORITE AVIATION WEBSITE

855
00:18:22,401 --> 00:18:23,402
AND PUT IN THE TAIL NUMBER

856
00:18:23,402 --> 00:18:25,671
NASA747 AND YOU CAN FIND US

857
00:18:25,671 --> 00:18:27,005
TAKING OFF TONIGHT

858
00:18:27,005 --> 00:18:27,906
AROUND SUNSET.

859
00:18:27,906 --> 00:18:28,740
>> WOW, RIGHT.

860
00:18:28,740 --> 00:18:29,441
>> AND FLYING AROUND FOR

861
00:18:29,441 --> 00:18:30,108
TEN HOURS.

862
00:18:31,343 --> 00:18:30,776
>> THAT'S PRETTY COOL.

863
00:18:31,343 --> 00:18:32,110

>> RIGHT, SO PEOPLE CAN TRACK

864

00:18:32,110 --> 00:18:32,711
THESE THINGS. COOL.

865

00:18:32,711 --> 00:18:33,712
UM, ONE PERSON WAS CHECKING,

866

00:18:33,712 --> 00:18:35,080
IS IT A RADIO TELESCOPE?

867

00:18:35,080 --> 00:18:36,114
AND I THINK IT'S JUST--

868

00:18:36,114 --> 00:18:37,182
>> IT IS NOT A RADIO TELESCOPE.

869

00:18:37,182 --> 00:18:38,917
IT LOOKS LIKE A-A VISIBLE

870

00:18:38,917 --> 00:18:40,285
TELESCOPE BUT IT HAS THE RIGHT

871

00:18:40,285 --> 00:18:41,887
COATINGS AND THE RIGHT OPTICS

872

00:18:41,887 --> 00:18:43,689
SO THAT IT WORKS FOR BOTH

873

00:18:43,689 --> 00:18:45,257
VISIBLE AND INFRARED.

874

00:18:45,257 --> 00:18:46,658
>> ALL RIGHT. OKAY.

875

00:18:46,658 --> 00:18:47,526
>> WE CAN GO OUT TO ABOUT

876

00:18:47,526 --> 00:18:48,627

A MILLIMETER ON A GOOD DAY.

877

00:18:48,627 --> 00:18:49,495

>> MMM-HMM.

878

00:18:49,495 --> 00:18:50,596

>> THE SCIENCE NERDS KNOW

879

00:18:50,596 --> 00:18:51,330

WHAT I'M TALKING ABOUT.

880

00:18:51,330 --> 00:18:52,064

>> OH, RIGHT.

881

00:18:52,064 --> 00:18:54,166

>> SO, IF OUR USERS AT HOME--

882

00:18:54,166 --> 00:18:55,133

OUR VIEWERS AT HOME

883

00:18:55,133 --> 00:18:57,002

WANTED TO RECREATE YOUR LOOK,

884

00:18:57,002 --> 00:18:58,337

WHAT WOULD THEY MI--

885

00:18:58,337 --> 00:18:59,505

WHAT WOULD THEY NEED TO DO?

886

00:18:59,505 --> 00:19:00,706

>> UH, MOSTLY IT'S NOT

887

00:19:00,706 --> 00:19:01,607

THAT HARD.

888

00:19:01,607 --> 00:19:03,208

SO, GO TO, UH, YOUR FAVORITE

889

00:19:03,208 --> 00:19:04,743

HARDWARE STORE AND BUY YOURSELF

890

00:19:04,743 --> 00:19:05,711

A PAINTER'S SMOCK

891

00:19:05,711 --> 00:19:06,845

OR SOMETHING LIKE THAT.

892

00:19:06,845 --> 00:19:08,747

AND THEN, GO FIND SOME

893

00:19:08,747 --> 00:19:09,615

GREAT IMAGES.

894

00:19:09,615 --> 00:19:10,849

SO, GO TO NASA.GOV,

895

00:19:10,849 --> 00:19:11,917

DOWNLOAD PICTURES OF

896

00:19:11,917 --> 00:19:13,285

THE MEATBALLS OR THINGS

897

00:19:13,285 --> 00:19:14,219

LIKE THAT AND MAKE 'EM

898

00:19:14,219 --> 00:19:15,487

BIG AND BRIGHT AND STAPLE 'EM

899

00:19:15,487 --> 00:19:16,788

ALL OVER YOUR UNIFORM.

900

00:19:16,788 --> 00:19:17,823

UH, YOU'LL HAVE A HARD TIME

901
00:19:17,823 --> 00:19:18,590
FINDING THIS ONE.

902
00:19:18,590 --> 00:19:19,791
THIS ONE'S KINDA MY FAVORITE.

903
00:19:19,791 --> 00:19:21,360
THIS IS THE SOFIA MISSION

904
00:19:21,360 --> 00:19:22,394
OPERATIONS.

905
00:19:22,394 --> 00:19:24,196
SO, SOFIAMOPS.

906
00:19:27,032 --> 00:19:24,997
>> SOFIAMOPS.

907
00:19:27,032 --> 00:19:28,400
>> SO, COUPLE FINAL SHOUT-OUTS

908
00:19:28,400 --> 00:19:29,334
FOR YOU, KEN.

909
00:19:29,334 --> 00:19:30,068
>> YEAH!

910
00:19:30,068 --> 00:19:31,436
>> UH, FLYOVER TWITCHCON,

911
00:19:31,436 --> 00:19:32,271
THAT'S COMIN' UP.

912
00:19:32,271 --> 00:19:33,305
>> OKAY.

913
00:19:33,305 --> 00:19:34,573

>> PEOPLE WANNA SEE YOU.

914

00:19:34,573 --> 00:19:37,643
AND "KEN, THAT MAN IS HOT."

915

00:19:37,643 --> 00:19:39,778
"KEN LOOKS THE COOLEST

916

00:19:39,778 --> 00:19:41,713
SO FAR, FOR SURE."

917

00:19:41,713 --> 00:19:43,048
SO, YOU GOT

918

00:19:43,048 --> 00:19:44,049
A COUPLE VOTES THERE.

919

00:19:44,049 --> 00:19:44,883
>> HURRAY.

920

00:19:44,883 --> 00:19:47,352
>> THANK YOU. THANK YOU, KEN.

921

00:19:47,352 --> 00:19:48,587
WE APPRECIATE IT.

922

00:19:48,587 --> 00:19:49,388
>> ALL RIGHT. THANKS, DANIELLE.

923

00:19:49,388 --> 00:19:50,122
THANKS, ABBY.

924

00:19:50,122 --> 00:19:50,856
>> AND FOR OUR VIEWERS

925

00:19:50,856 --> 00:19:52,024
THAT ARE FILLING IN, UH,

926
00:19:52,024 --> 00:19:53,158
MAKE SURE YOU GUYS VOTE

927
00:19:53,158 --> 00:19:54,793
FOR YOUR FAVORITE COSTUMES

928
00:19:54,793 --> 00:19:56,328
AND DON'T FORGET, IF YOU GUYS

929
00:19:56,328 --> 00:19:58,130
DO USE AND OF THESE LOOKS

930
00:19:58,130 --> 00:19:59,364
OR WEAR AND SPACE-THEMED

931
00:19:59,364 --> 00:20:00,999
COSTUMES MAKE SURE YOU TAG US

932
00:20:00,999 --> 00:20:02,568
ON SOCIAL MEDIA WITH

933
00:20:02,568 --> 00:20:06,138
THE HASHTAG #NASACOSTUMES.

934
00:20:06,138 --> 00:20:07,272
>> EXCELLENT, ALL RIGHT.

935
00:20:07,272 --> 00:20:08,607
WHO IS UP NEXT, DANIELLE?

936
00:20:08,607 --> 00:20:10,342
>> UM, I THINK WE HAVE

937
00:20:10,342 --> 00:20:12,077
TED AND CHRISTINA.

938
00:20:12,077 --> 00:20:13,378

SO YOU GUYS, GO AHEAD,

939

00:20:13,378 --> 00:20:15,781

COME ON OUT.

940

00:20:15,781 --> 00:20:17,349

>> OH, YEAH.

941

00:20:18,584 --> 00:20:20,419

[LAUGHTER]

942

00:20:20,419 --> 00:20:23,155

THE CHOREOGRAPHY!

943

00:20:23,155 --> 00:20:26,091

WELL, WELCOME, WELCOME.

944

00:20:26,091 --> 00:20:27,159

>> THOSE ARE SOME, UH,

945

00:20:27,159 --> 00:20:28,460

PRETTY INTERESTING 'STACHES THAT

946

00:20:28,460 --> 00:20:29,695

YOU GOT GOIN' ON OVER THERE.

947

00:20:29,695 --> 00:20:30,662

>> YES, YES, YES.

948

00:20:30,662 --> 00:20:31,430

>> I HADN'T SEEN YOU GUYS

949

00:20:31,430 --> 00:20:32,164

IN A WHILE.

950

00:20:32,164 --> 00:20:32,931

I DIDN'T, UH, KNOW YOU'D

951
00:20:32,931 --> 00:20:33,699
GROWN THOSE OUT.

952
00:20:33,699 --> 00:20:34,433
>> YEAH, YEAH.

953
00:20:34,433 --> 00:20:36,201
>> NICE. WELCOME.

954
00:20:36,201 --> 00:20:37,502
SO WHAT IS GOIN' ON HERE?

955
00:20:37,502 --> 00:20:38,837
[LAUGHTER]

956
00:20:38,837 --> 00:20:40,072
>> WELL, WELL, WE'RE-WE'RE HERE

957
00:20:40,072 --> 00:20:41,473
TO REPRESENT THE WIND TUNNELS

958
00:20:41,473 --> 00:20:42,474
AND TALK A LITTLE BIT ABOUT

959
00:20:42,474 --> 00:20:43,809
WHAT WE DO, AND SHOW YOU WHAT

960
00:20:43,809 --> 00:20:45,644
WE WEAR IN A TYPICAL WORK DAY.

961
00:20:45,644 --> 00:20:47,312
>> A TYPICAL WORK DAY.

962
00:20:47,312 --> 00:20:48,680
FIRST, LET'S INTRODUCE OURSELVES

963
00:20:48,680 --> 00:20:49,948

SO YOU GUYS CAN BE FAMILIAR

964

00:20:49,948 --> 00:20:50,782

WITH THE AUDIENCE.

965

00:20:50,782 --> 00:20:51,783

>> YEAH, YEAH.

966

00:20:51,783 --> 00:20:53,018

I'M-I'M TED GARBEFF.

967

00:20:53,018 --> 00:20:54,686

I'M AN INSTRUMENTATION ENGINEER,

968

00:20:54,686 --> 00:20:56,288

UM, IN OUR WIND TUNNELS

969

00:20:56,288 --> 00:20:57,656

HERE AT AMES RESEARCH CENTER.

970

00:20:57,656 --> 00:20:59,224

>> UH, MY NAME'S CHRISTINA NGO.

971

00:20:59,224 --> 00:21:00,726

I'M ALSO A INSTRUMENTATION

972

00:21:00,726 --> 00:21:02,127

ENGINEER IN WIND TUNNEL SYSTEMS.

973

00:21:02,127 --> 00:21:03,161

UM, WE DO A LOT--

974

00:21:03,161 --> 00:21:04,429

LITTLE MORE STRUCTURE DYNAMICS,

975

00:21:04,429 --> 00:21:06,832

AND WE BOTH DO IMAGE ANALYSIS.

976
00:21:06,832 --> 00:21:08,100
>> ALL RIGHTY, SO, YOU GUYS

977
00:21:08,100 --> 00:21:09,368
MENTIONED WIND TUNNELS.

978
00:21:09,368 --> 00:21:10,535
LIKE, WHAT ARE THOSE?

979
00:21:10,535 --> 00:21:12,204
LIKE, WHY DO WE USE THEM?

980
00:21:12,204 --> 00:21:13,171
>> YEAH, WELL, UH,

981
00:21:13,171 --> 00:21:14,673
THE FIRST A IN NASA, RIGHT,

982
00:21:14,673 --> 00:21:15,874
IS AERONAUTICS.

983
00:21:15,874 --> 00:21:18,043
AND SO NASA HAS THESE COOL IDEAS

984
00:21:18,043 --> 00:21:19,378
FOR NEW KINDS OF AIRPLANES

985
00:21:19,378 --> 00:21:20,746
AND ROCKETS AND STUFF.

986
00:21:20,746 --> 00:21:21,747
AND BEFORE YOU BUILD

987
00:21:21,747 --> 00:21:22,781
THE REAL THING, YOU WANNA

988
00:21:22,781 --> 00:21:24,116

TEST OUT YOUR IDEA

989

00:21:24,116 --> 00:21:25,083
WITHOUT BUILDING, LIKE,

990

00:21:25,083 --> 00:21:25,917
THE FULL-SCALE THING.

991

00:21:25,917 --> 00:21:26,618
AND THAT'S WHAT WE USE

992

00:21:26,618 --> 00:21:27,486
WIND TUNNELS FOR.

993

00:21:27,486 --> 00:21:28,487
UM, AND INCIDENTALLY,

994

00:21:28,487 --> 00:21:29,655
YOU KNOW, I SAID ROCKETS

995

00:21:29,655 --> 00:21:30,789
AND WIND TUNNELS.

996

00:21:30,789 --> 00:21:31,623
YOU MIGHT THINK,

997

00:21:31,623 --> 00:21:32,491
"OH, ROCKETS ARE IN SPACE.

998

00:21:32,491 --> 00:21:33,392
THERE'S NO AIR IN SPACE."

999

00:21:33,392 --> 00:21:34,493
BUT THE HARDEST THING

1000

00:21:34,493 --> 00:21:35,794
ABOUT BUILDING A ROCKET

1001
00:21:35,794 --> 00:21:36,795
IS GETTING THROUGH THE AIR

1002
00:21:36,795 --> 00:21:37,929
TO GET TO SPACE.

1003
00:21:37,929 --> 00:21:38,964
>> OKAY, GETTING IT OFF

1004
00:21:38,964 --> 00:21:39,765
OF EARTH.

1005
00:21:39,765 --> 00:21:40,565
>> WE DO A LOT OF TESTING

1006
00:21:40,565 --> 00:21:41,366
ROCKETS IN THE WIND TUNNELS.

1007
00:21:41,366 --> 00:21:42,100
>> ALL RIGHT.

1008
00:21:42,100 --> 00:21:42,901
>> AND HERE AT AMES, WE HAVE

1009
00:21:42,901 --> 00:21:43,969
SOME REALLY COOL WIND TUNNELS.

1010
00:21:43,969 --> 00:21:44,970
WE'VE GOT THE BIGGEST

1011
00:21:44,970 --> 00:21:46,138
WIND TUNNEL IN THE WORLD,

1012
00:21:46,138 --> 00:21:47,172
THE NATIONAL FULL-SCALE

1013
00:21:47,172 --> 00:21:48,073

AERODYNAMICS COMPLEX.

1014

00:21:48,073 --> 00:21:50,575

IT'S 80 BY 120 FEET WIDE

1015

00:21:50,575 --> 00:21:51,610

TEST SECTION, SO YOU CAN FIT

1016

00:21:51,610 --> 00:21:53,278

FULL-SIZE AIRCRAFT IN IT.

1017

00:21:53,278 --> 00:21:54,546

>> THAT'S RIDICULOUSLY HUGE.

1018

00:21:54,546 --> 00:21:56,314

>> WE ALSO HAVE REALLY FAST

1019

00:21:56,314 --> 00:21:57,182

WIND TUNNELS.

1020

00:21:57,182 --> 00:21:58,150

WE HAVE THE UNITARY PLAN

1021

00:21:58,150 --> 00:21:59,084

WIND TUNNEL, WHICH CAN GO UP

1022

00:21:59,084 --> 00:22:00,952

TO MACH 2.5 AND 2 ATMOSPHERES

1023

00:22:00,952 --> 00:22:02,220

OF PRESSURE AND DO LOTS

1024

00:22:02,220 --> 00:22:03,055

OF DIFFERENT THINGS.

1025

00:22:03,055 --> 00:22:04,022

>> I THINK WE HAVE A PHOTO OF--

1026

00:22:04,022 --> 00:22:05,557

I THINK-- I THINK THIS IS

1027

00:22:05,557 --> 00:22:06,658

THE UNITARY PLAN.

1028

00:22:06,658 --> 00:22:07,426

CAN WE GO AHEAD AND BRING

1029

00:22:07,426 --> 00:22:08,960

THAT UP ON SCREEN?

1030

00:22:08,960 --> 00:22:10,529

>> OH, YEAH.

1031

00:22:10,529 --> 00:22:11,196

>> CHRISTINA CAN TALK

1032

00:22:11,196 --> 00:22:12,097

ABOUT THAT.

1033

00:22:12,097 --> 00:22:13,231

>> SO, UH, WHEN-- SOME OF

1034

00:22:13,231 --> 00:22:14,032

THE TECHNIQUES WE USE,

1035

00:22:14,032 --> 00:22:15,767

IT'S ACTUALLY IMAGE PROCESSING,

1036

00:22:15,767 --> 00:22:18,837

AND WE USE, UH, VERY NICE,

1037

00:22:18,837 --> 00:22:20,005

NEON PINK PAINT.

1038

00:22:20,005 --> 00:22:20,806

AND ONE OF--

1039

00:22:20,806 --> 00:22:22,040

WHAT THIS PAINT DOES IS, UH,

1040

00:22:22,040 --> 00:22:23,375

IT'S PRESSURE SENSITIVE.

1041

00:22:23,375 --> 00:22:24,309

SO WE ILLUMINATE WITH

1042

00:22:24,309 --> 00:22:25,243

U.V. LIGHTS.

1043

00:22:25,243 --> 00:22:26,111

>> OKAY.

1044

00:22:26,111 --> 00:22:27,112

>> AND, UH, DEPENDING ON

1045

00:22:27,112 --> 00:22:28,046

HOW MUCH IS ILLUMINATED

1046

00:22:28,046 --> 00:22:28,780

IS ACTUALLY PROPORTIONAL

1047

00:22:28,780 --> 00:22:29,715

TO PRESSURE.

1048

00:22:29,715 --> 00:22:32,150

SO, A LOT OF THE TIMES, UM,

1049

00:22:32,150 --> 00:22:33,785

YOU COULD SEE LITTLE TINY PORTS.

1050

00:22:33,785 --> 00:22:34,786

YOU SEE THE LITTLE BLACK DOTS

1051
00:22:34,786 --> 00:22:35,620
ON THE MODEL?

1052
00:22:35,620 --> 00:22:36,688
SO YOU'RE MEASURING PRESSURES.

1053
00:22:36,688 --> 00:22:37,589
>> YEP, OKAY.

1054
00:22:37,589 --> 00:22:39,057
>> WITH OUR IMAGING TECHNIQUE,

1055
00:22:39,057 --> 00:22:40,325
BASICALLY, EVERY SINGLE PIXEL

1056
00:22:40,325 --> 00:22:41,526
IS A PRESSURE MEASUREMENT.

1057
00:22:41,526 --> 00:22:42,694
SO YOU'RE BASICALLY MEASURING

1058
00:22:42,694 --> 00:22:43,995
MILLIONS OF PRESSURES

1059
00:22:43,995 --> 00:22:45,130
ON THE SURFACE OF THE MODEL.

1060
00:22:45,130 --> 00:22:46,064
>> OKAY, BECAUSE THE PAINT

1061
00:22:46,064 --> 00:22:47,132
IS LIKE A SENSOR, RIGHT?

1062
00:22:47,132 --> 00:22:48,066
>> EXACTLY, THE PAINT IS

1063
00:22:48,066 --> 00:22:48,867

A SENSOR.

1064

00:22:48,867 --> 00:22:49,701

>> IT'S REACTING TO

1065

00:22:49,701 --> 00:22:50,402

THE AIR PRESSURE.

1066

00:22:50,402 --> 00:22:51,136

I GOT TO WRITE ABOUT THIS ONCE.

1067

00:22:51,136 --> 00:22:51,903

IT WAS VERY EXCITING.

1068

00:22:51,903 --> 00:22:52,671

>> YEAH.

1069

00:22:52,671 --> 00:22:53,772

>> SO, LIKE, THE-THE AIR IS

1070

00:22:53,772 --> 00:22:54,973

BLASTING AGAINST THAT MODEL,

1071

00:22:54,973 --> 00:22:56,041

AND YOU CAN MEASURE THE PRESSURE

1072

00:22:56,041 --> 00:22:56,908

THAT'S HITTING IT?

1073

00:22:56,908 --> 00:22:58,276

>> YEAH, SO, THE-THE-THE PAINT

1074

00:22:58,276 --> 00:22:59,244

ACTUALLY GETS QUENCHED

1075

00:22:59,244 --> 00:23:00,212

BY OXYGEN.

1076
00:23:00,212 --> 00:23:01,713
UM, AND DEPENDS HOW MUCH OXYGEN

1077
00:23:01,713 --> 00:23:02,848
IS ON THERE-- THAT'S HOW MUCH

1078
00:23:02,848 --> 00:23:04,049
THE PAINT IS ILLUMINATED,

1079
00:23:04,049 --> 00:23:04,916
WHICH IS HOW WE GET

1080
00:23:04,916 --> 00:23:05,550
THE PRESSURES.

1081
00:23:05,550 --> 00:23:06,218
>> ALL RIGHT,

1082
00:23:06,218 --> 00:23:07,119
THAT'S PRETTY COOL.

1083
00:23:07,119 --> 00:23:08,019
A ZILLION LITTLE POINTS.

1084
00:23:08,019 --> 00:23:08,687
SUPER COOL.

1085
00:23:08,687 --> 00:23:09,921
WHAT-WHAT WAS THAT MODEL?

1086
00:23:09,921 --> 00:23:10,989
>> OH, THAT WAS THE SPACE

1087
00:23:10,989 --> 00:23:13,024
LAUNCH SYSTEM, WHICH IS, UH,

1088
00:23:13,024 --> 00:23:14,659

ONE OF THE-THE NEW BIG ROCKETS

1089

00:23:14,659 --> 00:23:15,794

NASA'S WORKING ON.

1090

00:23:15,794 --> 00:23:16,762

>> OKAY, THAT'S ACTUALLY--

1091

00:23:16,762 --> 00:23:17,529

THAT'S PRETTY COOL.

1092

00:23:17,529 --> 00:23:18,330

YOU GUYS GET TO--

1093

00:23:18,330 --> 00:23:19,030

>> YEAH, WE ALSO--

1094

00:23:19,030 --> 00:23:19,831

WE ALSO, LIKE, SUPPORT

1095

00:23:19,831 --> 00:23:20,632

COMMERCIAL SPACE LAUNCH.

1096

00:23:20,632 --> 00:23:21,600

SO, WE WORK WITH

1097

00:23:21,600 --> 00:23:22,734

BOEING AND SPACEX,

1098

00:23:22,734 --> 00:23:23,869

UNITED LAUNCH ALLIANCE.

1099

00:23:23,869 --> 00:23:24,669

>> OKAY.

1100

00:23:24,669 --> 00:23:25,470

>> UM, ANYTHING COMMERCIAL

1101
00:23:25,470 --> 00:23:26,571
CREW RELATED, TOO.

1102
00:23:26,571 --> 00:23:27,272
>> COOL, A LOTTA

1103
00:23:27,272 --> 00:23:28,073
DIFFERENT THINGS.

1104
00:23:28,073 --> 00:23:28,807
I'VE GOT SOME QUESTIONS

1105
00:23:28,807 --> 00:23:30,041
AND COMMENTS, LIKE,

1106
00:23:30,041 --> 00:23:31,243
"THAT'S SO COOL!"

1107
00:23:31,243 --> 00:23:32,043
[LAUGHTER]

1108
00:23:32,043 --> 00:23:32,744
I DON'T KNOW WHAT

1109
00:23:32,744 --> 00:23:33,478
THEY'RE REFERRING TO,

1110
00:23:33,478 --> 00:23:34,146
BUT IT'S ALL COOL.

1111
00:23:34,146 --> 00:23:34,813
>> YEAH.

1112
00:23:34,813 --> 00:23:36,281
>> UM, "I BET WIND TUNNELS

1113
00:23:36,281 --> 00:23:37,149

ARE SUPER FUN TO

1114

00:23:37,149 --> 00:23:37,916
MESS AROUND WITH."

1115

00:23:37,916 --> 00:23:38,850
>> YEAH.

1116

00:23:38,850 --> 00:23:39,818
>> WOULD YOU AGREE?

1117

00:23:39,818 --> 00:23:40,585
>> ABSOLUTELY.

1118

00:23:40,585 --> 00:23:41,286
>> YEAH, YEAH, IT'S FUN.

1119

00:23:41,286 --> 00:23:42,287
BUT IT'S DEFINITELY, LIKE,

1120

00:23:42,287 --> 00:23:43,922
YOU KNOW, A DANGEROUS WORK AREA.

1121

00:23:43,922 --> 00:23:45,190
>> YEAH, IS THAT-- IS THAT

1122

00:23:45,190 --> 00:23:46,958
WHY YOU GUYS GOT THESE, UH--

1123

00:23:46,958 --> 00:23:48,560
>> YEAH, OFTENTIMES YOU'RE

1124

00:23:48,560 --> 00:23:49,361
GETTING-- YOU KNOW,

1125

00:23:49,361 --> 00:23:50,362
THERE'S LOTS OF, YOU KNOW,

1126

00:23:50,362 --> 00:23:51,963

HYDRAULIC FLUID, AND...

1127

00:23:51,963 --> 00:23:52,798

>> YEAH, THINGS WE HAVE

1128

00:23:52,798 --> 00:23:53,765

TO INSTALL, LIKE, THE-THE PAINT

1129

00:23:53,765 --> 00:23:55,033

ISN'T VERY SAFE, EITHER,

1130

00:23:55,033 --> 00:23:56,001

TO THE SKIN.

1131

00:23:56,001 --> 00:23:57,636

SO, WE KINDA WEAR THESE SUITS

1132

00:23:57,636 --> 00:23:58,837

TO MAKE SURE WE GET,

1133

00:23:58,837 --> 00:23:59,871

YOU KNOW-- SAFETY.

1134

00:23:59,871 --> 00:24:00,806

>> YEAH.

1135

00:24:00,806 --> 00:24:01,840

>> OFTENTIMES WE'RE USING

1136

00:24:01,840 --> 00:24:03,742

REALLY BRIGHT LIGHT SOURCES,

1137

00:24:03,742 --> 00:24:05,577

LASERS, OR ULTRAVIOLET LIGHT,

1138

00:24:05,577 --> 00:24:06,878

SO, YOU KNOW, WEARING

1139

00:24:06,878 --> 00:24:08,547

EYE PROTECTION IS IMPORTANT.

1140

00:24:08,547 --> 00:24:10,682

>> SO, IF WE WANT TO DO THIS

1141

00:24:10,682 --> 00:24:12,150

AT HOME, WHAT WOULD YOU MIGHT--

1142

00:24:12,150 --> 00:24:13,285

WHAT MIGHT YOU SUGGEST FOR

1143

00:24:13,285 --> 00:24:15,187

OUR COSTUME IDEAS?

1144

00:24:15,187 --> 00:24:16,521

>> WELL, UH, I THINK GOING

1145

00:24:16,521 --> 00:24:17,489

TO THE HOME IMPROVEMENT STORE

1146

00:24:17,489 --> 00:24:18,356

FOR US, TOO, GETTING

1147

00:24:18,356 --> 00:24:19,591

A NICE PAINT SUIT.

1148

00:24:19,591 --> 00:24:20,826

>> YEAH, IT HELPS TO

1149

00:24:20,826 --> 00:24:21,459

ROLL AROUND IN LIKE

1150

00:24:21,459 --> 00:24:22,427

A PUDDLE OF OIL, THOUGH.

1151

00:24:22,427 --> 00:24:24,462

[LAUGHTER]

1152

00:24:24,462 --> 00:24:26,164

>> FOR AN AUTHENTIC TOUCH.

1153

00:24:26,164 --> 00:24:26,998

>> AND YOU HAVE TO HAVE

1154

00:24:26,998 --> 00:24:28,433

A MOUSTACHE WHERE WE WORK.

1155

00:24:28,433 --> 00:24:30,035

>> SPEAKING OF THAT,

1156

00:24:30,035 --> 00:24:31,203

I HAVE A QUESTION.

1157

00:24:31,203 --> 00:24:32,871

TED, CHRISTINA, "HOW CAN I

1158

00:24:32,871 --> 00:24:34,272

GROW A MOUSTACHE LIKE THAT?"

1159

00:24:34,272 --> 00:24:35,173

[LAUGHTER]

1160

00:24:35,173 --> 00:24:37,042

>> OH, UH, BROCCOLI.

1161

00:24:37,042 --> 00:24:38,643

>> BROCCOLI, YES, YES.

1162

00:24:38,643 --> 00:24:41,279

IT'S ALL ABOUT DIET. YEAH.

1163

00:24:41,279 --> 00:24:42,180

>> I'D LIKE TO POINT OUT

1164

00:24:42,180 --> 00:24:42,914
THE GLASSES.

1165

00:24:42,914 --> 00:24:43,648
>> YES.

1166

00:24:43,648 --> 00:24:44,282
>> YOU CAN PICK UP

1167

00:24:44,282 --> 00:24:44,983
WHEREVER YOU PICK UP

1168

00:24:44,983 --> 00:24:45,817
YOUR HIGH POWERED LASER.

1169

00:24:45,817 --> 00:24:46,585
>> OKAY.

1170

00:24:46,585 --> 00:24:47,252
>> ALL RIGHT,

1171

00:24:47,252 --> 00:24:48,053
WHILE YOU'RE THERE,

1172

00:24:48,053 --> 00:24:48,887
YOU CAN GET THE GLASSES.

1173

00:24:48,887 --> 00:24:49,554
>> BE SURE TO GET SOME

1174

00:24:49,554 --> 00:24:50,388
EYE PROTECTION, YEAH.

1175

00:24:50,388 --> 00:24:51,089
>> I HAVE A COUPLE QUICK

1176
00:24:51,089 --> 00:24:52,924
QUESTIONS ABOUT YOUR EDUCATION.

1177
00:24:52,924 --> 00:24:54,292
"WHAT TRAINING AND EDUCATION

1178
00:24:54,292 --> 00:24:55,994
DID YOU NEED TO DO WHAT YOU DO?"

1179
00:24:55,994 --> 00:24:57,229
AND RELATED: "DOES NASA

1180
00:24:57,229 --> 00:24:58,396
LIKE ELECTRICAL ENGINEERS

1181
00:24:58,396 --> 00:24:59,831
OR MECHANICAL ENGINEERS WITH

1182
00:24:59,831 --> 00:25:02,534
A FOCUS IN AEROSPACE MORE?"

1183
00:25:02,534 --> 00:25:03,702
WHICH MIGHT BE A BETTER PATH

1184
00:25:03,702 --> 00:25:04,836
TO DO WHAT YOU DO?

1185
00:25:04,836 --> 00:25:05,737
>> SO FOR OUR BRANCH,

1186
00:25:05,737 --> 00:25:06,805
ACTUALLY, WE HAVE, UH,

1187
00:25:06,805 --> 00:25:07,639
ELECTRICAL ENGINEERS,

1188
00:25:07,639 --> 00:25:08,473

MECHANICAL ENGINEERS,

1189

00:25:08,473 --> 00:25:09,674

AND AEROSPACE ENGINEERS.

1190

00:25:09,674 --> 00:25:10,976

UM, I [INDISTINCT] AS

1191

00:25:10,976 --> 00:25:12,043

A MECHANICAL ENGINEER,

1192

00:25:12,043 --> 00:25:12,911

BUT I CONCENTRATE MORE

1193

00:25:12,911 --> 00:25:14,045

IN, UH, AERODYNAMICS.

1194

00:25:14,045 --> 00:25:14,880

AND I THINK--

1195

00:25:14,880 --> 00:25:15,647

>> YEAH, I'M AN AEROSPACE

1196

00:25:15,647 --> 00:25:17,349

ENGINEER. UM, BUT YEAH,

1197

00:25:17,349 --> 00:25:18,817

A LOT OF WHAT WE DO IS,

1198

00:25:18,817 --> 00:25:20,619

UM, YOU KNOW, RELATED TO

1199

00:25:20,619 --> 00:25:22,487

ELECTRICAL AND MECHANICAL.

1200

00:25:22,487 --> 00:25:23,989

UM, YEAH, SO IT'S NOT SO MUCH,

1201
00:25:23,989 --> 00:25:25,457
YOU KNOW, SPECIFIC TO LIKE

1202
00:25:25,457 --> 00:25:27,025
HAVING THAT RIGHT DEGREE.

1203
00:25:27,025 --> 00:25:28,560
IT'S MORE OF, LIKE, YOU KNOW,

1204
00:25:28,560 --> 00:25:29,728
HAVING THE BACKGROUND

1205
00:25:29,728 --> 00:25:30,929
AND INTEREST IN THE KIND OF

1206
00:25:30,929 --> 00:25:31,663
THINGS THAT WE DO.

1207
00:25:31,663 --> 00:25:32,530
>> MM-KAY.

1208
00:25:32,530 --> 00:25:33,531
CAN I SQUEEZE IN A FEW MORE?

1209
00:25:33,531 --> 00:25:34,399
I THINK WE HAVE TIME.

1210
00:25:34,399 --> 00:25:35,433
>> I THINK WE DO.

1211
00:25:35,433 --> 00:25:36,468
WE CAN DO ONE MORE QUESTION

1212
00:25:36,468 --> 00:25:37,235
FOR YOU GUYS.

1213
00:25:37,235 --> 00:25:38,069

>> OKAY, OKAY.

1214

00:25:38,069 --> 00:25:38,937
IN THE WIND TUNNEL,

1215

00:25:38,937 --> 00:25:40,138
HOT OR COLD AIR?

1216

00:25:40,138 --> 00:25:41,206
"DO YOU USE ONLY COLD AIR

1217

00:25:41,206 --> 00:25:42,173
OR ALSO WARM AIR?"

1218

00:25:42,173 --> 00:25:42,974
IS THE QUESTION.

1219

00:25:42,974 --> 00:25:43,942
>> THAT'S A VERY GOOD QUESTION.

1220

00:25:43,942 --> 00:25:45,143
NO, SO, W-WE, UH, WE USE

1221

00:25:45,143 --> 00:25:47,112
JUST AIR THAT WE GET

1222

00:25:47,112 --> 00:25:48,146
FROM THE OUTSIDE.

1223

00:25:48,146 --> 00:25:49,447
SO IT COULD BE HOT OR COLD,

1224

00:25:49,447 --> 00:25:50,515
BUT, UH, IT ACTUALLY CHANGES

1225

00:25:50,515 --> 00:25:51,650
SOME OF OUR VARIABLES

1226
00:25:51,650 --> 00:25:53,018
DEPENDING ON IF IT'S A HUMID DAY

1227
00:25:53,018 --> 00:25:53,919
OR NOT HUMID DAY.

1228
00:25:53,919 --> 00:25:54,819
>> OH, AH.

1229
00:25:54,819 --> 00:25:55,754
>> THERE'S OTHER TUNNELS

1230
00:25:55,754 --> 00:25:57,489
THAT USES LIKE A-A REFRIGERANT,

1231
00:25:57,489 --> 00:25:59,724
R134a, TO GET, UH, HIGHER

1232
00:25:59,724 --> 00:26:01,293
DENSITY TO-- SO YOU COULD

1233
00:26:01,293 --> 00:26:02,594
HAVE DIFFERENT FLOW PHENOMENON.

1234
00:26:02,594 --> 00:26:03,762
SO YOU COULD USE

1235
00:26:03,762 --> 00:26:05,196
ANY KINDA REALLY FLUIDS,

1236
00:26:05,196 --> 00:26:06,131
DEPENDING ON THE TUNNEL.

1237
00:26:06,131 --> 00:26:07,032
>> OH, WOW. YOU CAN CONTROL--

1238
00:26:07,032 --> 00:26:07,933

>> AND YEAH, JUST LIKE,

1239

00:26:07,933 --> 00:26:09,701

FOR REFERENCE, LIKE THE TOTAL

1240

00:26:09,701 --> 00:26:10,669

TEMPERATURE IN A TUNNEL

1241

00:26:10,669 --> 00:26:11,569

LIKE VARIES BETWEEN

1242

00:26:11,569 --> 00:26:12,771

50 DEGREES FAHRENHEIT AND 100.

1243

00:26:12,771 --> 00:26:13,905

>> OKAY.

1244

00:26:13,905 --> 00:26:14,973

>> SO THAT'S KINDA THE RANGE,

1245

00:26:14,973 --> 00:26:15,774

DEPENDING ON WHAT--

1246

00:26:15,774 --> 00:26:16,508

>> VERY COOL.

1247

00:26:16,508 --> 00:26:17,208

>> INTERESTING.

1248

00:26:17,208 --> 00:26:18,376

>> WELL, THANK YOU,

1249

00:26:18,376 --> 00:26:19,311

TED AND CHRISTINA.

1250

00:26:19,311 --> 00:26:20,712

IT HAS BEEN A PLEASURE.

1251
00:26:20,712 --> 00:26:22,514
>> YEAH, WE'LL SEE YOU

1252
00:26:22,514 --> 00:26:23,715
RIGHT BACK OUT HERE.

1253
00:26:23,715 --> 00:26:24,616
>> WE ARE, IN A MOMENT.

1254
00:26:24,616 --> 00:26:25,383
>> BECAUSE WE'RE GONNA

1255
00:26:25,383 --> 00:26:26,484
GO INTO OUR VOTING.

1256
00:26:26,484 --> 00:26:27,352
>> YEAH, SO YOU GUYS CAN

1257
00:26:27,352 --> 00:26:28,787
HEAD BACKSTAGE, AND THEN

1258
00:26:28,787 --> 00:26:29,688
WE'RE GONNA CALL YOU BACK OUT

1259
00:26:29,688 --> 00:26:31,690
ONE BY ONE FOR VOTING.

1260
00:26:31,690 --> 00:26:32,857
>> THANK YOU.

1261
00:26:32,857 --> 00:26:33,692
>> THANKS, GUYS.

1262
00:26:33,692 --> 00:26:35,627
>> SO, UH, LET'S GO AHEAD

1263
00:26:35,627 --> 00:26:37,362

AND BRING BACK OUT ALL OF

1264

00:26:37,362 --> 00:26:38,630

OUR CONTESTANTS SO THAT WE

1265

00:26:38,630 --> 00:26:40,999

CAN VOTE ON THE BEST COSTUME.

1266

00:26:40,999 --> 00:26:42,233

>> YEAH, AND PEOPLE WATCHING,

1267

00:26:42,233 --> 00:26:43,268

YOU CAN LEAVE YOUR VOTES

1268

00:26:43,268 --> 00:26:44,235

IN THE CHAT.

1269

00:26:44,235 --> 00:26:46,338

WE'LL, UH, SEE ABOUT THAT.

1270

00:26:47,672 --> 00:26:50,375

[MUSIC]

1271

00:26:50,375 --> 00:26:51,509

>> EGLE.

1272

00:26:51,509 --> 00:26:53,845

OH, CAROLINE. EMMA.

1273

00:26:53,845 --> 00:26:54,746

>> OKAY.

1274

00:26:54,746 --> 00:26:55,847

>> HERE THEY ALL ARE.

1275

00:26:55,847 --> 00:26:59,718

>> SO UP FIRST, WE HAVE EGLE.

1276
00:26:59,718 --> 00:27:00,952
>> GIVE US ANOTHER-NOTHER

1277
00:27:00,952 --> 00:27:03,054
LOOK AT THAT FINE OUTFIT.

1278
00:27:03,054 --> 00:27:05,991
BRILLIANT.

1279
00:27:05,991 --> 00:27:07,726
>> OKAY, UP NEXT WE'VE GOT

1280
00:27:07,726 --> 00:27:10,528
CAROLINE AND EMMA.

1281
00:27:10,528 --> 00:27:13,298
>> IN THEIR AJAX FLIGHT SUITS.

1282
00:27:13,298 --> 00:27:15,066
HECK, YEAH.

1283
00:27:15,066 --> 00:27:17,902
>> UP NEXT, WE'VE GOT KEN.

1284
00:27:17,902 --> 00:27:20,505
>> HIGH FLYIN' KEN.

1285
00:27:20,505 --> 00:27:22,640
FROM NASA'S FLYING TELESCOPE.

1286
00:27:22,640 --> 00:27:23,842
>> AND LAST BUT NOT LEAST,

1287
00:27:23,842 --> 00:27:26,811
WE'VE GOT TED AND CHRISTINA.

1288
00:27:26,811 --> 00:27:30,415

>> AND THEIR MOUSTACHES.

1289

00:27:30,415 --> 00:27:33,251

ALSO CONTENDING FOR THE PRIZE.

1290

00:27:33,251 --> 00:27:35,954

ALL RIGHT, YOU GUYS READY?

1291

00:27:35,954 --> 00:27:37,288

>> I THINK THEY ARE.

1292

00:27:37,288 --> 00:27:38,790

>> DUN-DA-DA-DUN!

1293

00:27:38,790 --> 00:27:41,126

THE WINNER IS KEN!

1294

00:27:41,126 --> 00:27:43,261

IT'S KEN FROM [INDISTINCT].

1295

00:27:43,261 --> 00:27:45,563

>> NICE.

1296

00:27:45,563 --> 00:27:47,198

>> CONGRATULATIONS, KEN.

1297

00:27:47,198 --> 00:27:48,633

BUT YOU GUYS ALL LOOK AMAZING.

1298

00:27:48,633 --> 00:27:49,501

>> YOU GUYS DO.

1299

00:27:49,501 --> 00:27:50,402

WELL, THANK YOU GUYS FOR

1300

00:27:50,402 --> 00:27:51,202

COMIN' ON OUR SHOW.

1301
00:27:51,202 --> 00:27:52,337
>> YEAH. EVERYBODY TAKE

1302
00:27:52,337 --> 00:27:53,338
ONE LAST LOOK BEFORE YOU

1303
00:27:53,338 --> 00:27:54,706
HEAD TO THE HARDWARE STORE,

1304
00:27:54,706 --> 00:27:55,874
WHERE MOST OF THESE OUTFITS

1305
00:27:55,874 --> 00:27:56,775
ARE COMIN' FROM.

1306
00:27:56,775 --> 00:27:58,977
[LAUGHTER]

1307
00:27:58,977 --> 00:28:00,111
THANK YOU GUYS.

1308
00:28:00,111 --> 00:28:01,413
IT'S BEEN GREAT.

1309
00:28:01,413 --> 00:28:02,514
>> AND SO FOR OUR VIEWERS

1310
00:28:02,514 --> 00:28:03,782
AT HOME, DON'T FORGET--

1311
00:28:03,782 --> 00:28:04,916
IF YOU GUYS DO END UP

1312
00:28:04,916 --> 00:28:06,718
USING SOME OF THESE, UH, LOOKS

1313
00:28:06,718 --> 00:28:09,354

OR ANY SPACE INSPIRED COSTUMES,

1314

00:28:09,354 --> 00:28:10,955

WE'D LOVE TO SEE THEM.

1315

00:28:10,955 --> 00:28:12,757

SO ON OUR-- YOU CAN GO AHEAD

1316

00:28:12,757 --> 00:28:14,592

AND TAG US ON OUR SOCIAL MEDIA

1317

00:28:14,592 --> 00:28:16,061

CHANNELS, UH, USING

1318

00:28:16,061 --> 00:28:20,098

THE HASHTAG #NASACOSTUME.

1319

00:28:20,098 --> 00:28:21,766

UM. ABBY, LIKE WHAT'S

1320

00:28:21,766 --> 00:28:23,068

GOIN' ON OVER HERE?

1321

00:28:23,068 --> 00:28:24,302

I SEE A SLIGHT CHANGE

1322

00:28:24,302 --> 00:28:25,303

IN YOUR COSTUME.

1323

00:28:25,303 --> 00:28:26,438

>> THAT'S RIGHT!

1324

00:28:26,438 --> 00:28:28,306

I DISCOVERED PLANETS!

1325

00:28:28,306 --> 00:28:30,375

I'M KEPLER, AND I DISCOVERED

1326
00:28:30,375 --> 00:28:32,410
A WHOLE BUNCH OF NEW PLANETS.

1327
00:28:32,410 --> 00:28:33,845
I'VE GOT THIS GIANT JUPITER-LIKE

1328
00:28:33,845 --> 00:28:35,580
PLANET, AND MAYBE THIS IS

1329
00:28:35,580 --> 00:28:37,282
A WATER WORLD.

1330
00:28:37,282 --> 00:28:39,451
AND IT'S JUST SO EXCITING

1331
00:28:39,451 --> 00:28:40,618
BECAUSE KEPLER DISCOVERED

1332
00:28:40,618 --> 00:28:42,387
THOUSANDS OF EXOPLANETS

1333
00:28:42,387 --> 00:28:43,588
OUT THERE.

1334
00:28:43,588 --> 00:28:46,658
SOME WERE OCEANS OF MOLTEN LAVA,

1335
00:28:46,658 --> 00:28:48,393
AND SOME WERE LIKE SUPERSIZED

1336
00:28:48,393 --> 00:28:50,428
EARTHS COVERED IN OCEANS

1337
00:28:50,428 --> 00:28:52,363
THEMSELVES-- OCEANS OF WATER

1338
00:28:52,363 --> 00:28:53,832

OR OTHER LIQUIDS.

1339

00:28:53,832 --> 00:28:55,300

AND THESE ARE JUST SOME EXAMPLES

1340

00:28:55,300 --> 00:28:57,135

OF THOSE EXCITING FINDS.

1341

00:28:57,135 --> 00:28:58,570

>> OKAY, WELL, THAT'S

1342

00:28:58,570 --> 00:28:59,637

ACTUALLY PRETTY COOL.

1343

00:28:59,637 --> 00:29:00,538

>> THANKS.

1344

00:29:00,538 --> 00:29:01,473

>> SO WE'RE GONNA MOVE

1345

00:29:01,473 --> 00:29:03,174

INTO OUR NEXT CATEGORY.

1346

00:29:03,174 --> 00:29:05,009

IT'S GONNA BE VINTAGE

1347

00:29:05,009 --> 00:29:06,177

NASA OUTFITS.

1348

00:29:06,177 --> 00:29:07,011

>> EXCELLENT.

1349

00:29:07,011 --> 00:29:08,446

>> SO THESE ARE NASA INSPIRED

1350

00:29:08,446 --> 00:29:10,348

LOOKS FROM DIFFERENT DECADES.

1351
00:29:10,348 --> 00:29:11,816
SO LET'S GO AHEAD AND BRING OUT

1352
00:29:11,816 --> 00:29:13,051
OUR GUESTS TO THE SET.

1353
00:29:13,051 --> 00:29:16,788
COME ON OUT, APRIL AND LAYNE.

1354
00:29:16,788 --> 00:29:19,057
>> HERE THEY COME.

1355
00:29:19,057 --> 00:29:19,891
>> NICE.

1356
00:29:19,891 --> 00:29:21,593
>> HI, APRIL AND LAYNE.

1357
00:29:21,593 --> 00:29:23,561
YOUR HAIR IS LOVELY TODAY.

1358
00:29:23,561 --> 00:29:24,896
>> WELCOME, LADIES.

1359
00:29:24,896 --> 00:29:26,631
>> SO COME ON OUT.

1360
00:29:26,631 --> 00:29:28,566
LET'S SEE WHAT-- YOU-YOU'VE

1361
00:29:28,566 --> 00:29:30,201
GOT SOME EXPLAINING TO DO.

1362
00:29:30,201 --> 00:29:34,205
COME ON UP HERE.

1363
00:29:34,205 --> 00:29:36,941

>> SO, UH, PLEASE INTRODUCE

1364

00:29:36,941 --> 00:29:39,544

YOURSELVES, AND TELL YOU--

1365

00:29:39,544 --> 00:29:40,645

AND TELL US, UH,

1366

00:29:40,645 --> 00:29:41,579

TELL OUR VIEWERS LIKE

1367

00:29:41,579 --> 00:29:42,647

WHAT YOU DO HERE AT AMES,

1368

00:29:42,647 --> 00:29:44,082

AND ALSO, WHAT IS YOUR COSTUME

1369

00:29:44,082 --> 00:29:46,050

THAT YOU GUYS ARE ROCKIN' TODAY?

1370

00:29:46,050 --> 00:29:46,985

>> OKAY, WELL,

1371

00:29:46,985 --> 00:29:47,952

I'M LAYNE KARAFANTIS.

1372

00:29:47,952 --> 00:29:49,487

I'M THE CENTER HISTORIAN.

1373

00:29:49,487 --> 00:29:51,589

AND, UM, THIS IS THE COSTUME

1374

00:29:51,589 --> 00:29:52,757

I WEAR EVERY DAY.

1375

00:29:52,757 --> 00:29:54,225

I'M DRESSED AS AN HISTORIAN.

1376
00:29:54,225 --> 00:29:56,961
I HAVE THE CORDUROY BLAZER

1377
00:29:56,961 --> 00:29:59,964
WITH A LAPEL PIN, AND GENERALLY

1378
00:29:59,964 --> 00:30:01,666
COVERED IN CAT HAIR.

1379
00:30:01,666 --> 00:30:03,468
UM, THIS IS ABOUT HOW

1380
00:30:03,468 --> 00:30:04,569
HISTORIANS HAVE LOOKED FOR

1381
00:30:04,569 --> 00:30:06,538
A VERY LONG TIME.

1382
00:30:06,538 --> 00:30:09,374
>> THANKS, LAYNE.

1383
00:30:09,374 --> 00:30:10,441
>> UM, AND MY NAME IS

1384
00:30:10,441 --> 00:30:11,609
APRIL GAGE.

1385
00:30:11,609 --> 00:30:12,644
I'M THE CENTER'S

1386
00:30:12,644 --> 00:30:13,745
SENIOR ARCHIVIST

1387
00:30:13,745 --> 00:30:15,480
AND ARTIFACTS MA-MANAGER.

1388
00:30:15,480 --> 00:30:18,049

AND, UM, YEAH, I MANAGE,

1389

00:30:18,049 --> 00:30:19,817

UH, HISTORICAL ASSETS

1390

00:30:19,817 --> 00:30:20,952

FOR THE CENTER.

1391

00:30:20,952 --> 00:30:23,087

UM, THAT REPRESENT, UM,

1392

00:30:23,087 --> 00:30:25,490

OUR CAPABILITIES AND OUR PEOPLE

1393

00:30:25,490 --> 00:30:26,958

AND MAKE THEM ACCESSIBLE

1394

00:30:26,958 --> 00:30:28,793

TO RESEARCHERS AND THE PUBLIC.

1395

00:30:28,793 --> 00:30:29,761

>> VERY COOL.

1396

00:30:29,761 --> 00:30:30,728

I'M SURE YOU SEE A LOT OF

1397

00:30:30,728 --> 00:30:31,696

COOL THINGS IN THERE.

1398

00:30:31,696 --> 00:30:32,530

>> I DO.

1399

00:30:32,530 --> 00:30:33,298

>> NASA ARCHIVES, YEAH.

1400

00:30:33,298 --> 00:30:34,165

SO, YOU'VE GOT A FUNKY LOOK

1401

00:30:34,165 --> 00:30:34,899

GOING ON TODAY.

1402

00:30:34,899 --> 00:30:37,202

>> OKAY, SO, AS YOU CAN SEE

1403

00:30:37,202 --> 00:30:38,770

I'M AN ARCHIVIST.

1404

00:30:38,770 --> 00:30:41,172

AND WE ACTUALLY DO WEAR

1405

00:30:41,172 --> 00:30:42,774

LAB COATS, UM, WHEN WE'RE

1406

00:30:42,774 --> 00:30:44,075

WORKING ON PRESERVATION

1407

00:30:44,075 --> 00:30:45,109

ACTIVITIES.

1408

00:30:45,109 --> 00:30:46,411

PRESERVING ARTIFACTS,

1409

00:30:46,411 --> 00:30:47,912

WORKING WITH, UM, PRESERVING

1410

00:30:47,912 --> 00:30:49,347

PHOTOGRAPHS OR DOCUMENTS.

1411

00:30:49,347 --> 00:30:50,248

>> I SEE.

1412

00:30:50,248 --> 00:30:51,115

>> OKAY.

1413

00:30:51,115 --> 00:30:52,350

>> WE ALSO DO, UM, WEAR

1414

00:30:52,350 --> 00:30:53,685

THE LAB COATS WHEN WE'RE WORKING

1415

00:30:53,685 --> 00:30:55,787

WITH, UM, BIOLOGICAL SAMPLES.

1416

00:30:55,787 --> 00:30:57,255

WE ACTUALLY DO HAVE A SAMPLE

1417

00:30:57,255 --> 00:30:59,057

ARCHIVE HERE AT AMES, AS WELL.

1418

00:30:59,057 --> 00:31:00,558

>> OH, WOW. I WOULD NEVER HAVE

1419

00:31:00,558 --> 00:31:01,693

GUESSED BIOLOGICAL SAMPLES,

1420

00:31:01,693 --> 00:31:02,627

COOL.

1421

00:31:02,627 --> 00:31:03,861

>> OKAY, SO, WHAT'S

1422

00:31:03,861 --> 00:31:05,330

THE DIFFERENCE BETWEEN

1423

00:31:05,330 --> 00:31:07,498

AN ARCHIVIST AND A HISTORIAN?

1424

00:31:07,498 --> 00:31:08,933

'CAUSE THEY SEEM LIKE

1425

00:31:08,933 --> 00:31:11,936

TWO SIDES OF THE SAME COIN.

1426

00:31:11,936 --> 00:31:13,371
>> THEY ARE VERY SIMILAR

1427

00:31:13,371 --> 00:31:14,439
PROFESSIONS.

1428

00:31:14,439 --> 00:31:15,873
AND, IN FACT, SOME ARCHIVISTS

1429

00:31:15,873 --> 00:31:16,975
ARE HISTORIANS,

1430

00:31:16,975 --> 00:31:18,076
THEY HAVE MULTIPLE DEGREES.

1431

00:31:18,076 --> 00:31:18,876
>> OKAY.

1432

00:31:18,876 --> 00:31:19,811
>> BUT, IF YOU WANTED,

1433

00:31:19,811 --> 00:31:20,945
LIKE, SORT OF, DRAW AN EASY

1434

00:31:20,945 --> 00:31:22,914
DISTINCTION, UM, I WOULD SAY

1435

00:31:22,914 --> 00:31:24,382
Y-YOU KNOW, AS AN ARCHIVIST

1436

00:31:24,382 --> 00:31:26,217
HERE, I REALLY FOCUS ON TRYING

1437

00:31:26,217 --> 00:31:27,885
TO BUILD AN EVIDENCE BASE.

1438

00:31:27,885 --> 00:31:30,088

UM, THAT REPRESENTS, YOU KNOW,

1439

00:31:30,088 --> 00:31:31,689

SORT OF PRIMARY SOURCES

1440

00:31:31,689 --> 00:31:33,057

AND UNIQUE ITEMS THAT

1441

00:31:33,057 --> 00:31:34,492

REPRESENT OUR CAPABILITIES

1442

00:31:34,492 --> 00:31:35,860

AND OUR HISTORY.

1443

00:31:35,860 --> 00:31:36,961

>> REALLY DOCUMENT THINGS

1444

00:31:36,961 --> 00:31:37,829

AND ALL THAT.

1445

00:31:37,829 --> 00:31:38,730

>> UM, AND I DON'T-- YEAH.

1446

00:31:38,730 --> 00:31:40,365

I RESEARCH AND I DO DOCUMENT,

1447

00:31:40,365 --> 00:31:41,899

BUT I DON'T TRY TO INTERPRET

1448

00:31:41,899 --> 00:31:43,401

AND I REALLY TRY TO FOCUS

1449

00:31:43,401 --> 00:31:44,469

ON BUILDING THAT BASE.

1450

00:31:44,469 --> 00:31:45,270

>> COOL.

1451
00:31:45,270 --> 00:31:46,004
>> OKAY.

1452
00:31:46,004 --> 00:31:46,838
>> AND IT WOULDN'T BE WITHOUT

1453
00:31:46,838 --> 00:31:48,139
THIS TYPE OF BASE THAT I WOULD

1454
00:31:48,139 --> 00:31:50,408
BE ABLE TO-TO DO MY RESEARCH.

1455
00:31:50,408 --> 00:31:53,077
SO, ON BEHALF OF ALL HISTORIANS,

1456
00:31:53,077 --> 00:31:54,712
UH, THANK YOU TO ALL ARCHIVISTS.

1457
00:31:54,712 --> 00:31:56,881
>> NICE.

1458
00:31:56,881 --> 00:31:57,815
>> THAT'S PRETTY COOL.

1459
00:31:57,815 --> 00:31:58,583
>> I BET THERE ARE PEOPLE

1460
00:31:58,583 --> 00:31:59,884
OUT THERE SAYING "HISTORIANS

1461
00:31:59,884 --> 00:32:01,819
AND ARCHIVISTS WORK AT NASA?"

1462
00:32:01,819 --> 00:32:02,654
SO, THAT'S COOL FOR PEOPLE

1463
00:32:02,654 --> 00:32:03,855

TO DISCOVER, RIGHT?

1464

00:32:03,855 --> 00:32:04,622

>> YEAH.

1465

00:32:04,622 --> 00:32:05,890

>> OKAY, SO, LET'S GO AHEAD

1466

00:32:05,890 --> 00:32:07,425

AND BRING UP OUR FIRST,

1467

00:32:07,425 --> 00:32:09,027

UH, VINTAGE PHOTO

1468

00:32:09,027 --> 00:32:10,428

FROM THE AMES ARCHIVE.

1469

00:32:10,428 --> 00:32:11,195

CAN WE GO AHEAD AND GET

1470

00:32:11,195 --> 00:32:12,630

THAT BROUGHT UP ON SCREEN?

1471

00:32:12,630 --> 00:32:13,831

>> THERE IT IS!

1472

00:32:13,831 --> 00:32:15,700

>> WHAT IS-WHAT IS

1473

00:32:15,700 --> 00:32:17,035

GOIN' ON HERE?

1474

00:32:17,035 --> 00:32:18,536

>> SO, UH, AMES HAS

1475

00:32:18,536 --> 00:32:19,937

A LONG HISTORY OF

1476

00:32:19,937 --> 00:32:21,072
SIMULATION RESEARCH.

1477

00:32:21,072 --> 00:32:22,807
AND ALSO HIGH, UH,

1478

00:32:22,807 --> 00:32:23,841
HIGH-END COMPUTING.

1479

00:32:23,841 --> 00:32:26,077
SO, IT MADE SENSE THAT OUR EARLY

1480

00:32:26,077 --> 00:32:27,512
EFFORTS IN VIRTUAL REALITY

1481

00:32:27,512 --> 00:32:29,280
WOULD BE GOING ON HERE.

1482

00:32:29,280 --> 00:32:32,350
THIS IS FROM THE, UH, EARLY 90s.

1483

00:32:32,350 --> 00:32:35,486
IT WAS THE, UM, VIRTUAL

1484

00:32:35,486 --> 00:32:37,322
INTERFACE ENVIRONMENT

1485

00:32:37,322 --> 00:32:39,090
WORKSTATION, OR "VIEW."

1486

00:32:39,090 --> 00:32:41,926
>> THAT'S A MOUTHFUL.

1487

00:32:41,926 --> 00:32:43,261
EARLY VR, THOUGH, RIGHT?

1488

00:32:43,261 --> 00:32:44,228

I MEAN, IT-IT LOOKS SOMETHING

1489

00:32:44,228 --> 00:32:45,863

LIKE A VR HEADSET TODAY?

1490

00:32:45,863 --> 00:32:47,465

>> THIS IS AN EARLY VR

1491

00:32:47,465 --> 00:32:49,033

AND, UM, AS YOU CAN SEE

1492

00:32:49,033 --> 00:32:51,336

IN THE PICTURE, UM, THERE IS

1493

00:32:51,336 --> 00:32:52,937

A STEREO HEAD-MOUNTED DISPLAY,

1494

00:32:52,937 --> 00:32:54,372

AND THERE ARE HEADPHONES,

1495

00:32:54,372 --> 00:32:55,707

AND THERE'S A MICROPHONE

1496

00:32:55,707 --> 00:32:57,308

AND THERE ARE DATA GLOVES

1497

00:32:57,308 --> 00:32:58,576

THAT THE WEARER

1498

00:32:58,576 --> 00:33:00,078

WOULD BE PUTTING ON.

1499

00:33:00,078 --> 00:33:02,246

AND SO, TOGETHER THIS WOULD

1500

00:33:02,246 --> 00:33:05,116

HELP, UM, PROVIDE A FEELING OF

1501
00:33:05,116 --> 00:33:07,852
S-STIMULATION FOR THE SENSES.

1502
00:33:07,852 --> 00:33:08,853
>> MM-HMM.

1503
00:33:08,853 --> 00:33:12,323
>> AND AS WELL AS, ALSO,

1504
00:33:12,323 --> 00:33:13,324
HAVING THAT ENVIRONMENT

1505
00:33:13,324 --> 00:33:14,258
SORT OF REACT TO WHAT

1506
00:33:14,258 --> 00:33:15,293
THE WEARER WAS DOING.

1507
00:33:15,293 --> 00:33:16,561
THE EYE MOVEMENTS WOULD BE

1508
00:33:16,561 --> 00:33:18,162
TRACKED BY THE OPTICS.

1509
00:33:18,162 --> 00:33:20,331
AND THE GESTURES WOULD BE,

1510
00:33:20,331 --> 00:33:22,066
YOU KNOW, WOULD ALSO BE

1511
00:33:22,066 --> 00:33:23,501
CAPTURED WITH THESE GLOVES

1512
00:33:23,501 --> 00:33:24,969
SO THAT THE PERSON COULD

1513
00:33:24,969 --> 00:33:26,270

REALLY BE MANIPULATING

1514

00:33:26,270 --> 00:33:27,572
THE ENVIRONMENT.

1515

00:33:27,572 --> 00:33:28,740
AND IT WOULD BE MOVING

1516

00:33:28,740 --> 00:33:30,208
AS THEY MOVED WITH IT.

1517

00:33:30,208 --> 00:33:32,610
AND ALSO, UM, YEAH.

1518

00:33:32,610 --> 00:33:34,245
SO, YOU REALLY FEEL IMMERSED.

1519

00:33:34,245 --> 00:33:35,079
>> YEAH, YEAH.

1520

00:33:35,079 --> 00:33:35,880
>> EVEN BACK IN

1521

00:33:35,880 --> 00:33:36,647
THE EARLY VERSIONS. COOL.

1522

00:33:36,647 --> 00:33:37,415
>> SO, WHAT'S THIS THAT

1523

00:33:37,415 --> 00:33:38,416
YOU BROUGHT OUT ON THE--

1524

00:33:38,416 --> 00:33:39,784
ON THE TABLE?

1525

00:33:39,784 --> 00:33:40,818
>> SO, THIS IS AN EXAMPLE

1526
00:33:40,818 --> 00:33:41,853
OF A DATA GLOVE.

1527
00:33:41,853 --> 00:33:42,653
>> OH, THAT'S IT!

1528
00:33:42,653 --> 00:33:43,688
>> FROM THE-- YEAH,

1529
00:33:43,688 --> 00:33:44,856
FROM THE ARCHIVE HERE.

1530
00:33:44,856 --> 00:33:47,625
>> COOL!

1531
00:33:47,625 --> 00:33:49,193
>> SORT OF STUFFED LIKE

1532
00:33:49,193 --> 00:33:50,294
A FAKE HAND.

1533
00:33:50,294 --> 00:33:52,063
>> I LIKE IT.

1534
00:33:52,063 --> 00:33:53,231
THAT'S SUPER COOL, THOUGH.

1535
00:33:53,231 --> 00:33:54,565
NOW, NOW I WAS JUST GONNA

1536
00:33:54,565 --> 00:33:56,834
SAY THAT IT'S COOL THAT THAT

1537
00:33:56,834 --> 00:33:58,403
WORKED THAT WAY EVEN BACK THEN,

1538
00:33:58,403 --> 00:33:59,670

BUT ACTUALLY I DIED A LITTLE BIT

1539

00:33:59,670 --> 00:34:00,638

INSIDE WHEN YOU SAID THAT

1540

00:34:00,638 --> 00:34:02,039

WAS FROM THE 90s.

1541

00:34:02,039 --> 00:34:03,307

BECAUSE I DON'T THINK THE 90s

1542

00:34:03,307 --> 00:34:04,542

WERE THAT LONG AGO,

1543

00:34:04,542 --> 00:34:05,576

AND THAT PICTURE LOOKS

1544

00:34:05,576 --> 00:34:06,711

REALLY, REALLY OLD.

1545

00:34:06,711 --> 00:34:07,945

SO, A LITTLE BIT SAD THERE.

1546

00:34:07,945 --> 00:34:09,947

BUT I HAVE SOME COMMENTS

1547

00:34:09,947 --> 00:34:11,115

AND QUESTIONS FOR YOU.

1548

00:34:13,651 --> 00:34:12,116

>> OKAY.

1549

00:34:13,651 --> 00:34:15,486

FIRST OF ALL. THAT IS TRUE.

1550

00:34:15,486 --> 00:34:16,788

UH, "NICE HAIR, APRIL."

1551
00:34:16,788 --> 00:34:17,822
>> THANK YOU.

1552
00:34:17,822 --> 00:34:18,790
>> AND A QUESTION FOR YOU.

1553
00:34:18,790 --> 00:34:20,925
WHAT IS YOUR FAVORITE ARTIFACT?

1554
00:34:20,925 --> 00:34:21,893
>> OH, OH.

1555
00:34:21,893 --> 00:34:22,927
>> CAN YOU CHOOSE?

1556
00:34:22,927 --> 00:34:23,761
IS IT POSSIBLE?

1557
00:34:23,761 --> 00:34:24,962
>> YOU KNOW, AS A RULE,

1558
00:34:24,962 --> 00:34:27,131
UM, I DO NOT HAVE FAVORITES.

1559
00:34:27,131 --> 00:34:28,599
UM, I-I--

1560
00:34:28,599 --> 00:34:29,400
>> I FEEL LIKE THAT'S

1561
00:34:29,400 --> 00:34:30,168
A GOOD RULE TO LIVE BY.

1562
00:34:30,168 --> 00:34:30,902
>> YEAH.

1563
00:34:30,902 --> 00:34:31,669

>> I HAVE A HARD TIME

1564

00:34:31,669 --> 00:34:32,437
WITH FAVORITES.

1565

00:34:32,437 --> 00:34:33,137
WE DO HAVE A LOT OF FUN STUFF

1566

00:34:33,137 --> 00:34:34,138
IN THE ARCHIVE.

1567

00:34:34,138 --> 00:34:35,540
IF I CAN NAME A SUITE OF

1568

00:34:35,540 --> 00:34:37,809
ARTIFACTS THAT I REALLY ENJOY,

1569

00:34:37,809 --> 00:34:39,710
THAT WOULD BE-- AND I WOULD

1570

00:34:39,710 --> 00:34:41,078
PROBABLY SPEND WAY TOO MUCH TIME

1571

00:34:41,078 --> 00:34:42,914
TALKING ABOUT THESE--

1572

00:34:42,914 --> 00:34:43,748
BUT, THERE--

1573

00:34:43,748 --> 00:34:44,615
>> JUST GIVE US A TASTE.

1574

00:34:44,615 --> 00:34:45,416
WHAT WOULD IT BE?

1575

00:34:45,416 --> 00:34:46,317
WHAT IS THE CATEGORY?

1576

00:34:46,317 --> 00:34:47,118

>> OKAY, UM, BE-BEFORE

1577

00:34:47,118 --> 00:34:48,019

WE HAD COMPUTER GRAPHICS

1578

00:34:48,019 --> 00:34:50,087

AND ALL THIS COOL VR STUFF,

1579

00:34:50,087 --> 00:34:51,489

UM, WE USED TO HIRE ARTISTS

1580

00:34:51,489 --> 00:34:54,492

TO, UM, TO PAINT OUR CONCEPTS

1581

00:34:54,492 --> 00:34:55,793

AND WHO ACTUALLY, BY HAND,

1582

00:34:55,793 --> 00:34:57,995

UM, PROVIDE THE VISUALS

1583

00:34:57,995 --> 00:34:59,063

FOR THE TECHNOLOGY

1584

00:34:59,063 --> 00:35:00,264

WE WERE DEVELOPING.

1585

00:35:00,264 --> 00:35:01,566

AND, YOU KNOW, THESE MISSIONS

1586

00:35:01,566 --> 00:35:02,533

WE THOUGHT WE WANTED

1587

00:35:02,533 --> 00:35:03,501

TO BE GOING ON.

1588

00:35:03,501 --> 00:35:04,669

AND WE CAN'T FOLLOW

1589

00:35:04,669 --> 00:35:06,070

OUR SPACECRAFT WITH A CAMERA

1590

00:35:06,070 --> 00:35:07,071

TO TAKE A PICTURE OF WHAT

1591

00:35:07,071 --> 00:35:08,406

IT'S DOING AND IF WE HAVEN'T

1592

00:35:08,406 --> 00:35:09,540

DISCOVERED IT YET, WE DON'T

1593

00:35:09,540 --> 00:35:10,641

REALLY KNOW WHAT IT LOOKS LIKE.

1594

00:35:10,641 --> 00:35:11,542

SO, WE HAVE THESE

1595

00:35:11,542 --> 00:35:12,510

ARTIST CONCEPTS.

1596

00:35:12,510 --> 00:35:13,344

>> YEAH. COOL.

1597

00:35:13,344 --> 00:35:14,212

>> SO, THERE'S AN ART COLLECTION

1598

00:35:14,212 --> 00:35:15,580

AND IT INCLUDES CONCEPTS

1599

00:35:15,580 --> 00:35:18,282

FROM THE 1970s OF OUR NOTIONS

1600

00:35:18,282 --> 00:35:20,384

OF WHAT SPACE SETTLEMENTS

1601
00:35:20,384 --> 00:35:21,619
WOULD LOOK LIKE.

1602
00:35:21,619 --> 00:35:23,054
>> I'VE GOTTEN TO SEE SOME OF

1603
00:35:23,054 --> 00:35:26,991
THEM AND THEY ARE STUNNING.

1604
00:35:26,991 --> 00:35:28,259
>> OH, COOL.

1605
00:35:28,259 --> 00:35:29,193
>> AND THEY'RE GONNA BE

1606
00:35:29,193 --> 00:35:31,496
ON EXHIBIT IN 2019 IN A LOCAL

1607
00:35:31,496 --> 00:35:32,563
MUSEUM HERE IN THE BAY AREA.

1608
00:35:32,563 --> 00:35:33,431
>> NICE.

1609
00:35:33,431 --> 00:35:34,432
>> THAT'S PRETTY COOL.

1610
00:35:34,432 --> 00:35:35,967
>> VERY COOL!

1611
00:35:35,967 --> 00:35:37,935
>> OKAY, SO, I THINK WE HAVE

1612
00:35:37,935 --> 00:35:41,639
ANOTHER, UH, AMES ARCHIVE PHOTO.

1613
00:35:41,639 --> 00:35:42,673

SO, CAN WE GO AHEAD AND GET

1614

00:35:42,673 --> 00:35:45,176

THAT BROUGHT UP ON SCREEN?

1615

00:35:45,176 --> 00:35:48,546

SO, WHAT'S GOIN' ON HERE?

1616

00:35:48,546 --> 00:35:49,881

>> OKAY, WELL, WHAT WE ARE

1617

00:35:49,881 --> 00:35:51,616

LOOKING AT ARE, UM,

1618

00:35:51,616 --> 00:35:53,451

HUMAN COMPUTERS BEFORE,

1619

00:35:53,451 --> 00:35:55,186

UM, SINCE WE'RE TALKING ABOUT

1620

00:35:55,186 --> 00:35:56,420

PRE-COMPUTING SOMETIMES,

1621

00:35:56,420 --> 00:35:57,889

BEFORE WE HAD MACHINE COMPUTING,

1622

00:35:57,889 --> 00:36:00,124

WE HAD TO USE HUMANS,

1623

00:36:00,124 --> 00:36:01,792

UM, ALONG WITH THEIR BRAINPOWER

1624

00:36:01,792 --> 00:36:03,327

AND MAYBE SOME SLIDE RULES.

1625

00:36:03,327 --> 00:36:04,228

>> YEAH.

1626
00:36:04,228 --> 00:36:05,396
>> AND SO, THESE WOMEN,

1627
00:36:05,396 --> 00:36:06,497
UM, WOULD HAVE BEEN WORKING

1628
00:36:06,497 --> 00:36:09,100
IN A WIND TUNNEL IN THE 1940s.

1629
00:36:09,100 --> 00:36:10,635
AND-- DURING WORLD WAR II

1630
00:36:10,635 --> 00:36:12,236
A LOT OF WOMEN STEPPED UP

1631
00:36:12,236 --> 00:36:13,471
TO FILL THESE HUMAN

1632
00:36:13,471 --> 00:36:15,006
COMPUTING ROLES.

1633
00:36:15,006 --> 00:36:16,807
AND, UM, THEY WOULD HAVE HAD

1634
00:36:16,807 --> 00:36:18,876
ADVANCED DEGREES IN A FIELD

1635
00:36:18,876 --> 00:36:20,444
LIKE MATHEMATICS.

1636
00:36:20,444 --> 00:36:21,579
AND WHAT THEY WOULD DO

1637
00:36:21,579 --> 00:36:22,813
IS THEY WOULD TAKE

1638
00:36:22,813 --> 00:36:24,148

ALL OF THIS RAW DATA.

1639

00:36:24,148 --> 00:36:25,483

DURING THE WAR, WE WERE DOING

1640

00:36:25,483 --> 00:36:26,984

JUST TONS AND TONS OF

1641

00:36:26,984 --> 00:36:28,352

WIND TUNNEL TESTING

1642

00:36:28,352 --> 00:36:30,788

TO TRY TO HELP, UM, IMPROVE

1643

00:36:30,788 --> 00:36:32,189

THE STABILITY AND

1644

00:36:32,189 --> 00:36:34,191

THE MANEUVERABILITY AND SPEED,

1645

00:36:34,191 --> 00:36:35,893

UM, AND HANDLING CHARACTERISTICS

1646

00:36:35,893 --> 00:36:37,428

OF AIRCRAFT IN THE WAR EFFORT.

1647

00:36:37,428 --> 00:36:38,863

AND SO, ALL OF THIS DATA

1648

00:36:38,863 --> 00:36:40,865

PUMPING THROUGH THESE TUNNELS,

1649

00:36:40,865 --> 00:36:43,067

THEY WOULD BE COLLECTING

1650

00:36:43,067 --> 00:36:44,769

AND REDUCING AND THEY WOULD BE

1651
00:36:44,769 --> 00:36:46,771
PERFORMING COMPLEX CALCULATIONS

1652
00:36:46,771 --> 00:36:48,806
TO, UM, MAKE IT INTO

1653
00:36:48,806 --> 00:36:51,175
MANAGEABLE ENGINEERING UNITS.

1654
00:36:51,175 --> 00:36:52,176
>> RIGHT.

1655
00:36:52,176 --> 00:36:53,077
>> I MEAN, THIS WAS--

1656
00:36:53,077 --> 00:36:54,045
THIS WAS FAR MORE THAN JUST

1657
00:36:54,045 --> 00:36:55,446
PURELY SECRETARIAL WORK.

1658
00:36:55,446 --> 00:36:56,914
THESE-THESE WERE HIGHLY

1659
00:36:56,914 --> 00:36:58,015
EDUCATED WOMEN.

1660
00:36:58,015 --> 00:36:58,950
>> MMM-HMM, MMM-HMM.

1661
00:36:58,950 --> 00:37:01,218
>> SO, IF OUR VIEWERS AT HOME

1662
00:37:01,218 --> 00:37:03,120
WANTED TO RECREATE THE LOOK

1663
00:37:03,120 --> 00:37:04,755

OF A HUMAN COMPUTER,

1664

00:37:04,755 --> 00:37:08,259

WHAT MIGHT WE NEED?

1665

00:37:08,259 --> 00:37:09,460

>> WELL, I SUPPOSE YOU COULD,

1666

00:37:09,460 --> 00:37:10,528

UH, IF YOU'RE GOING FOR

1667

00:37:10,528 --> 00:37:11,462

THIS ERA, YOU COULD GO TO

1668

00:37:11,462 --> 00:37:12,663

A VINTAGE CLOTHING SHOP.

1669

00:37:12,663 --> 00:37:13,598

>> YEAH.

1670

00:37:13,598 --> 00:37:15,032

>> UH, MAYBE CARRY A CLIPBOARD

1671

00:37:15,032 --> 00:37:17,301

AROUND OR A SLIDE RULE.

1672

00:37:17,301 --> 00:37:18,235

>> A LITTLE SLIDE RULE.

1673

00:37:18,235 --> 00:37:19,337

>> DEFINITELY, YOU COULD,

1674

00:37:19,337 --> 00:37:20,771

UM, IF YOU WERE VERY ADVENTUROUS

1675

00:37:20,771 --> 00:37:22,206

AND SKILLED YOU COULD DO

1676

00:37:22,206 --> 00:37:24,008

A 1940s HAIRSTYLE.

1677

00:37:24,008 --> 00:37:25,376

WHICH THEY-- THERE ARE

1678

00:37:25,376 --> 00:37:26,811

VERY SPECIFIC RULES AND A LOT

1679

00:37:26,811 --> 00:37:28,079

OF DIFFERENT VARIETIES

1680

00:37:28,079 --> 00:37:29,513

THAT YOU CAN CHOOSE FROM.

1681

00:37:29,513 --> 00:37:31,716

OR YOU COULD ALSO GET A--

1682

00:37:31,716 --> 00:37:32,683

LIKE A HAIRNET,

1683

00:37:32,683 --> 00:37:33,684

ALSO CALLED A "SNOOD."

1684

00:37:33,684 --> 00:37:34,552

>> HMM.

1685

00:37:34,552 --> 00:37:35,386

>> YES, YES.

1686

00:37:35,386 --> 00:37:36,253

>> UM, YEAH.

1687

00:37:36,253 --> 00:37:37,054

>> I'VE HEARD OF THOSE,

1688

00:37:37,054 --> 00:37:37,922

YEAH. COOL.

1689

00:37:37,922 --> 00:37:39,190

>> I DID WANT TO MENTION THAT

1690

00:37:39,190 --> 00:37:40,424

WE TRIED TO FIND OUT THE NAMES

1691

00:37:40,424 --> 00:37:42,326

OF THE WOMEN WHO ARE IN

1692

00:37:42,326 --> 00:37:43,427

THIS PHOTOGRAPH, BUT WE

1693

00:37:43,427 --> 00:37:44,729

DIDN'T HAVE ENOUGH TIME.

1694

00:37:44,729 --> 00:37:46,230

BUT THERE IS A REALLY GREAT

1695

00:37:46,230 --> 00:37:47,698

PROJECT, UH, GOING ON CALLED

1696

00:37:47,698 --> 00:37:49,367

"THE HUMAN COMPUTER PROJECT"

1697

00:37:49,367 --> 00:37:50,835

AND IT'S TRYING TO IDENTIFY

1698

00:37:50,835 --> 00:37:52,670

ALL OF THE WOMEN SCIENTISTS,

1699

00:37:52,670 --> 00:37:55,006

ENGINEERS, AND MATHEMATICIANS,

1700

00:37:55,006 --> 00:37:56,040

UH, THAT WORKED FOR

1701

00:37:56,040 --> 00:37:57,508

THE NACA AND AT NASA.

1702

00:37:57,508 --> 00:37:58,376

>> OKAY.

1703

00:37:58,376 --> 00:37:59,677

>> NICE, VERY NICE.

1704

00:37:59,677 --> 00:38:01,145

WE HAVE PLENTY OF TIME TO GET

1705

00:38:01,145 --> 00:38:02,580

INTO THIS STUFF, SO LEMME

1706

00:38:02,580 --> 00:38:04,315

THROW OUT SOME MORE QUESTIONS.

1707

00:38:04,315 --> 00:38:05,916

MORE "LOVE THE

1708

00:38:05,916 --> 00:38:06,984

PURPLE-HAIRED LADY."

1709

00:38:06,984 --> 00:38:09,053

PE-PEOPLE ARE LOVIN' APRIL

1710

00:38:09,053 --> 00:38:10,287

AND HER STORIES.

1711

00:38:10,287 --> 00:38:12,957

UM, APRIL OR LANE,

1712

00:38:12,957 --> 00:38:14,525

IS NASA USING VR TECHNOLOGY

1713

00:38:14,525 --> 00:38:16,327

TODAY AS WELL?

1714

00:38:16,327 --> 00:38:17,495

IS THAT SOMETHING YOU GUYS

1715

00:38:17,495 --> 00:38:19,363

TRACK, OR KNOW MUCH ABOUT?

1716

00:38:19,363 --> 00:38:20,464

>> THAT'S NOT SOMETHING THAT,

1717

00:38:20,464 --> 00:38:21,699

YOU KNOW, IN THE ARCHIVE,

1718

00:38:21,699 --> 00:38:23,501

I'M LOOKING MORE IN THE PAST.

1719

00:38:23,501 --> 00:38:24,869

UM, BUT, YOU KNOW,

1720

00:38:24,869 --> 00:38:26,971

OUR HUMAN PERFORMANCE LAB, UM--

1721

00:38:26,971 --> 00:38:28,873

>> RIGHT. OR, UM,

1722

00:38:28,873 --> 00:38:30,641

WHERE THE VIEW WAS DEVELOPED,

1723

00:38:30,641 --> 00:38:31,976

THE HUMAN SYSTEMS

1724

00:38:31,976 --> 00:38:33,077

INTEGRATION DIVISION.

1725

00:38:33,077 --> 00:38:34,011

>> YES.

1726

00:38:34,011 --> 00:38:35,012

>> UH, IS MAYBE NOT LOOKING

1727

00:38:35,012 --> 00:38:36,313

NECESSARILY IN TO VR,

1728

00:38:36,313 --> 00:38:37,882

BUT CERTAINLY RELATED THINGS.

1729

00:38:37,882 --> 00:38:38,749

>> OKAY, YEAH.

1730

00:38:38,749 --> 00:38:40,051

>> MAYBE THE NEXT BEST THING.

1731

00:38:40,051 --> 00:38:42,219

>> YEAH, THE NEXT VERSION.

1732

00:38:42,219 --> 00:38:43,788

UM, APRIL, CAN PE-- CAN

1733

00:38:43,788 --> 00:38:45,289

THE PUBLIC VISIT THE ARCHIVE?

1734

00:38:45,289 --> 00:38:46,724

>> BY APPOINTMENT.

1735

00:38:46,724 --> 00:38:47,992

UM, YOU KNOW.

1736

00:38:47,992 --> 00:38:50,261

THE PUBLIC CAN-CAN RESEARCH

1737

00:38:50,261 --> 00:38:51,362

IN THE ARCHIVE.

1738

00:38:51,362 --> 00:38:53,097

WE DO HAVE LIMITED RESOURCES.

1739

00:38:53,097 --> 00:38:55,099

UM, SOMETIMES I DO GIVE TOURS.

1740

00:38:55,099 --> 00:38:56,100

>> OKAY.

1741

00:38:56,100 --> 00:38:57,401

>> UM, AND, YOU KNOW, LIKE,

1742

00:38:57,401 --> 00:38:59,170

IT WOULD BE, LIKE, YOU KNOW,

1743

00:38:59,170 --> 00:39:00,671

A WHOLE CLASS OF STUDENTS

1744

00:39:00,671 --> 00:39:01,872

FROM THE U--

1745

00:39:01,872 --> 00:39:03,074

YOU KNOW, UNIVERSITY.

1746

00:39:03,074 --> 00:39:03,808

>> OKAY.

1747

00:39:03,808 --> 00:39:04,642

>> HISTORY STUDENTS

1748

00:39:04,642 --> 00:39:05,576

TO COME OVER.

1749

00:39:05,576 --> 00:39:06,711

AND SO, ABSOLUTELY.

1750

00:39:06,711 --> 00:39:07,845

I MEAN, PART OF THE POINT

1751
00:39:07,845 --> 00:39:09,447
OF THE ARCHIVE IS TO MAKE

1752
00:39:09,447 --> 00:39:11,415
OUR HISTORY AND THESE RESEARCH

1753
00:39:11,415 --> 00:39:13,017
MATERIALS ACCESSIBLE.

1754
00:39:13,017 --> 00:39:14,852
UM, TO WHOEVER WANTS

1755
00:39:14,852 --> 00:39:15,886
TO USE THEM.

1756
00:39:15,886 --> 00:39:17,254
TYPICALLY, PEOPLE, UM,

1757
00:39:17,254 --> 00:39:18,322
HAVE A RESEARCH PURPOSE.

1758
00:39:18,322 --> 00:39:19,156
>> YEAH.

1759
00:39:19,156 --> 00:39:19,924
>> OKAY.

1760
00:39:19,924 --> 00:39:20,725
>> THAT MAKES SENSE.

1761
00:39:20,725 --> 00:39:21,559
>> WHEN THEY COME INTO THE

1762
00:39:21,559 --> 00:39:22,493
ARCHIVE, THE-- OF COURSE, YES.

1763
00:39:22,493 --> 00:39:23,828

AND THERE ARE MATERIALS ONLINE.

1764

00:39:23,828 --> 00:39:25,296

>> OOH, YEAH.

1765

00:39:25,296 --> 00:39:26,464

UH, A FEW MORE.

1766

00:39:26,464 --> 00:39:27,732

APRIL, HOW LONG HAVE YOU

1767

00:39:27,732 --> 00:39:29,700

BEEN WORKING AT NASA?

1768

00:39:29,700 --> 00:39:31,635

>> I'VE BEEN WORKING AT NASA,

1769

00:39:31,635 --> 00:39:33,370

UM, UM, I GUESS FOR

1770

00:39:33,370 --> 00:39:34,705

ABOUT 14 YEARS.

1771

00:39:34,705 --> 00:39:35,539

>> OH, OKAY.

1772

00:39:35,539 --> 00:39:36,340

>> YES.

1773

00:39:36,340 --> 00:39:37,274

>> ALL RIGHT, COOL.

1774

00:39:37,274 --> 00:39:38,209

>> WHAT ABOUT YOU, LAYNE?

1775

00:39:38,209 --> 00:39:38,976

>> YEAH.

1776

00:39:38,976 --> 00:39:39,844

>> OH, ME, I'M A RELATIVELY

1777

00:39:39,844 --> 00:39:40,678

NEW ADDITION.

1778

00:39:40,678 --> 00:39:41,679

I'M, UH, JUST ABOUT

1779

00:39:41,679 --> 00:39:42,980

FINISHING UP MY FIRST YEAR.

1780

00:39:42,980 --> 00:39:44,348

>> OKAY.

1781

00:39:44,348 --> 00:39:46,417

>> IS IT ALL...

1782

00:39:46,417 --> 00:39:47,418

>> IT'S NOT LONGER.

1783

00:39:47,418 --> 00:39:48,419

>> I-- NO, I REMEMBER

1784

00:39:48,419 --> 00:39:49,453

WHEN YOU ARRIVED.

1785

00:39:49,453 --> 00:39:50,387

IT WAS LIKE A YEAR AGO.

1786

00:39:50,387 --> 00:39:53,124

UM, A COUPLE THING ABOUT

1787

00:39:53,124 --> 00:39:55,126

THE HUMAN COMPUTERS.

1788

00:39:55,126 --> 00:39:56,594

A COMMENT-- "WOW, IMAGINE

1789

00:39:56,594 --> 00:39:58,195
HOW TIME-CONSUMING."

1790

00:39:58,195 --> 00:39:59,263
THAT MATHEMATICAL WORK

1791

00:39:59,263 --> 00:40:00,197
THEY WERE DOING.

1792

00:40:00,197 --> 00:40:01,999
AND "DID THE WOMEN RETAIN

1793

00:40:01,999 --> 00:40:03,434
THE ROLES THEY WERE IN

1794

00:40:03,434 --> 00:40:05,603
AFTER WORLD WAR II?"

1795

00:40:05,603 --> 00:40:07,938
>> SO IN SOME CASES, UM,

1796

00:40:07,938 --> 00:40:11,242
WELL, IF YOU'RE THINKING, UH--

1797

00:40:11,242 --> 00:40:12,977
YES, THEY WERE-- DID STAY

1798

00:40:12,977 --> 00:40:14,044
IN SOME OF THE POSITIONS

1799

00:40:14,044 --> 00:40:15,079
AND NOT NECESSARILY WERE

1800

00:40:15,079 --> 00:40:16,680
PUSHED OUT FOR MEN TO COME BACK

1801
00:40:16,680 --> 00:40:18,549
INTO-IN-INTO THESE JOBS.

1802
00:40:18,549 --> 00:40:20,551
BUT, UM, NOT ONLY THAT,

1803
00:40:20,551 --> 00:40:21,619
BUT A LOT OF THE WOMEN

1804
00:40:21,619 --> 00:40:22,820
CONTINUED ON AT AMES

1805
00:40:22,820 --> 00:40:24,822
AFTER ELECTRONIC COMPUTING,

1806
00:40:24,822 --> 00:40:26,757
AND, UH, WERE WORKING

1807
00:40:26,757 --> 00:40:27,992
WITH THOSE MACHINES.

1808
00:40:27,992 --> 00:40:28,793
>> OKAY.

1809
00:40:28,793 --> 00:40:29,794
>> YEAH, ABSOLUTELY.

1810
00:40:29,794 --> 00:40:31,128
THEY-- YOU KNOW, THEY MOVED IN

1811
00:40:31,128 --> 00:40:32,163
AND BECAME COMPUTER

1812
00:40:32,163 --> 00:40:33,731
PROGRAMMERS, BASICALLY.

1813
00:40:33,731 --> 00:40:35,065

AND ONE OF THE WOMEN--

1814

00:40:35,065 --> 00:40:36,033

I DON'T THINK SHE STARTED

1815

00:40:36,033 --> 00:40:38,068

AS A COMPUTER, A HUMAN COMPUTER,

1816

00:40:38,068 --> 00:40:39,804

UM, BUT MARCY [INDISTINCT]

1817

00:40:39,804 --> 00:40:41,705

ACTUALLY ROSE THROUGH THE RANKS

1818

00:40:41,705 --> 00:40:43,674

AND BECAME THE CHIEF OF

1819

00:40:43,674 --> 00:40:45,075

THE COMPUTING DIVISION.

1820

00:40:45,075 --> 00:40:45,943

>> OH, WOW.

1821

00:40:45,943 --> 00:40:46,944

>> WOW, THAT'S EXCELLENT-- COOL.

1822

00:40:46,944 --> 00:40:48,345

>> SO, YEAH, YEAH.

1823

00:40:48,345 --> 00:40:49,346

AND THAT HAPPENED ACROSS

1824

00:40:49,346 --> 00:40:50,414

THE FEDERAL GOVERNMENT.

1825

00:40:50,414 --> 00:40:51,348

LIKE, WHEN YOU THINK ABOUT

1826
00:40:51,348 --> 00:40:52,416
THE LIBRARY OF CONGRESS

1827
00:40:52,416 --> 00:40:53,984
AND THE MACHINE CATALOGUING,

1828
00:40:53,984 --> 00:40:55,319
A LOT OF WOMEN WERE

1829
00:40:55,319 --> 00:40:56,487
BEHIND THOSE EFFORTS.

1830
00:40:56,487 --> 00:40:57,588
>> AH, NICE TO KNOW.

1831
00:40:57,588 --> 00:40:58,622
>> THAT'S PRETTY COOL.

1832
00:40:58,622 --> 00:40:59,957
>> COOL. SHOULD WE GO

1833
00:40:59,957 --> 00:41:00,958
TO OUR NEXT IMAGE?

1834
00:41:00,958 --> 00:41:02,026
>> I THINK WE SHOULD.

1835
00:41:02,026 --> 00:41:03,060
>> ALL RIGHT.

1836
00:41:03,060 --> 00:41:03,961
>> SO CAN WE GO AHEAD

1837
00:41:03,961 --> 00:41:05,863
AND GET THAT UP ON SCREEN?

1838
00:41:05,863 --> 00:41:07,198

>> ALL RIGHT, WHO DO WE

1839

00:41:07,198 --> 00:41:08,098
HAVE HERE?

1840

00:41:08,098 --> 00:41:08,966
OR WHAT'S--

1841

00:41:08,966 --> 00:41:09,967
>> AND WHAT IS THAT THAT

1842

00:41:09,967 --> 00:41:11,368
HE'S STANDING IN FRONT OF?

1843

00:41:11,368 --> 00:41:12,303
>> SO, SO MANY ELEMENTS

1844

00:41:12,303 --> 00:41:13,237
HERE, RIGHT?

1845

00:41:13,237 --> 00:41:14,939
UM, THIS IS A-AN F-100

1846

00:41:14,939 --> 00:41:16,040
SUPER SABRE.

1847

00:41:16,040 --> 00:41:19,143
UM, THIS PHOTO IS FROM 1957.

1848

00:41:19,143 --> 00:41:21,745
SO IT WAS THE YEAR BEFORE,

1849

00:41:21,745 --> 00:41:24,014
UM, AMES BECAME PART OF NASA,

1850

00:41:24,014 --> 00:41:25,015
WHEN IT WAS ONE OF

1851
00:41:25,015 --> 00:41:26,817
THE AERONAUTICAL LABORATORIES

1852
00:41:26,817 --> 00:41:28,452
OF THE NACA-- THE NATIONAL

1853
00:41:28,452 --> 00:41:29,386
ADVISORY COMMITTEE

1854
00:41:29,386 --> 00:41:30,321
FOR AERONAUTICS.

1855
00:41:30,321 --> 00:41:31,188
>> OKAY, RIGHT.

1856
00:41:31,188 --> 00:41:32,189
>> AND A LOT OF THE WORK

1857
00:41:32,189 --> 00:41:33,624
THAT WAS DONE HERE AT AMES

1858
00:41:33,624 --> 00:41:35,559
WAS FOCUSED ON, UH,

1859
00:41:35,559 --> 00:41:36,760
FLIGHT TESTING.

1860
00:41:36,760 --> 00:41:39,430
AND, UM, HERE, UH, ON THIS PLANE

1861
00:41:39,430 --> 00:41:42,433
YOU CAN SEE, UH, WELL, RATHER

1862
00:41:42,433 --> 00:41:43,801
LARGE PITOT TUBE,

1863
00:41:43,801 --> 00:41:44,602

ST-- THAT'S THE BOOM

1864

00:41:44,602 --> 00:41:45,769

STICKING OUT FROM THE FRONT.

1865

00:41:45,769 --> 00:41:46,904

THAT MEASURES AIRSPEED.

1866

00:41:46,904 --> 00:41:47,872

>> OKAY.

1867

00:41:47,872 --> 00:41:48,806

>> AND YOU MIGHT ALSO

1868

00:41:48,806 --> 00:41:50,307

NOTICE THE SWEEPED BACK WINGS

1869

00:41:50,307 --> 00:41:52,509

THAT WERE ON THE F-100.

1870

00:41:52,509 --> 00:41:54,245

AND THAT WAS A PRETTY RECENT

1871

00:41:54,245 --> 00:41:56,080

DEVELOPMENT, UH, THE DESIGN

1872

00:41:56,080 --> 00:41:58,015

OF HAVING THE WINGS SWEEPED BACK,

1873

00:41:58,015 --> 00:41:58,916

AND THAT SORT OF A WAY

1874

00:41:58,916 --> 00:42:00,551

WHICH WOULD REDUCE DRAG.

1875

00:42:00,551 --> 00:42:03,020

AND, UH, R.T. JONES, WHO WAS

1876
00:42:03,020 --> 00:42:04,321
AT LANGLEY BUT SPENT A LOT

1877
00:42:04,321 --> 00:42:05,856
OF HIS CAREER HERE AT AMES,

1878
00:42:05,856 --> 00:42:07,625
WAS ONE OF THE PEOPLE WHO

1879
00:42:07,625 --> 00:42:09,393
WAS RESPONSIBLE FOR PROMOTING

1880
00:42:09,393 --> 00:42:10,661
THE SWEEP WING DESIGN.

1881
00:42:10,661 --> 00:42:12,529
>> OKAY, SO I THINK WE HAVE

1882
00:42:12,529 --> 00:42:13,898
A STREET NAMED AFTER HIM

1883
00:42:13,898 --> 00:42:14,698
ON OUR CAMPUS, DON'T WE?

1884
00:42:14,698 --> 00:42:15,532
>> YEAH, WE DO, WE DO.

1885
00:42:15,532 --> 00:42:16,267
IT'S RIGHT OUTSIDE

1886
00:42:16,267 --> 00:42:17,001
THE FRONT GATES.

1887
00:42:17,001 --> 00:42:18,969
NEVER KNEW WHO HE WAS.

1888
00:42:18,969 --> 00:42:19,937

>> OH, R.T. JONES, SORRY.

1889

00:42:19,937 --> 00:42:23,040

[INDISTINCT CHATTER]

1890

00:42:23,040 --> 00:42:24,875

>> SO WHO'S THE PILOT

1891

00:42:24,875 --> 00:42:26,243

THAT'S SHOWN IN THIS, UH,

1892

00:42:26,243 --> 00:42:27,511

HISTORICAL PHOTO?

1893

00:42:27,511 --> 00:42:29,313

>> THE-THE PILOT IS, UM,

1894

00:42:29,313 --> 00:42:30,581

ONE OF OUR, YOU KNOW, ONE OF

1895

00:42:30,581 --> 00:42:31,949

OUR MOST DISTINGUISHED, UM,

1896

00:42:31,949 --> 00:42:33,684

TEST PILOTS, GEORGE COOPER.

1897

00:42:33,684 --> 00:42:34,852

UM, GEORGE COOPER STARTED

1898

00:42:34,852 --> 00:42:37,221

AT AMES IN 1945, UM,

1899

00:42:37,221 --> 00:42:38,856

BEFORE WHICH HE SERVED, UM,

1900

00:42:38,856 --> 00:42:40,190

IN THE-- IN WORLD WAR II

1901
00:42:40,190 --> 00:42:41,292
AS A FIGHTER PILOT.

1902
00:42:41,292 --> 00:42:42,226
>> OKAY.

1903
00:42:42,226 --> 00:42:44,094
>> UM, AND, UM, AMONG HIS

1904
00:42:44,094 --> 00:42:46,063
MANY, MANY ACCOMPLISHMENTS,

1905
00:42:46,063 --> 00:42:48,198
UM, UM-- HE WAS ALSO

1906
00:42:48,198 --> 00:42:50,501
AN ENGINEER, AND HE DEVELOPED

1907
00:42:50,501 --> 00:42:52,369
THE-- A RATING SCALE,

1908
00:42:52,369 --> 00:42:54,038
A TEN-POINT RATING SCALE

1909
00:42:54,038 --> 00:42:56,006
THAT PILOTS WOULD USE TO BE

1910
00:42:56,006 --> 00:42:57,975
ABLE TO PROVIDE NORMALIZED

1911
00:42:57,975 --> 00:43:00,911
AND CONSISTENT INFORMATION

1912
00:43:00,911 --> 00:43:02,379
THAT THEY, UM, YOU KNOW,

1913
00:43:02,379 --> 00:43:03,781

THAT THEY WOULD GATHER

1914

00:43:03,781 --> 00:43:05,182

WHILE THEY WERE TESTING

1915

00:43:05,182 --> 00:43:06,517

THESE AIRCRAFT.

1916

00:43:06,517 --> 00:43:07,685

AND SO, YOU KNOW,

1917

00:43:07,685 --> 00:43:08,852

IT'S JUST THIS WAY OF LIKE,

1918

00:43:08,852 --> 00:43:10,354

OKAY, WE'RE GONNA HAVE METRICS,

1919

00:43:10,354 --> 00:43:11,588

AND WE'RE GONNA BE CONSISTENT,

1920

00:43:11,588 --> 00:43:12,523

AND WE'RE GONNA CONTRIBUTE

1921

00:43:12,523 --> 00:43:13,657

TO THE--

1922

00:43:13,657 --> 00:43:14,525

>> AIRCRAFT PERFORMANCE

1923

00:43:14,525 --> 00:43:15,359

OR SOMETHING?

1924

00:43:15,359 --> 00:43:16,126

>> AIRCRAFT PERFORMANCE

1925

00:43:16,126 --> 00:43:16,860

AND SAFETY.

1926

00:43:16,860 --> 00:43:17,594

>> AH, YES.

1927

00:43:17,594 --> 00:43:18,362

>> UM, AND, UM,

1928

00:43:18,362 --> 00:43:19,330

IT'S ACTUALLY STILL USED AS

1929

00:43:19,330 --> 00:43:20,998

AN INTERNATIONAL STANDARD TODAY.

1930

00:43:20,998 --> 00:43:22,299

>> IS IT? EVEN NOW, WOW.

1931

00:43:22,299 --> 00:43:23,801

>> WHAT'S IT CALLED AGAIN?

1932

00:43:23,801 --> 00:43:24,768

>> IT'S, UM, LIKE THE

1933

00:43:24,768 --> 00:43:26,837

COOPER-HARPER RATING SCALE.

1934

00:43:26,837 --> 00:43:27,738

BILL HARPER, I THINK,

1935

00:43:27,738 --> 00:43:29,707

HELPED HIM, UM-- BILL HARPER?

1936

00:43:29,707 --> 00:43:30,541

CHARLES HARPER?

1937

00:43:30,541 --> 00:43:31,375

>> THAT'S PRETTY COOL.

1938

00:43:31,375 --> 00:43:33,110

SO, VIEWERS AT HOME,

1939

00:43:33,110 --> 00:43:34,545

IF THEY WANTED TO RECREATE

1940

00:43:34,545 --> 00:43:37,448

GEORGE COOPER'S LOOK OVER HERE,

1941

00:43:37,448 --> 00:43:39,583

WHAT WOULD WE NEED?

1942

00:43:39,583 --> 00:43:41,552

>> WELL...

1943

00:43:41,552 --> 00:43:43,087

>> UM, IF WE COULD SEE

1944

00:43:43,087 --> 00:43:44,621

THE-THE PHOTO AGAIN...

1945

00:43:44,621 --> 00:43:45,556

>> THAT WOULD HELP.

1946

00:43:45,556 --> 00:43:46,724

>> CAN WE GET THAT BROUGHT UP?

1947

00:43:46,724 --> 00:43:47,858

>> OKAY, UM, I'M THINKING

1948

00:43:47,858 --> 00:43:50,227

SOME KIND OF HELMET, UM,

1949

00:43:50,227 --> 00:43:52,229

PERHAPS SOME KIND OF BACKPACK.

1950

00:43:52,229 --> 00:43:53,297

I THINK LAYNE THOUGHT

1951

00:43:53,297 --> 00:43:54,465

THAT WAS A PARACHUTE?

1952

00:43:54,465 --> 00:43:55,399

>> A PARACHUTE.

1953

00:43:55,399 --> 00:43:56,266

>> UM, PROBABLY.

1954

00:43:56,266 --> 00:43:57,668

>> YEAH, AND SOME WORK BOOTS,

1955

00:43:57,668 --> 00:43:59,069

AND COVERALLS, AND-AND IT

1956

00:43:59,069 --> 00:44:00,471

ALSO DEPENDS IF YOU, UH,

1957

00:44:00,471 --> 00:44:02,406

ARE THINKING ABOUT WHICH TYPE

1958

00:44:02,406 --> 00:44:03,640

OF FLIGHT SUIT YOU WANNA

1959

00:44:03,640 --> 00:44:05,042

BE-BE WEARING.

1960

00:44:05,042 --> 00:44:06,877

UM, THIS IS MORE OF A PRESSURE,

1961

00:44:06,877 --> 00:44:08,679

UH, SUIT, BECAUSE THE F-100,

1962

00:44:08,679 --> 00:44:10,881

UH, WAS A SUPERSONIC,

1963

00:44:10,881 --> 00:44:12,683

UH, AIRCRAFT.

1964

00:44:12,683 --> 00:44:16,620

AND, UM, SO IF-- AND ALSO

1965

00:44:16,620 --> 00:44:18,088

FLYING AT HIGHER ALTITUDES.

1966

00:44:18,088 --> 00:44:19,757

SO LOOSER CLOTHING COULD BE

1967

00:44:19,757 --> 00:44:21,358

WORN IN-IN A FLIGHT SUIT,

1968

00:44:21,358 --> 00:44:22,993

JUST ALL DEPENDING.

1969

00:44:22,993 --> 00:44:24,595

>> DEPENDS ON WHAT ALTITUDE

1970

00:44:24,595 --> 00:44:26,230

YOUR HALLOWEEN COSTUME NEEDS TO

1971

00:44:26,230 --> 00:44:28,565

FLY AT, IS WHAT I UNDERSTAND.

1972

00:44:28,565 --> 00:44:29,933

[LAUGHTER]

1973

00:44:29,933 --> 00:44:31,702

OKAY, SO SOMEBODY WANTED TO

1974

00:44:31,702 --> 00:44:32,970

CHECK WHAT THE PLANE WAS CALLED.

1975

00:44:32,970 --> 00:44:34,238

IT IS THE F-100, RIGHT?

1976

00:44:34,238 --> 00:44:35,205

>> THAT'S RIGHT.

1977

00:44:35,205 --> 00:44:37,107

>> OKAY. UM, SPEAKING OF

1978

00:44:37,107 --> 00:44:38,175

HOW LONG PEOPLE HAVE WORKED

1979

00:44:38,175 --> 00:44:40,010

AT NASA, DO YOU KNOW WHAT

1980

00:44:40,010 --> 00:44:41,845

THE LONGEST SERVING EMPLOYEE

1981

00:44:41,845 --> 00:44:43,180

OF NASA IS?

1982

00:44:43,180 --> 00:44:44,581

WHO IT IS OR HOW LONG

1983

00:44:44,581 --> 00:44:47,684

THAT TENURE WAS?

1984

00:44:47,684 --> 00:44:49,153

>> WE WOULD-- WE-- ONE WOULD

1985

00:44:49,153 --> 00:44:51,755

ASSUME, UM, JACK BOYD.

1986

00:44:51,755 --> 00:44:53,390

UM, BUT THAT WOULDN'T BE RIGHT,

1987

00:44:53,390 --> 00:44:54,358

IF YOU'RE THINKING OF

1988

00:44:54,358 --> 00:44:55,526

CONTIGUOUS YEARS, BUT--

1989

00:44:55,526 --> 00:44:57,261

>> OH, JACK BOYD IS HERE.

1990

00:44:57,261 --> 00:44:58,362

HE WORKS HERE AT NASA AMES.

1991

00:44:58,362 --> 00:44:59,930

>> OUR BOSS, JACK BOYD,

1992

00:44:59,930 --> 00:45:01,265

UM, STARTED AT AMES WHEN IT

1993

00:45:01,265 --> 00:45:03,767

WAS NACA IN 1947,

1994

00:45:03,767 --> 00:45:05,235

AND HE HAS SERVED UNDER

1995

00:45:05,235 --> 00:45:06,970

EVERY SINGLE CENTER DIRECTOR

1996

00:45:06,970 --> 00:45:08,272

SINCE THE BEGINNING.

1997

00:45:08,272 --> 00:45:09,807

>> INCREDIBLE.

1998

00:45:09,807 --> 00:45:11,208

>> HE'S IN HIS EARLY 90s.

1999

00:45:11,208 --> 00:45:12,076

>> HE STILL COMES INTO

2000

00:45:12,076 --> 00:45:13,043

THE CENTER THREE DAYS A WEEK.

2001

00:45:13,043 --> 00:45:14,011

>> YEP.

2002

00:45:14,011 --> 00:45:15,746

>> VERY ACTIVE IN, UH,

2003

00:45:15,746 --> 00:45:16,947

THINGS GOING ON AT AMES,

2004

00:45:16,947 --> 00:45:17,915

AND VERY SUPPORTIVE OF

2005

00:45:17,915 --> 00:45:18,816

THE HISTORY OFFICE.

2006

00:45:18,816 --> 00:45:20,284

>> YES, AND A TESTAMENT

2007

00:45:20,284 --> 00:45:23,153

TO, UM, WHY IT MIGHT NOT BE

2008

00:45:23,153 --> 00:45:24,822

A GOOD IDEA TO RETIRE.

2009

00:45:24,822 --> 00:45:25,889

[LAUGHTER]

2010

00:45:25,889 --> 00:45:26,790

>> SO THE LONGEST SERVING

2011

00:45:26,790 --> 00:45:27,791

NASA EMPLOYEES HAVE BEEN HERE

2012

00:45:27,791 --> 00:45:29,960

FOR DECADES AND DECADES, YEAH?

2013

00:45:29,960 --> 00:45:30,761

THAT'S FANTASTIC.

2014

00:45:30,761 --> 00:45:31,595

>> THAT'S PRETTY COOL.

2015

00:45:31,595 --> 00:45:32,329

>> THAT IS COOL.

2016

00:45:32,329 --> 00:45:33,230

>> JOB SATISFACTION.

2017

00:45:33,230 --> 00:45:36,300

>> YEAH. UM, A FEW COMMENTS.

2018

00:45:36,300 --> 00:45:38,602

WELL, LAYNE, A QUESTION:

2019

00:45:38,602 --> 00:45:39,837

"IS THE NASA LIBRARY ONLY

2020

00:45:39,837 --> 00:45:41,205

TEXTBOOKS, OR DOES IT CONTAIN

2021

00:45:41,205 --> 00:45:42,840

CREATIVE WORK AS WELL?"

2022

00:45:42,840 --> 00:45:44,341

INTERESTING.

2023

00:45:44,341 --> 00:45:47,578

>> UH, NASA LIBRARY MEANING?

2024

00:45:47,578 --> 00:45:48,912

>> PERHAPS THE ARCHIVE.

2025

00:45:48,912 --> 00:45:50,380

>> OH, UM, THERE IS A DIFFERENCE

2026
00:45:50,380 --> 00:45:52,216
BETWEEN LIBRARIES AND ARCHIVES.

2027
00:45:52,216 --> 00:45:54,251
WE DO HAVE TWO LIBRARIES,

2028
00:45:54,251 --> 00:45:56,019
UM, TWO MAIN LIBRARIES AT AMES--

2029
00:45:56,019 --> 00:45:57,254
A TECHNICAL LIBRARY

2030
00:45:57,254 --> 00:45:59,256
AND A LIFE SCIENCES LIBRARY.

2031
00:45:59,256 --> 00:46:00,557
THEY FOCUS ON PUBLISHED

2032
00:46:00,557 --> 00:46:01,658
MATERIALS.

2033
00:46:01,658 --> 00:46:02,493
>> OKAY.

2034
00:46:02,493 --> 00:46:03,494
>> AND, UM, YOU KNOW,

2035
00:46:03,494 --> 00:46:05,062
ASSIST WITH RESEARCH QUERIES,

2036
00:46:05,062 --> 00:46:06,430
UM, YOU KNOW, THROUGH

2037
00:46:06,430 --> 00:46:08,432
THIS PUBLISHED MATERIALS,

2038
00:46:08,432 --> 00:46:10,968

WHEREAS THE ARCHIVE TEND-TEND

2039

00:46:10,968 --> 00:46:12,936
TO FOCUS ON MORE UNIQUE,

2040

00:46:12,936 --> 00:46:15,005
UH, MATERIALS AND COLLECTIONS

2041

00:46:15,005 --> 00:46:18,342
OF, UM, WHATEVER IT IS.

2042

00:46:18,342 --> 00:46:20,177
>> LETTERS, CORRESPONDENCE,

2043

00:46:20,177 --> 00:46:22,479
UM, EARLY DRAFTS OF-OF

2044

00:46:22,479 --> 00:46:23,413
THEIR WORK.

2045

00:46:23,413 --> 00:46:24,548
>> OKAY, I SEE.

2046

00:46:24,548 --> 00:46:26,650
>> DATA, DESIGNS.

2047

00:46:26,650 --> 00:46:29,186
>> YEAH. UM, QUICK COMMENT

2048

00:46:29,186 --> 00:46:31,088
BEFORE WE GO TO OUR NEXT IMAGE.

2049

00:46:31,088 --> 00:46:32,689
"IT'S SO AMAZING, ALL THOSE

2050

00:46:32,689 --> 00:46:34,191
OLD PICTURES-- I LOVE IT."

2051
00:46:34,191 --> 00:46:35,359
SOMEBODY APPRECIATES

2052
00:46:35,359 --> 00:46:38,128
YOUR HISTORICAL STUFF HERE.

2053
00:46:38,128 --> 00:46:39,596
AND, UH, AND A TIP FOR

2054
00:46:39,596 --> 00:46:40,731
EVERYONE AT HOME: IF YOU

2055
00:46:40,731 --> 00:46:43,567
WANNA RECREATE THAT FLIGHT SUIT

2056
00:46:43,567 --> 00:46:45,002
OUTFIT-- "SALAD BOWL

2057
00:46:45,002 --> 00:46:45,969
FOR THE HELMET."

2058
00:46:45,969 --> 00:46:46,970
>> AH, OKAY.

2059
00:46:46,970 --> 00:46:48,105
>> SMART.

2060
00:46:48,105 --> 00:46:51,608
>> THAT COULD WORK. YEAH.

2061
00:46:51,608 --> 00:46:53,010
>> SO LET'S MOVE ALONG

2062
00:46:53,010 --> 00:46:54,845
TO OUR NEXT IMAGE THAT

2063
00:46:54,845 --> 00:46:57,447

WE HAVE FROM AMES.

2064

00:46:57,447 --> 00:46:58,549

>> OKAY.

2065

00:46:58,549 --> 00:46:59,650

>> THIS IS PRETTY UNIQUE.

2066

00:46:59,650 --> 00:47:00,617

LIKE I DON'T THINK I'VE EVER

2067

00:47:00,617 --> 00:47:01,585

SEEN SOMETHING LIKE THIS BEFORE.

2068

00:47:01,585 --> 00:47:03,387

>> I JUST LOVE THESE PHOTOS.

2069

00:47:03,387 --> 00:47:06,890

UM, THIS IS, UM-- WHAT WE'RE

2070

00:47:06,890 --> 00:47:08,625

SEEING IS THE AX-3,

2071

00:47:08,625 --> 00:47:10,460

WHICH IS ONE OF A SERIES OF

2072

00:47:10,460 --> 00:47:14,431

AMES EXPERIMENTAL HARD, UM,

2073

00:47:14,431 --> 00:47:16,500

HARD-BODIED SPACESUITS.

2074

00:47:16,500 --> 00:47:17,834

UM, THE MAN WE'RE SEEING

2075

00:47:17,834 --> 00:47:19,469

IS VIC VYKUKAL-- AND I'M

2076

00:47:19,469 --> 00:47:20,470
ACTUALLY NOT SURE HOW

2077

00:47:20,470 --> 00:47:21,805
TO PRONOUNCE HIS NAME.

2078

00:47:21,805 --> 00:47:23,340
SO I'M PROBABLY BUTCHERING IT.

2079

00:47:23,340 --> 00:47:25,275
UM, AND HE WAS VERY

2080

00:47:25,275 --> 00:47:26,610
INSTRUMENTAL IN TESTING

2081

00:47:26,610 --> 00:47:28,412
AND DESIGNING THESE SUITS.

2082

00:47:28,412 --> 00:47:30,581
SO, UM, WHAT YOU CAN SEE

2083

00:47:30,581 --> 00:47:32,249
WHERE THERE'S SORT OF JOINTS--

2084

00:47:32,249 --> 00:47:33,317
THESE SUITS WERE MADE

2085

00:47:33,317 --> 00:47:35,118
TO BE VERY FLEXIBLE.

2086

00:47:35,118 --> 00:47:36,053
THEY WERE MEANT TO BE

2087

00:47:36,053 --> 00:47:37,487
WORN IN EVA,

2088

00:47:37,487 --> 00:47:39,790

OR EXTRAVEHICULAR ACTIVITIES,

2089

00:47:39,790 --> 00:47:41,558

WHERE SPACE-- UM, ASTRONAUTS

2090

00:47:41,558 --> 00:47:42,726

GO OUTSIDE OF THE SHIP

2091

00:47:42,726 --> 00:47:43,727

OR THE STATION.

2092

00:47:43,727 --> 00:47:44,695

>> YEAH.

2093

00:47:44,695 --> 00:47:46,630

>> AND, UM, THEY ARE ABLE TO

2094

00:47:46,630 --> 00:47:48,665

WITHSTAND ALL KINDS OF HAZARDS

2095

00:47:48,665 --> 00:47:49,833

FLYING PAST THEM,

2096

00:47:49,833 --> 00:47:52,869

LIKE METEOROIDS, UM-- NOT TO

2097

00:47:52,869 --> 00:47:54,938

BE CONFUSED WITH ASTEROIDS.

2098

00:47:54,938 --> 00:47:56,073

THAT WOULD BE A PROBLEM.

2099

00:47:56,073 --> 00:47:57,140

[LAUGHTER]

2100

00:47:57,140 --> 00:47:58,075

>> IS THAT BIGGER?

2101
00:47:58,075 --> 00:48:00,310
LITTLE BIT BIGGER. OKAY.

2102
00:48:00,310 --> 00:48:02,279
>> I MEAN, AND IN CONTRAST

2103
00:48:02,279 --> 00:48:04,047
TO THE, UH, REALLY ICONIC

2104
00:48:04,047 --> 00:48:06,984
APOLLO ERA SUITS, THE A7L,

2105
00:48:06,984 --> 00:48:08,285
WHICH LOOK AND WERE

2106
00:48:08,285 --> 00:48:10,153
CONSTRUCTED LARGELY OF FABRIC,

2107
00:48:10,153 --> 00:48:11,021
EVEN THOUGH THERE WERE

2108
00:48:11,021 --> 00:48:11,888
HARD COMPONENTS.

2109
00:48:11,888 --> 00:48:12,689
>> MM-HMM.

2110
00:48:12,689 --> 00:48:13,490
>> YOU MIGHT THINK THAT

2111
00:48:13,490 --> 00:48:14,258
THOSE SUITS WOULD BE

2112
00:48:14,258 --> 00:48:15,492
MORE FLEXIBLE THAN A HARD SUIT.

2113
00:48:15,492 --> 00:48:16,293

>> YEAH.

2114

00:48:16,293 --> 00:48:17,127

>> BUT THIS HARD SUIT

2115

00:48:17,127 --> 00:48:19,096

WAS EXTREMELY MANEUVERABLE,

2116

00:48:19,096 --> 00:48:21,531

AND I-I EVEN READ THAT, UH,

2117

00:48:21,531 --> 00:48:23,467

WITHIN THAT SUIT YOU HAVE

2118

00:48:23,467 --> 00:48:26,737

95% MANEUVERABILITY AS YOU DO

2119

00:48:26,737 --> 00:48:28,171

WHEN YOU'RE NAKED.

2120

00:48:28,171 --> 00:48:29,406

>> OKAY, FOR OUR VIEWERS

2121

00:48:29,406 --> 00:48:31,408

AT HOME, PLEASE DON'T DO THAT.

2122

00:48:31,408 --> 00:48:32,442

[LAUGHTER]

2123

00:48:32,442 --> 00:48:33,810

>> DON'T TEST THAT OUT.

2124

00:48:33,810 --> 00:48:34,711

>> THAT'S PRETTY GOOD

2125

00:48:34,711 --> 00:48:35,545

FOR A SPACESUIT.

2126
00:48:35,545 --> 00:48:36,647
>> YEAH, I'M HAVING TROUBLE

2127
00:48:36,647 --> 00:48:37,481
IMAGINING THAT,

2128
00:48:37,481 --> 00:48:38,682
BUT THAT-THAT-THAT'S

2129
00:48:38,682 --> 00:48:39,916
A SUPER WEIRD FUN FACT

2130
00:48:39,916 --> 00:48:41,418
AND I ENJOY KNOWING THAT.

2131
00:48:41,418 --> 00:48:42,719
[LAUGHTER]

2132
00:48:42,719 --> 00:48:44,755
>> SO SPEAKING OF THAT,

2133
00:48:44,755 --> 00:48:46,423
IF YOU WANTED TO RECREATE THIS

2134
00:48:46,423 --> 00:48:48,825
AT HOME-- MINUS

2135
00:48:48,825 --> 00:48:50,727
THE 95% MANEUVERABILITY

2136
00:48:50,727 --> 00:48:51,628
WHILE YOU'RE NAKED--

2137
00:48:51,628 --> 00:48:52,462
>> RIGHT, RIGHT.

2138
00:48:52,462 --> 00:48:54,898

>> UH, WHAT MIGHT WE DO?

2139

00:48:54,898 --> 00:48:56,266

>> THIS IS A REALLY DIFFICULT

2140

00:48:56,266 --> 00:48:58,035

ONE FOR ME, AND, UM, CLEARLY

2141

00:48:58,035 --> 00:49:00,070

I'M NOT THE RIGHT PERSON TO

2142

00:49:00,070 --> 00:49:03,206

BE-BE ASKING HOW TO PUT

2143

00:49:03,206 --> 00:49:04,775

TOGETHER A HALLOWEEN COSTUME.

2144

00:49:04,775 --> 00:49:06,476

BUT WE'RE THINKING MAYBE,

2145

00:49:06,476 --> 00:49:09,546

UM, SOME KIND OF DUCT TAPE

2146

00:49:09,546 --> 00:49:11,281

TO BE SHOWING EXACTLY WHERE

2147

00:49:11,281 --> 00:49:12,482

THE DIFFERENT COMPONENTS

2148

00:49:12,482 --> 00:49:14,084

WOULD-WOULD BE REMOVED.

2149

00:49:14,084 --> 00:49:15,185

I MEAN, SOMETHING THAT--

2150

00:49:15,185 --> 00:49:16,219

AND THESE SUITS WERE NEVER USED,

2151
00:49:16,219 --> 00:49:20,023
BUT WHAT MADE THEM SUCH

2152
00:49:20,023 --> 00:49:21,525
AN IMPROVEMENT WAS

2153
00:49:21,525 --> 00:49:22,592
THEIR FLEXIBILITY AND THE FACT

2154
00:49:22,592 --> 00:49:23,627
THAT THEY WERE MODULAR.

2155
00:49:23,627 --> 00:49:24,761
SO THEY COULD BE TAKEN APART

2156
00:49:24,761 --> 00:49:27,197
EASILY, AND, UH, MAINTAINED.

2157
00:49:27,197 --> 00:49:29,333
SO THERE COULD BE SOME KIND OF

2158
00:49:29,333 --> 00:49:31,468
ELEMENT THAT'S SHOWING THAT--

2159
00:49:31,468 --> 00:49:32,402
YOU KNOW, THAT KIND OF--

2160
00:49:32,402 --> 00:49:33,270
>> RED DUCT TAPE--

2161
00:49:33,270 --> 00:49:34,171
THAT'S A GREAT IDEA.

2162
00:49:34,171 --> 00:49:35,639
YOU COULD PUT ON SOME KNEE PADS,

2163
00:49:35,639 --> 00:49:37,040

YOU COULD HAVE A DU-RAG,

2164

00:49:37,040 --> 00:49:38,041

UH, YOU KNOW.

2165

00:49:38,041 --> 00:49:39,209

AND IF YOU COULDN'T QUITE

2166

00:49:39,209 --> 00:49:40,177

PULL OFF THE HELMET,

2167

00:49:40,177 --> 00:49:41,912

YOU COULD SORT OF HAVE

2168

00:49:41,912 --> 00:49:43,113

SOMETHING TO THE SIDE.

2169

00:49:43,113 --> 00:49:44,147

>> HOLDING YOUR HELMET.

2170

00:49:44,147 --> 00:49:45,749

>> YEAH, FISHBOWL. I DUNNO.

2171

00:49:45,749 --> 00:49:49,619

>> OKAY, SO-SO I THINK WE'RE

2172

00:49:49,619 --> 00:49:50,987

GONNA GO AHEAD AND MOVE ON

2173

00:49:50,987 --> 00:49:53,023

TO OUR NEXT ARCHIVE PHOTO.

2174

00:49:53,023 --> 00:49:54,291

>> OKAY, WHILE WE BRING THAT UP,

2175

00:49:54,291 --> 00:49:55,592

CAN I JUST SHARE THAT PEOPLE

2176
00:49:55,592 --> 00:49:57,728
WANT THAT FOR THEIR COSTUME.

2177
00:49:57,728 --> 00:49:59,463
>> IT'S PRETTY COOL, RIGHT?

2178
00:49:59,463 --> 00:50:01,031
UH, THIS ONE IS ACTUALLY

2179
00:50:01,031 --> 00:50:02,232
MY FAVORITE.

2180
00:50:02,232 --> 00:50:03,066
THIS IS--

2181
00:50:03,066 --> 00:50:03,900
>> WHAT IS THIS?

2182
00:50:03,900 --> 00:50:05,702
>> THIS IS RISQUE FOR

2183
00:50:05,702 --> 00:50:06,903
THE NORMAL HALLOWEEN COSTUME.

2184
00:50:06,903 --> 00:50:08,572
>> RIGHT. YOU'RE GONNA--

2185
00:50:08,572 --> 00:50:09,806
YOU'RE DARING.

2186
00:50:09,806 --> 00:50:11,608
BY ALL MEANS, RECREATE

2187
00:50:11,608 --> 00:50:12,976
THE LIQUID COOLING

2188
00:50:12,976 --> 00:50:15,412

AND VENTILATION GARMENT.

2189

00:50:15,412 --> 00:50:17,748

AND THIS IS A LATER VERSION

2190

00:50:17,748 --> 00:50:19,583

FROM THE 90s, BUT THESE SUITS

2191

00:50:19,583 --> 00:50:20,550

HAVE BEEN USED FOR

2192

00:50:20,550 --> 00:50:21,785

A VERY LONG TIME.

2193

00:50:21,785 --> 00:50:24,321

AND WHAT THEY HAVE ARE TUBES

2194

00:50:24,321 --> 00:50:25,422

THROUGHOUT THE GARMENT

2195

00:50:25,422 --> 00:50:27,657

THAT HAVE COOL LIQUID FLOWING

2196

00:50:27,657 --> 00:50:29,659

THROUGH THEM, AND THEN

2197

00:50:29,659 --> 00:50:31,061

GO BACK INTO A HEAT EXCHANGER

2198

00:50:31,061 --> 00:50:32,929

AND THE WATER IS COOLED AGAIN,

2199

00:50:32,929 --> 00:50:34,030

AND THEN PUT BACK

2200

00:50:34,030 --> 00:50:35,031

THROUGH THE SUIT.

2201
00:50:35,031 --> 00:50:36,066
AND THIS IS ALL TO KEEP

2202
00:50:36,066 --> 00:50:37,467
THE ASTRONAUT'S, UH,

2203
00:50:37,467 --> 00:50:38,635
BODY TEMPERATURE REGULATED.

2204
00:50:40,237 --> 00:50:39,436
>> OKAY.

2205
00:50:40,237 --> 00:50:41,071
>> SO YOU'D WEAR THIS

2206
00:50:41,071 --> 00:50:41,872
UNDERNEATH A SPACE SUIT

2207
00:50:41,872 --> 00:50:42,806
WHEN YOU'RE IN EVA

2208
00:50:42,806 --> 00:50:43,774
AND, YOU KNOW, YOU'RE

2209
00:50:43,774 --> 00:50:44,641
DOING A LOT OF WORK.

2210
00:50:44,641 --> 00:50:45,776
AND YOU'RE SWEATING.

2211
00:50:45,776 --> 00:50:47,010
AND, YOU KNOW, YOU NEED

2212
00:50:47,010 --> 00:50:48,078
TO BE ABLE TO STAY COOL.

2213
00:50:48,078 --> 00:50:48,945

SO, THAT'S WHAT THIS

2214

00:50:48,945 --> 00:50:49,946
GARMENT DOES.

2215

00:50:49,946 --> 00:50:50,914
UH, THE VENTILATION

2216

00:50:50,914 --> 00:50:52,048
ASPECT OF IT.

2217

00:50:52,048 --> 00:50:53,550
UH, IF YOU CAN SEE,

2218

00:50:53,550 --> 00:50:55,185
THE MATERIAL'S A BIT POROUS.

2219

00:50:55,185 --> 00:50:57,454
IT IS TO BRING THE SWEAT AWAY

2220

00:50:57,454 --> 00:50:58,555
FROM THE ASTRONAUT'S BODY.

2221

00:50:58,555 --> 00:50:59,489
>> OKAY.

2222

00:50:59,489 --> 00:51:00,223
>> YEAH.

2223

00:51:00,223 --> 00:51:00,991
>> THAT'S ACTUALLY PRETTY COOL.

2224

00:51:00,991 --> 00:51:01,758
SO, IT'S KIND OF LIKE

2225

00:51:01,758 --> 00:51:02,893
YOUR UNDERGARMENT FOR

2226

00:51:02,893 --> 00:51:03,960

YOUR SPACE SUIT.

2227

00:51:03,960 --> 00:51:04,828

>> MM-HMM.

2228

00:51:04,828 --> 00:51:06,296

>> AND, UM, YEAH, THEY WERE

2229

00:51:06,296 --> 00:51:07,631

ALSO CALLED "UNION SUITS",

2230

00:51:07,631 --> 00:51:08,799

AFTER THE LONG UNDERWEAR

2231

00:51:08,799 --> 00:51:09,766

WITH THE FLAP IN THE BACK.

2232

00:51:09,766 --> 00:51:11,568

>> YES!

2233

00:51:11,568 --> 00:51:12,869

>> SO AND-- IF YOU'RE

2234

00:51:12,869 --> 00:51:14,171

TOO SHY TO BE WHERE--

2235

00:51:14,171 --> 00:51:15,639

IF YOU WANNA BE SOMEWHAT RISQUE,

2236

00:51:15,639 --> 00:51:16,773

BUT YOU DON'T WANNA GO FOR

2237

00:51:16,773 --> 00:51:18,275

THE SHEER WHITE UNDERWEAR

2238

00:51:18,275 --> 00:51:19,609

ON HALLOWEEN, THEY DID

2239

00:51:19,609 --> 00:51:20,544

COME IN DIFFERENT COLORS.

2240

00:51:20,544 --> 00:51:21,478

>> OKAY.

2241

00:51:21,478 --> 00:51:22,612

>> GOOD TO KNOW.

2242

00:51:22,612 --> 00:51:23,613

>> AND, UH, AND THEN LATER

2243

00:51:23,613 --> 00:51:25,382

VERSIONS WERE MADE MORE SPANDEX.

2244

00:51:25,382 --> 00:51:26,283

THIS ONE WAS KIND OF

2245

00:51:26,283 --> 00:51:27,517

AN ELASTICITY FABRIC.

2246

00:51:27,517 --> 00:51:29,619

BUT, UM, MAYBE A WETSUIT WOULD

2247

00:51:29,619 --> 00:51:31,655

ALSO WORK FOR-FOR RECREATING

2248

00:51:31,655 --> 00:51:32,522

THIS, AS WELL.

2249

00:51:32,522 --> 00:51:33,356

>> OH, YEAH.

2250

00:51:33,356 --> 00:51:34,157

>> I MEAN, WHAT I THINK IS

2251
00:51:34,157 --> 00:51:35,192
SO FASCINATING ABOUT THESE

2252
00:51:35,192 --> 00:51:36,126
GARMENTS IS THAT THEY'VE

2253
00:51:36,126 --> 00:51:38,128
BEEN USED FAR BEYOND NASA.

2254
00:51:38,128 --> 00:51:40,697
AND ARE WORN BY RACECAR DRIVERS,

2255
00:51:40,697 --> 00:51:43,733
UH, FIREFIGHTERS, UM, SURGEONS

2256
00:51:43,733 --> 00:51:45,168
WHO ARE DOING LONG OPERATIONS.

2257
00:51:45,168 --> 00:51:46,236
>> OH, WHOA.

2258
00:51:46,236 --> 00:51:47,204
>> THAT'S ACTUALLY PRETTY COOL.

2259
00:51:47,204 --> 00:51:48,104
>> AND, UH, MY FAVORITE ONE

2260
00:51:48,104 --> 00:51:48,872
IS, UM-- AND I NEVER

2261
00:51:48,872 --> 00:51:49,606
THOUGHT OF THIS,

2262
00:51:49,606 --> 00:51:50,607
BUT IT MAKES TOTAL SENSE.

2263
00:51:50,607 --> 00:51:51,775

IF YOU GO TO A THEME PARK

2264

00:51:51,775 --> 00:51:52,709

AND YOU SEE SOMEONE WEARING,

2265

00:51:52,709 --> 00:51:53,643

LIKE, ONE OF THOSE HUGE,

2266

00:51:53,643 --> 00:51:54,744

FURRY ANIMAL COSTUMES--

2267

00:51:54,744 --> 00:51:55,612

>> MM-HMM.

2268

00:51:55,612 --> 00:51:56,379

>> YES!

2269

00:51:56,379 --> 00:51:57,113

>> ESPECIALLY IF YOU'RE

2270

00:51:57,113 --> 00:51:57,881

SOMEPLACE HOT.

2271

00:51:57,881 --> 00:51:58,715

THEY'LL WEAR ONE OF THESE,

2272

00:51:58,715 --> 00:51:59,850

UH, LIQUID COOLING GARMENTS

2273

00:51:59,850 --> 00:52:00,750

UNDERNEATH.

2274

00:52:00,750 --> 00:52:01,585

>> WOW, THAT'S HILARIOUS.

2275

00:52:01,585 --> 00:52:02,352

>> YEAH, THAT'S ACTUALLY

2276

00:52:02,352 --> 00:52:03,086

REALLY COOL.

2277

00:52:03,086 --> 00:52:04,221

>> I NEVER THOUGHT ABOUT THAT.

2278

00:52:04,221 --> 00:52:06,256

>> AND IT WAS-- AND THEN, I'M--

2279

00:52:06,256 --> 00:52:07,190

THESE WERE DEVELOPED

2280

00:52:07,190 --> 00:52:08,758

ALL OVER, UM, THROUGHOUT

2281

00:52:08,758 --> 00:52:09,826

DIFFERENT CENTERS.

2282

00:52:09,826 --> 00:52:11,394

BUT THERE WAS ACTUALLY

2283

00:52:11,394 --> 00:52:12,562

A BRITISH PHYSICIAN WHO WAS

2284

00:52:12,562 --> 00:52:14,731

THE FIRST PERSON WHO SAID

2285

00:52:14,731 --> 00:52:15,699

THAT MAYBE WE SHOULD USE

2286

00:52:15,699 --> 00:52:16,900

LIQUID COOLING INSTEAD

2287

00:52:16,900 --> 00:52:18,502

OF AIR OR GAS VENTILATION

2288

00:52:18,502 --> 00:52:19,769

TO ACCOMPLISH THIS.

2289

00:52:19,769 --> 00:52:22,405
AND, UH, HE CAME OVER

2290

00:52:22,405 --> 00:52:23,874
TO THE NASA IN THE 60s.

2291

00:52:23,874 --> 00:52:25,842
AND THEN TO AMES.

2292

00:52:25,842 --> 00:52:27,110
UH, THIS WAS-- HIS NAME

2293

00:52:27,110 --> 00:52:28,311
WAS JOHN BILLINGHAM.

2294

00:52:28,311 --> 00:52:30,013
AND HE'S VERY IMPORTANT

2295

00:52:30,013 --> 00:52:31,515
FOR A LOT OF DIFFERENT REASONS,

2296

00:52:31,515 --> 00:52:33,550
IN ADDITION TO-TO, UH,

2297

00:52:33,550 --> 00:52:34,818
THINKING OF THIS IDEA.

2298

00:52:34,818 --> 00:52:36,119
HE WAS THE-- HE'S KNOWN

2299

00:52:36,119 --> 00:52:37,287
AS THE FATHER OR SETI

2300

00:52:37,287 --> 00:52:38,989
AT NASA AND--

2301
00:52:38,989 --> 00:52:40,156
>> SEARCH FOR EXTRATERRESTRIALS

2302
00:52:40,156 --> 00:52:41,091
INTELLIGENCE. REALLY?

2303
00:52:41,091 --> 00:52:41,925
OH, WOW.

2304
00:52:41,925 --> 00:52:42,626
>> YEAH.

2305
00:52:42,626 --> 00:52:43,426
>> HE-HE DID IT ALL.

2306
00:52:43,426 --> 00:52:44,261
>> THE ASTRO-BIOLOGY COMMUNITY.

2307
00:52:44,261 --> 00:52:45,395
AND I MET HIM.

2308
00:52:45,395 --> 00:52:46,162
>> OH!

2309
00:52:46,162 --> 00:52:46,997
>> THAT'S PRETTY COOL.

2310
00:52:46,997 --> 00:52:47,864
>> ALONG WITH GEORGE COOPER,

2311
00:52:47,864 --> 00:52:48,732
I FORGOT TO MENTION.

2312
00:52:48,732 --> 00:52:49,466
>> OH, NICE!

2313
00:52:49,466 --> 00:52:50,433

>> I GOT TO MEET GEORGE COOPER.

2314

00:52:50,433 --> 00:52:51,334

>> YOU GOT TO MEET LOTS

2315

00:52:51,334 --> 00:52:52,202

AND LOTS OF FAMOUS FOLKS.

2316

00:52:52,202 --> 00:52:53,103

>> RIGHT. YOU WENT TO

2317

00:52:53,103 --> 00:52:54,204

ALL THE STARS AS AN ARCHIVIST,

2318

00:52:54,204 --> 00:52:55,238

I GUESS.

2319

00:52:55,238 --> 00:52:55,939

>> WHO KNEW, HUH?

2320

00:52:55,939 --> 00:52:56,773

>> VERY COOL.

2321

00:52:56,773 --> 00:52:59,309

>> OKAY, WELL, THANK YOU

2322

00:52:59,309 --> 00:53:00,977

APRIL AND LANE FOR JOINING US.

2323

00:53:00,977 --> 00:53:01,945

>> YEAH, THAT WAS FASCINATING.

2324

00:53:01,945 --> 00:53:03,213

>> AND JOINING US ON

2325

00:53:03,213 --> 00:53:05,715

THIS TRIP DOWN MEMORY LANE.

2326

00:53:05,715 --> 00:53:06,917

AND SO DON'T FORGET,

2327

00:53:06,917 --> 00:53:08,885

FOR OUR VIEWERS ON TWITCH,

2328

00:53:08,885 --> 00:53:10,220

IF YOU DO END UP USING

2329

00:53:10,220 --> 00:53:11,688

ANY OF THESE LOOKS OR WEAR

2330

00:53:11,688 --> 00:53:13,790

ANY SPACE-THEMED COSTUMES,

2331

00:53:13,790 --> 00:53:14,991

UH, WE WANNA SEE IT.

2332

00:53:14,991 --> 00:53:16,793

SO YOU CAN GO AHEAD AND SHARE

2333

00:53:16,793 --> 00:53:18,395

YOUR NASA-INSPIRED COSTUMES

2334

00:53:18,395 --> 00:53:20,130

ON SOCIAL MEDIA, USING

2335

00:53:20,130 --> 00:53:23,466

THE HASHTAG, #NASACOSTUME.

2336

00:53:23,466 --> 00:53:24,701

>> SWEET.

2337

00:53:24,701 --> 00:53:25,969

CHECK IT OUT, DANIELLE.

2338

00:53:25,969 --> 00:53:27,137

>> ABBY, WHAT IS GOING ON

2339

00:53:27,137 --> 00:53:28,038

OVER HERE?

2340

00:53:28,038 --> 00:53:29,806

>> I FOUND MORE EXOPLANETS!

2341

00:53:29,806 --> 00:53:30,740

MORE OF THEM.

2342

00:53:30,740 --> 00:53:32,142

I JUST KEEP FINDING THEM.

2343

00:53:32,142 --> 00:53:33,977

KEPLER FOUND SOME REALLY COOL

2344

00:53:33,977 --> 00:53:35,545

PLANETS, LIKE, FOR INSTANCE,

2345

00:53:35,545 --> 00:53:37,247

ONE OF MY FAVORITES IS PLANETS

2346

00:53:37,247 --> 00:53:38,915

AROUND DOUBLE STAR SYSTEMS.

2347

00:53:38,915 --> 00:53:39,849

>> AH!

2348

00:53:39,849 --> 00:53:41,351

>> SO, FOR YOU STAR WARS FANS,

2349

00:53:41,351 --> 00:53:42,686

THAT MEANS DOUBLE SUNSETS

2350

00:53:42,686 --> 00:53:45,088

DO EXIST, LIKE ON TATOOINE.

2351
00:53:45,088 --> 00:53:46,356
>> WHAT?

2352
00:53:46,356 --> 00:53:47,557
>> JUST ONE OF THE MANY THINGS

2353
00:53:47,557 --> 00:53:49,225
THAT OUR KEPLER MISSION

2354
00:53:49,225 --> 00:53:51,361
FOUND OUT ABOUT THE GALAXY.

2355
00:53:51,361 --> 00:53:52,629
>> THAT IS PRETTY COOL.

2356
00:53:52,629 --> 00:53:54,931
THAT IS DEFINITELY PRETTY COOL.

2357
00:53:54,931 --> 00:53:56,833
SO, LET'S GO AHEAD

2358
00:53:56,833 --> 00:53:59,002
AND MOVE RIGHT ON TO

2359
00:53:59,002 --> 00:54:00,904
OUR FINAL CATEGORY.

2360
00:54:00,904 --> 00:54:02,105
I'M SURE THIS IS GONNA BE

2361
00:54:02,105 --> 00:54:03,373
A FAN FAVORITE.

2362
00:54:03,373 --> 00:54:05,308
WE'RE TALKING NASA-INSPIRED

2363
00:54:05,308 --> 00:54:07,110

COSPLAY COSTUMES.

2364

00:54:07,110 --> 00:54:08,812

>> SWEET.

2365

00:54:08,812 --> 00:54:10,080

>> SO, THESE ARE COSPLAY

2366

00:54:10,080 --> 00:54:11,181

COSTUMES, OF COURSE,

2367

00:54:11,181 --> 00:54:12,549

WITH A NASA TWIST.

2368

00:54:12,549 --> 00:54:14,217

SO, LET'S GO AHEAD AND WELCOME

2369

00:54:14,217 --> 00:54:16,152

OUR FIRST GUEST TO THE SET.

2370

00:54:16,152 --> 00:54:18,788

COME ON OUT, UH--

2371

00:54:18,788 --> 00:54:19,823

>> ROBERT.

2372

00:54:19,823 --> 00:54:21,825

>> ROBERT!

2373

00:54:21,825 --> 00:54:23,326

>> HEY, HEY, YES, THE FORCE

2374

00:54:23,326 --> 00:54:25,128

IS STRONG WITH THIS ONE.

2375

00:54:25,128 --> 00:54:26,963

THIS IS ROBERT AS A JEDI

2376

00:54:26,963 --> 00:54:28,598

IN TRAINING.

2377

00:54:28,598 --> 00:54:30,033

>> IN TRAINING? THAT'S IT?

2378

00:54:30,033 --> 00:54:31,601

>> WELL, MY YOUNG PADAWAN.

2379

00:54:31,601 --> 00:54:32,669

>> YOU-YOU'RE ALMOST THERE.

2380

00:54:32,669 --> 00:54:33,637

YOU'RE ALMOST THERE.

2381

00:54:33,637 --> 00:54:35,438

>> HAVE I NOT LEARNED?

2382

00:54:35,438 --> 00:54:36,473

>> YOU'RE ABOUT TO GRADUATE.

2383

00:54:36,473 --> 00:54:37,374

>> OH, COOL!

2384

00:54:37,374 --> 00:54:38,241

>> THAT'S WHAT I HEARD.

2385

00:54:38,241 --> 00:54:39,009

>> IS THIS THE INTERVIEW FOR IT?

2386

00:54:39,009 --> 00:54:39,709

>> THAT'S RIGHT.

2387

00:54:39,709 --> 00:54:40,644

>> OH, GREAT.

2388

00:54:40,644 --> 00:54:42,479

>> WELL, WELCOME, ROBERT.

2389

00:54:42,479 --> 00:54:44,681

SO, UH, FIRST THINGS FIRST.

2390

00:54:44,681 --> 00:54:46,416

UH, TELL US A LITTLE BIT ABOUT

2391

00:54:46,416 --> 00:54:47,817

WHAT YOU DO HERE AT AMES.

2392

00:54:47,817 --> 00:54:48,818

>> UH, OKAY. SO, MY NAME IS

2393

00:54:48,818 --> 00:54:50,353

ROBERT AND I HAVE WORKED HERE

2394

00:54:50,353 --> 00:54:52,622

AT NASA AMES FOR FIVE YEARS NOW.

2395

00:54:52,622 --> 00:54:54,057

UH, I'M A SYSTEMS ENGINEER.

2396

00:54:54,057 --> 00:54:56,326

AND WHAT THAT MEANS IS WE WORK--

2397

00:54:56,326 --> 00:54:58,395

OUR TEAM WORKS ON SPACECRAFT

2398

00:54:58,395 --> 00:54:59,763

AND SATELLITE, UH,

2399

00:54:59,763 --> 00:55:00,964

KIND OF ON A SYSTEM--

2400

00:55:00,964 --> 00:55:02,999

SUB-SYSTEM LEVEL, UH, WHERE WE

2401
00:55:02,999 --> 00:55:04,334
GET TO KINDA MAKE THINGS,

2402
00:55:04,334 --> 00:55:05,869
UH, TEST THINGS,

2403
00:55:05,869 --> 00:55:07,103
OFTENTIMES BREAK THINGS.

2404
00:55:07,103 --> 00:55:08,271
AND THEN--

2405
00:55:08,271 --> 00:55:09,139
>> THAT'S THE BEST PART.

2406
00:55:09,139 --> 00:55:10,040
>> FIGURE OUT WHY THEY BROKE

2407
00:55:10,040 --> 00:55:10,907
AND MAYBE HOW TO PREVENT THAT

2408
00:55:10,907 --> 00:55:11,708
IN THE FUTURE, BEFORE IT

2409
00:55:11,708 --> 00:55:12,409
GOES UP INTO SPACE.

2410
00:55:12,409 --> 00:55:13,143
>> RIGHT.

2411
00:55:13,143 --> 00:55:13,977
>> OKAY, AND SO SPEAKING

2412
00:55:13,977 --> 00:55:15,111
OF SPACE, LIKE, WHAT HAVE

2413
00:55:15,111 --> 00:55:16,112

YOU GOT OVER HERE?

2414

00:55:16,112 --> 00:55:17,747

>> OKAY, SO THIS BAD BOY

2415

00:55:17,747 --> 00:55:19,215

IS CALLED SPHERES.

2416

00:55:19,215 --> 00:55:21,217

IT STANDS FOR SYNCHRONIZED

2417

00:55:21,217 --> 00:55:23,420

POSITION HOLD ENGAGE REORIENT

2418

00:55:23,420 --> 00:55:25,689

EXPERIMENTAL SATELLITES. UH--

2419

00:55:25,689 --> 00:55:26,523

>> THAT'S A MOUTHFUL.

2420

00:55:26,523 --> 00:55:27,657

>> YEAH, IT IS A MOUTHFUL, UH--

2421

00:55:27,657 --> 00:55:28,625

>> JUST SAY SPHERES.

2422

00:55:28,625 --> 00:55:29,626

>> AND MOST-MOST OF THE TIME

2423

00:55:29,626 --> 00:55:31,861

WE CAN'T REMEMBER THE ACRONYM.

2424

00:55:31,861 --> 00:55:33,430

UM, THERE ARE CURRENTLY

2425

00:55:33,430 --> 00:55:34,998

TWO OF THEM ON-STATION.

2426
00:55:34,998 --> 00:55:37,367
AND THEY ARE USED FOR CONDUCTING

2427
00:55:37,367 --> 00:55:39,069
CONTROL THEORY EXPERIMENTS.

2428
00:55:39,069 --> 00:55:39,936
>> WHAT?

2429
00:55:39,936 --> 00:55:41,037
>> AND THINGS LIKE THAT.

2430
00:55:41,037 --> 00:55:41,938
>> OKAY, SO FIRST OF ALL,

2431
00:55:41,938 --> 00:55:42,772
THIS GUY-- GUYS LIKE THIS

2432
00:55:42,772 --> 00:55:43,540
ARE ON THE INTERNATIONAL

2433
00:55:43,540 --> 00:55:44,240
SPACE STATION?

2434
00:55:44,240 --> 00:55:45,008
>> YES, THERE ARE

2435
00:55:45,008 --> 00:55:45,809
TWO IDENTICAL TO THIS.

2436
00:55:45,809 --> 00:55:46,543
>> OKAY.

2437
00:55:46,543 --> 00:55:47,310
>> DIFFERENT COLORS.

2438
00:55:47,310 --> 00:55:48,011

WE ACTUALLY DENOTE THEM

2439

00:55:48,011 --> 00:55:48,745
BY THEIR COLORS.

2440

00:55:48,745 --> 00:55:49,746
THERE IS, UH, A BLUE ONE AND

2441

00:55:49,746 --> 00:55:51,181
A RED ONE CURRENTLY UP THERE.

2442

00:55:51,181 --> 00:55:52,182
>> NOW, I THINK WE HAVE

2443

00:55:52,182 --> 00:55:53,083
SOME FOOTAGE OF THAT--

2444

00:55:53,083 --> 00:55:54,017
>> YES, DEFINITELY.

2445

00:55:54,017 --> 00:55:54,851
>> ON THE SPACE STATION.

2446

00:55:54,851 --> 00:55:55,618
CAN WE GO AHEAD AND GET THAT

2447

00:55:55,618 --> 00:55:56,352
BROUGHT UP?

2448

00:55:56,352 --> 00:55:57,087
>> OH, LOOK AT 'EM!

2449

00:55:57,087 --> 00:55:57,954
>> YEAH, SO, THIS IS, UH,

2450

00:55:57,954 --> 00:55:58,822
ACTUALLY THE ASTRONAUT ON

2451

00:55:58,822 --> 00:55:59,889

THE RIGHT IS SCOTT KELLY,

2452

00:55:59,889 --> 00:56:00,924

UH, THE GUY WHO WAS UP THERE

2453

00:56:00,924 --> 00:56:02,258

FOR A LITTLE OVER A YEAR.

2454

00:56:02,258 --> 00:56:03,760

THIS WAS A PREVIOUS MISSION

2455

00:56:03,760 --> 00:56:04,828

THAT HE HAD DONE.

2456

00:56:04,828 --> 00:56:05,995

UM, AND THIS KIND OF

2457

00:56:05,995 --> 00:56:07,263

THE, UH, REALLY GOOD EXAMPLE

2458

00:56:07,263 --> 00:56:08,131

TO UNDERSTAND.

2459

00:56:08,131 --> 00:56:09,766

SO THEY ARE, UM, DOING

2460

00:56:09,766 --> 00:56:10,967

JUST A SIMPLE MANEUVER--

2461

00:56:10,967 --> 00:56:12,102

WELL, NOT AS SIMPLE AS IT

2462

00:56:12,102 --> 00:56:13,636

APPEARS WHERE ONE IS ROTATING,

2463

00:56:13,636 --> 00:56:15,638

UH, AROUND ITSELF.

2464

00:56:15,638 --> 00:56:16,606

AND THEN THE OTHER ONE IS

2465

00:56:16,606 --> 00:56:18,041

ROTATING AROUND THAT ONE IN

2466

00:56:18,041 --> 00:56:18,908

A DIFFERENT PATTERN

2467

00:56:18,908 --> 00:56:19,709

>> OH!

2468

00:56:19,709 --> 00:56:20,443

>> THAT'S JUST SORT OF

2469

00:56:20,443 --> 00:56:21,444

A BASIC EXAMPLE OF-OF WHAT

2470

00:56:21,444 --> 00:56:22,412

THESE THINGS ARE CAPABLE OF.

2471

00:56:22,412 --> 00:56:23,146

>> YEAH.

2472

00:56:23,146 --> 00:56:23,913

>> BUT THERE'S SO MUCH MORE

2473

00:56:23,913 --> 00:56:24,714

THAT THEY CAN DO.

2474

00:56:24,714 --> 00:56:26,049

UM, AND THAT'S KINDA WITH

2475

00:56:26,049 --> 00:56:27,851

THE HELP OF THE EXPANSION PORT

2476

00:56:27,851 --> 00:56:28,651

RIGHT HERE.

2477

00:56:28,651 --> 00:56:29,986

THAT HAS ALLOWED FOR, UH,

2478

00:56:29,986 --> 00:56:31,855

NUMEROUS PAYLOADS AND SCIENCES

2479

00:56:31,855 --> 00:56:34,257

TO BE ADDED ONTO SPHERES TO DO

2480

00:56:34,257 --> 00:56:35,391

WAY MORE THINGS THAT WE MAYBE

2481

00:56:35,391 --> 00:56:36,626

NEVER THOUGHT WAS POSSIBLE

2482

00:56:36,626 --> 00:56:37,660

WITH THE ORIGINAL DESIGN

2483

00:56:37,660 --> 00:56:38,394

OF SPHERES.

2484

00:56:38,394 --> 00:56:39,229

SO, IT'S REALLY COOL

2485

00:56:39,229 --> 00:56:40,530

TO SEE THAT OVER TEN YEARS,

2486

00:56:40,530 --> 00:56:41,798

THAT THIS THING HAS

2487

00:56:41,798 --> 00:56:42,999

SORT OF EXPLODED

2488

00:56:42,999 --> 00:56:44,501

AND-AND WE'VE GOT SOMETHING LIKE

2489

00:56:44,501 --> 00:56:47,270

OVER 300 CREW HOURS ON-STATION,

2490

00:56:47,270 --> 00:56:48,171

IN THE LAST TEN YEARS.

2491

00:56:48,171 --> 00:56:48,938

>> OH, OKAY.

2492

00:56:48,938 --> 00:56:49,672

>> WHICH IS--

2493

00:56:49,672 --> 00:56:50,406

>> THAT'S PRETTY IMPRESSIVE.

2494

00:56:50,406 --> 00:56:51,107

>> UH, YEAH, I DON'T KNOW

2495

00:56:51,107 --> 00:56:52,175

IF IT'S THE-THE MOST,

2496

00:56:52,175 --> 00:56:53,176

BUT IT'S DEFINITELY UP THERE

2497

00:56:53,176 --> 00:56:54,744

WITH THE MOST, AND, UH,

2498

00:56:54,744 --> 00:56:55,845

WE'RE STILL GOIN' STRONG.

2499

00:56:55,845 --> 00:56:56,813

WE HAVE A TEST SESSION

2500

00:56:56,813 --> 00:56:57,647

NEXT WEEK,

2501
00:56:57,647 --> 00:56:58,515
AS A MATTER OF FACT, SO--

2502
00:56:58,515 --> 00:56:59,215
>> OH, COOL.

2503
00:56:59,215 --> 00:56:59,883
>> YEAH.

2504
00:56:59,883 --> 00:57:00,717
>> I'VE HEARD THESE HELP

2505
00:57:00,717 --> 00:57:01,584
DO EXPERIMENTS.

2506
00:57:01,584 --> 00:57:02,385
IS THAT TRUE?

2507
00:57:02,385 --> 00:57:03,319
>> YEAH, SO--

2508
00:57:03,319 --> 00:57:04,087
>> WHAT KIND OF EXPERIMENTS?

2509
00:57:04,087 --> 00:57:06,523
>> SO, UH, WHEN WE WANNA DO

2510
00:57:06,523 --> 00:57:08,191
OR PRACTICE CONTROL THEORY

2511
00:57:08,191 --> 00:57:10,360
FOR SPACECRAFT OR OTHER ROCKETS

2512
00:57:10,360 --> 00:57:11,961
IN A ZERO-GRAVITY ENVIRONMENT,

2513
00:57:11,961 --> 00:57:13,463

UH, IT CAN BE VERY DAUNTING

2514

00:57:13,463 --> 00:57:14,664

TO-TO IMMEDIATELY SEND

2515

00:57:14,664 --> 00:57:15,532

SOMETHING UP THERE

2516

00:57:15,532 --> 00:57:16,833

AND NOT HAVE PRACTICED

2517

00:57:16,833 --> 00:57:18,768

AND GOTTEN THE MATH RIGHT, UH,

2518

00:57:18,768 --> 00:57:19,836

'CAUSE THAT'S ALWAYS IMPORTANT.

2519

00:57:19,836 --> 00:57:21,671

SO, UH, WHAT THESE GUYS ALLOW

2520

00:57:21,671 --> 00:57:23,973

FOR IS REALLY BASIC TESTING,

2521

00:57:23,973 --> 00:57:25,742

WELL-WELL WITHIN

2522

00:57:25,742 --> 00:57:26,743

THE CONSTRAINTS OF THE

2523

00:57:26,743 --> 00:57:27,744

INTERNATIONAL SPACE STATION.

2524

00:57:27,744 --> 00:57:29,045

IT'S ALWAYS CREW ATTENDED.

2525

00:57:29,045 --> 00:57:30,680

UM, BUT ULTIMATELY, THESE THINGS

2526

00:57:30,680 --> 00:57:31,815

ARE ABLE TO VALIDATE

2527

00:57:31,815 --> 00:57:33,349

AND VERIFY A LOT OF ALGORITHMS

2528

00:57:33,349 --> 00:57:35,618

AND-AND IDEAS AND NEW SENSORS

2529

00:57:35,618 --> 00:57:36,753

THAT THEY CAN MAYBE

2530

00:57:36,753 --> 00:57:38,054

IMPLEMENT ON LARGER SPACECRAFT

2531

00:57:38,054 --> 00:57:38,922

TO AVOID--

2532

00:57:38,922 --> 00:57:39,823

>> OKAY.

2533

00:57:39,823 --> 00:57:40,757

>> COLLIDING WITH EACH OTHER

2534

00:57:40,757 --> 00:57:41,658

OR THAT THEY CAN

2535

00:57:41,658 --> 00:57:42,559

MORE ACCURATELY DOCK WITH

2536

00:57:42,559 --> 00:57:43,393

THE SPACE STATION.

2537

00:57:43,393 --> 00:57:44,861

OR, UH, REALLY, THE BIG

2538

00:57:44,861 --> 00:57:46,262

PUNCHLINE IS RECONFIGURABLE

2539

00:57:46,262 --> 00:57:48,464

SPACECRAFT IN-IN ORBIT

2540

00:57:48,464 --> 00:57:49,399

OR IF YOU'RE GOING TO

2541

00:57:49,399 --> 00:57:50,533

THE MOON AND YOU WANNA BUILD

2542

00:57:50,533 --> 00:57:51,568

SOME KIND OF STATION AROUND IT,

2543

00:57:51,568 --> 00:57:52,368

YOU HAVE TO HAVE

2544

00:57:52,368 --> 00:57:53,436

MULTIPLE PARTS COME TOGETHER.

2545

00:57:53,436 --> 00:57:54,804

UH, IF YOU'VE GOT THINGS

2546

00:57:54,804 --> 00:57:56,105

THAT CAN AUTONOMOUSLY DO THAT,

2547

00:57:56,105 --> 00:57:57,807

UH, AND SORT OF CONNECT

2548

00:57:57,807 --> 00:57:58,708

EVERYTHING TOGETHER,

2549

00:57:58,708 --> 00:57:59,609

IT'S A LOT OF SAFER,

2550

00:57:59,609 --> 00:58:00,476

SO YOU DON'T HAVE TO HAVE

2551

00:58:00,476 --> 00:58:01,344

ASTRONAUTS DOING IT,

2552

00:58:01,344 --> 00:58:02,378

AND IT'S MUCH MORE AUTOMATED.

2553

00:58:02,378 --> 00:58:03,580

SO THIS-THIS SORT OF HELPS

2554

00:58:03,580 --> 00:58:05,315

VALIDATE A LOT OF THAT.

2555

00:58:05,315 --> 00:58:07,750

BUT AT A MUCH CHEAPER COST,

2556

00:58:07,750 --> 00:58:09,219

BECAUSE YOU ALREADY HAVE THESE

2557

00:58:09,219 --> 00:58:10,753

THINGS IN THE SPACE STATION.

2558

00:58:10,753 --> 00:58:11,788

SO, ALL YOU HAVE TO DO IS

2559

00:58:11,788 --> 00:58:13,056

JUST REPROGRAM IT TO DO

2560

00:58:13,056 --> 00:58:14,324

WHATEVER YOU-YOU WANT.

2561

00:58:14,324 --> 00:58:15,625

AND YOU CAN TRY IT OUT.

2562

00:58:15,625 --> 00:58:16,759

AND IF IT DOESN'T WORK SO GOOD,

2563

00:58:16,759 --> 00:58:17,994

THEN YOU CAN TRY SOMETHING ELSE.

2564

00:58:17,994 --> 00:58:18,828

>> OKAY.

2565

00:58:18,828 --> 00:58:20,230

>> WITHOUT A VERY, UH,

2566

00:58:20,230 --> 00:58:21,598

HIGH PRICE POINT, SO--

2567

00:58:21,598 --> 00:58:22,498

>> YEAH, YEAH.

2568

00:58:22,498 --> 00:58:23,466

>> OKAY, THAT MAKES SENSE.

2569

00:58:23,466 --> 00:58:24,334

SO, ABBY, DO WE HAVE

2570

00:58:24,334 --> 00:58:25,368

ANY QUESTIONS.

2571

00:58:25,368 --> 00:58:26,135

>> WELL, WE DO.

2572

00:58:26,135 --> 00:58:26,903

HERE-HERE'S AN IMPORTANT ONE

2573

00:58:26,903 --> 00:58:27,670

TO START US OFF.

2574

00:58:27,670 --> 00:58:28,371

>> OKAY.

2575

00:58:28,371 --> 00:58:29,772

>> ROBERT, LUKE OR YODA?

2576

00:58:29,772 --> 00:58:30,540

>> LUKE.

2577

00:58:30,540 --> 00:58:31,274

>> OOH!

2578

00:58:31,274 --> 00:58:32,542

>> I'M A-I'M A MARK HAMILL FAN.

2579

00:58:32,542 --> 00:58:33,309

>> OKAY.

2580

00:58:33,309 --> 00:58:34,077

>> BUT I GOTTA SUPPORT

2581

00:58:34,077 --> 00:58:35,278

FRANK OZ, TOO, SO--

2582

00:58:35,278 --> 00:58:36,012

>> YOU DIDN'T-YOU DIDN'T

2583

00:58:36,012 --> 00:58:36,880

HESITATE AT ALL.

2584

00:58:36,880 --> 00:58:37,714

>> NO, NO.

2585

00:58:37,714 --> 00:58:38,448

>> I MUST SAY.

2586

00:58:38,448 --> 00:58:39,249

>> I'D SAY THE FORCE WAS

2587

00:58:39,249 --> 00:58:39,983

STRONG WITH THIS ONE.

2588

00:58:39,983 --> 00:58:41,017

>> I'D LIKE TO THINK SO.

2589

00:58:41,017 --> 00:58:42,418

>> YES. WHO SHOT FIRST?

2590

00:58:42,418 --> 00:58:44,020

>> HAN. WE'RE NOT EVEN--

2591

00:58:44,020 --> 00:58:45,655

THAT-THAT QUESTION IS NOT--

2592

00:58:45,655 --> 00:58:47,257

MOVING ON.

2593

00:58:47,257 --> 00:58:48,224

>> I WILL NOT DIGNIFY THAT

2594

00:58:48,224 --> 00:58:48,958

WITH AN ANSWER.

2595

00:58:48,958 --> 00:58:49,759

>> YEAH, YEAH.

2596

00:58:49,759 --> 00:58:50,927

>> OKAY, SO, IF OUR VIEWERS

2597

00:58:50,927 --> 00:58:53,062

WANTED TO RECREATE--

2598

00:58:53,062 --> 00:58:53,897

>> THE LOOK?

2599

00:58:53,897 --> 00:58:54,797

>> NOT ONLY THE LOOK,

2600

00:58:54,797 --> 00:58:56,232

BUT ALSO SPHERES,

2601

00:58:56,232 --> 00:58:57,166

WHAT MIGHT WE DO?

2602

00:58:57,166 --> 00:58:59,369

>> OKAY, SO, UH, FOR THE-THE,

2603

00:58:59,369 --> 00:59:02,071

UH, WONDERFUL JEDI GARB, UH,

2604

00:59:02,071 --> 00:59:03,306

YOU COULD START WITH

2605

00:59:03,306 --> 00:59:04,674

SOMETHING AS SIMPLE AS, LIKE,

2606

00:59:04,674 --> 00:59:06,109

A BATHROBE WITH A HOOD

2607

00:59:06,109 --> 00:59:07,143

AND KIND WORK YOUR WAY UP.

2608

00:59:07,143 --> 00:59:08,077

>> MM-HMM.

2609

00:59:08,077 --> 00:59:09,078

>> UM, YOU COULD GET

2610

00:59:09,078 --> 00:59:09,946

JUST A LOT OF FABRIC

2611

00:59:09,946 --> 00:59:10,914

AND SEW IT YOURSELF.

2612

00:59:10,914 --> 00:59:12,482

UH, THE COOL THING IS, LIKE,

2613

00:59:12,482 --> 00:59:15,051

JEDI OUTFITS ARE VERY, LIKE,

2614

00:59:15,051 --> 00:59:16,519

UNDEFINED, OFTENTIMES.

2615

00:59:16,519 --> 00:59:18,288

AND SO IT'S KIND OF LIKE

2616

00:59:18,288 --> 00:59:20,156

CREATOR CHOICE.

2617

00:59:20,156 --> 00:59:21,057

>> OKAY.

2618

00:59:21,057 --> 00:59:21,891

>> YOU KNOW, YOU CAN GET--

2619

00:59:21,891 --> 00:59:22,859

YOU CAN FIND ROBES AND PAJAMAS.

2620

00:59:22,859 --> 00:59:23,793

AND IF YOU PUT ENOUGH

2621

00:59:23,793 --> 00:59:24,661

SASHES AND BELTS ON IT,

2622

00:59:24,661 --> 00:59:26,062

IT LOOKS STAR WARS-Y.

2623

00:59:26,062 --> 00:59:27,096

AND YOU CAN GO FROM THERE.

2624

00:59:29,299 --> 00:59:28,164

>> IT'LL PASS.

2625

00:59:29,299 --> 00:59:30,199

IF YOU WANTED TO CREATE

2626

00:59:30,199 --> 00:59:30,934

ONE OF THESE BAD BOYS--

2627

00:59:30,934 --> 00:59:31,668

>> RIGHT.

2628

00:59:31,668 --> 00:59:33,670

>> YEAH, SO, UH, WE ACTUALLY

2629

00:59:33,670 --> 00:59:35,371

HAVE A WOODEN ONE, UH,

2630

00:59:35,371 --> 00:59:37,307

IN OUR LAB THAT WE USE

2631

00:59:37,307 --> 00:59:38,641

AS A MASS ANALOG.

2632

00:59:38,641 --> 00:59:40,176

IT WEIGHS IDENTICALLY TO IT.

2633

00:59:40,176 --> 00:59:41,144

UH, DIMENSIONALLY,

2634

00:59:41,144 --> 00:59:42,078

IT'S THE SAME.

2635

00:59:42,078 --> 00:59:43,413

WE CUT IT WITH A BANDSAW

2636

00:59:43,413 --> 00:59:44,480

AND GLUED IT TOGETHER.

2637

00:59:44,480 --> 00:59:45,548

UH, SO YOU COULD DO THAT

2638

00:59:45,548 --> 00:59:46,416

AND JUST PAINT IT BLACK

2639

00:59:46,416 --> 00:59:47,784

OR WHATEVER MAGICAL COLOR

2640

00:59:47,784 --> 00:59:48,584

YOU COULD THINK OF.

2641

00:59:48,584 --> 00:59:49,385

>> YEAH, COOL.

2642

00:59:49,385 --> 00:59:50,787

>> DID YOU SAY, AND IS IT TRUE,

2643

00:59:50,787 --> 00:59:52,488

THAT THIS INSPIRED--

2644

00:59:52,488 --> 00:59:54,590

>> YES, SO, THERE IS--

2645

00:59:54,590 --> 00:59:56,192

THE-THE STORY GOES, AND MAYBE

2646

00:59:56,192 --> 00:59:57,894

THAT'S THE TRUE REASON

2647

00:59:57,894 --> 00:59:59,262

THAT I'M REPRESENTING

2648

00:59:59,262 --> 01:00:00,697

OUR-OUR JEDI BRETHERN IS--

2649

01:00:00,697 --> 01:00:01,631

>> YES.

2650

01:00:01,631 --> 01:00:03,099

>> THE STORY BEHIND SPHERES

2651
01:00:03,099 --> 01:00:04,934
WAS DAVE MILLER, WHO IS

2652
01:00:04,934 --> 01:00:06,369
A PROFESSOR AT MIT, WHO IS ALSO

2653
01:00:06,369 --> 01:00:07,904
CHIEF TECHNOLOGIST AT AMES

2654
01:00:07,904 --> 01:00:10,573
A FEW YEARS AGO HAD ONE OF

2655
01:00:10,573 --> 01:00:11,874
HIS SENIOR PROJECTS,

2656
01:00:11,874 --> 01:00:13,109
AND HE SHOWED THE CLIP,

2657
01:00:13,109 --> 01:00:14,677
"A NEW HOPE" OF JEDI--

2658
01:00:14,677 --> 01:00:16,612
OF LUKE PRACTICING WITH

2659
01:00:16,612 --> 01:00:17,747
THE LITTLE DROID FLOATING AROUND

2660
01:00:17,747 --> 01:00:18,982
HITTING HIM WITH THE BLASTER,

2661
01:00:18,982 --> 01:00:20,049
AND HE TOLD HIM TO PUT

2662
01:00:20,049 --> 01:00:20,984
THE FACE SHIELD DOWN,

2663
01:00:20,984 --> 01:00:21,951

AND HAN'S LIKE, "I DON'T

2664

01:00:21,951 --> 01:00:22,852
BELIEVE IN THE FORCE"

2665

01:00:22,852 --> 01:00:24,087
AND ALL THAT FUN STUFF.

2666

01:00:24,087 --> 01:00:25,421
AND HE SHOWED THAT CLIP

2667

01:00:25,421 --> 01:00:26,255
TO HIS STUDENTS, AND HE SAID,

2668

01:00:26,255 --> 01:00:27,090
"I WANT YOU TO MAKE ME

2669

01:00:27,090 --> 01:00:27,857
ONE OF THOSE."

2670

01:00:27,857 --> 01:00:28,725
AND THAT'S WHAT THEY DID

2671

01:00:28,725 --> 01:00:30,193
IS THEY-- YOU KNOW, AS BEST

2672

01:00:30,193 --> 01:00:31,227
THEY COULD, AND IT'S

2673

01:00:31,227 --> 01:00:32,528
NOT SPHERICAL, IRONICALLY

2674

01:00:32,528 --> 01:00:34,197
IT IS CALLED SPHERES.

2675

01:00:34,197 --> 01:00:37,500
BUT IT WAS A VERY STRONG EFFORT

2676
01:00:37,500 --> 01:00:38,835
FROM A BUNCH OF STUDENTS AT MIT

2677
01:00:38,835 --> 01:00:39,869
THAT PUT THIS THING TOGETHER,

2678
01:00:39,869 --> 01:00:41,671
LIKE, 10, 12, 15 YEARS AGO.

2679
01:00:41,671 --> 01:00:43,606
AND THE THING STILL WORKS GREAT.

2680
01:00:43,606 --> 01:00:44,741
AND SO YEAH, IT IS

2681
01:00:44,741 --> 01:00:45,775
STAR WARS INSPIRED.

2682
01:00:45,775 --> 01:00:46,576
WE CAN--

2683
01:00:46,576 --> 01:00:48,211
>> THAT IS PRETTY COOL.

2684
01:00:48,211 --> 01:00:50,013
>> THAT'S GREAT, EXCELLENT.

2685
01:00:50,013 --> 01:00:51,881
>> OKAY, SO.

2686
01:00:51,881 --> 01:00:52,949
>> ALL RIGHT, I THINK WE HAVE

2687
01:00:52,949 --> 01:00:55,151
TIME FOR ONE QUICK QUESTION

2688
01:00:55,151 --> 01:00:57,720

ABOUT SPHERES' [INDISTINCT]

2689

01:00:57,720 --> 01:00:59,288

IS A COMMENT WE GOT.

2690

01:00:59,288 --> 01:01:00,356

>> HECK YEAH, IT IS.

2691

01:01:00,356 --> 01:01:02,225

NASA.GOV/SPHERES, CHECK IT OUT.

2692

01:01:02,225 --> 01:01:03,059

>> OKAY.

2693

01:01:03,059 --> 01:01:04,427

>> OKAY, AND WE'LL ALSO PUT

2694

01:01:04,427 --> 01:01:07,063

THAT IN THE CHAT TWITCH.

2695

01:01:07,063 --> 01:01:08,097

THE TWITCH CHAT.

2696

01:01:08,097 --> 01:01:08,831

>> YEP, YEP.

2697

01:01:08,831 --> 01:01:09,599

>> COOL.

2698

01:01:09,599 --> 01:01:10,299

>> ALL RIGHT.

2699

01:01:10,299 --> 01:01:11,034

>> WELL, THANK YOU ROBERT.

2700

01:01:11,034 --> 01:01:11,768

>> YEAH, ABSOLUTELY.

2701

01:01:11,768 --> 01:01:12,435

>> THANKS FOR JOINING US.

2702

01:01:12,435 --> 01:01:13,169

>> YEAH.

2703

01:01:13,169 --> 01:01:16,105

>> OKAY, SO LET'S GO AHEAD

2704

01:01:16,105 --> 01:01:18,341

AND WELCOME OUR NEXT GUEST.

2705

01:01:18,341 --> 01:01:20,176

SO WHAT WOULD YOU DO

2706

01:01:20,176 --> 01:01:22,178

IF YOU HAVE A BUNCH OF

2707

01:01:22,178 --> 01:01:23,846

ROBOBEEES IN SPACE?

2708

01:01:23,846 --> 01:01:24,781

YOU'RE GONNA NEED

2709

01:01:24,781 --> 01:01:26,049

AN ASTROBEEKEEPER.

2710

01:01:26,049 --> 01:01:27,283

SO LET'S GO AHEAD

2711

01:01:27,283 --> 01:01:29,619

AND WELCOME OUT RICK AS

2712

01:01:29,619 --> 01:01:32,088

ASTROBEEKEEPER AND MARIA.

2713

01:01:32,088 --> 01:01:33,389

>> YES, YES.

2714

01:01:33,389 --> 01:01:36,926

[LAUGHTER]

2715

01:01:39,762 --> 01:01:40,997

>> I'VE BEEN LOOKING FORWARD

2716

01:01:40,997 --> 01:01:43,900

TO SEEING THE ASTROBEEKEEPER.

2717

01:01:43,900 --> 01:01:44,834

HELLO, RICK.

2718

01:01:44,834 --> 01:01:45,535

>> HELLO.

2719

01:01:45,535 --> 01:01:46,235

>> WELCOME.

2720

01:01:46,235 --> 01:01:48,237

>> HI, MARIA. HI.

2721

01:01:48,237 --> 01:01:50,640

OKAY, SO STARTING US OFF,

2722

01:01:50,640 --> 01:01:52,809

SO MARIA, INTRODUCE YOURSELF

2723

01:01:52,809 --> 01:01:53,876

AND TELL US A LITTLE BIT

2724

01:01:53,876 --> 01:01:54,911

ABOUT WHAT YOU DO.

2725

01:01:54,911 --> 01:01:56,479

>> I'M MARIA BUALAT,

2726
01:01:56,479 --> 01:01:58,114
AND I'M THE PROJECT MANAGER

2727
01:01:58,114 --> 01:02:00,983
FOR THE ASTROBEE PROJECT.

2728
01:02:00,983 --> 01:02:02,618
WE ARE BUILDING THESE

2729
01:02:02,618 --> 01:02:04,120
FREE FLYING ROBOTS FOR

2730
01:02:04,120 --> 01:02:05,321
THE INTERNATIONAL SPACE STATION.

2731
01:02:05,321 --> 01:02:06,122
THANK YOU.

2732
01:02:06,122 --> 01:02:06,956
>> YEAH, HOLD IT UP THERE.

2733
01:02:06,956 --> 01:02:07,890
>> SO THESE ARE JUST SOME

2734
01:02:07,890 --> 01:02:10,059
3D PRINTED MODELS OF IT.

2735
01:02:10,059 --> 01:02:11,527
AND IT'S ACTUALLY-- THIS IS

2736
01:02:11,527 --> 01:02:12,929
A ONE-THIRD SCALE, SO IT'S

2737
01:02:12,929 --> 01:02:14,530
ACTUALLY 12 INCHES

2738
01:02:14,530 --> 01:02:15,631

BY 12 INCHES BY 12 INCHES.

2739

01:02:15,631 --> 01:02:16,432

>> OKAY.

2740

01:02:16,432 --> 01:02:17,233

>> OH, ALL RIGHT.

2741

01:02:17,233 --> 01:02:18,034

>> SO YEAH, IT'S A LITTLE BIT

2742

01:02:18,034 --> 01:02:19,869

BIGGER THAN WHAT YOU SEE HERE.

2743

01:02:19,869 --> 01:02:22,271

>> WHAT DOES ASTROBEE DO?

2744

01:02:22,271 --> 01:02:23,673

>> IT WILL FLY AROUND ON

2745

01:02:23,673 --> 01:02:25,141

THE INTERNATIONAL SPACE STATION.

2746

01:02:25,141 --> 01:02:26,109

IT'S ACTUALLY GOING

2747

01:02:26,109 --> 01:02:27,410

TO REPLACE THE SPHERES,

2748

01:02:27,410 --> 01:02:28,811

WHICH ROBERT JUST TALKED ABOUT.

2749

01:02:28,811 --> 01:02:30,580

SO SPHERES, THEY'VE HAD

2750

01:02:30,580 --> 01:02:31,914

GREAT PAYLOAD, THEY'VE BEEN

2751
01:02:31,914 --> 01:02:33,549
UP THERE FOR OVER TEN YEARS.

2752
01:02:33,549 --> 01:02:34,417
>> WOW, OKAY.

2753
01:02:34,417 --> 01:02:35,284
>> AND THEY ARE STARTING

2754
01:02:35,284 --> 01:02:36,352
TO SHOW THEIR AGE.

2755
01:02:36,352 --> 01:02:37,887
THE THRUSTERS DON'T WORK

2756
01:02:37,887 --> 01:02:38,955
QUITE AS WELL.

2757
01:02:38,955 --> 01:02:39,789
AND YOU KNOW,

2758
01:02:39,789 --> 01:02:41,057
THE PROCESSOR'S OUTDATED.

2759
01:02:41,057 --> 01:02:41,858
>> I SEE.

2760
01:02:41,858 --> 01:02:42,959
>> SO ASTROBEE IS GOING

2761
01:02:42,959 --> 01:02:44,026
TO REPLACE THEM.

2762
01:02:44,026 --> 01:02:44,827
WE'RE GOING TO FLY

2763
01:02:44,827 --> 01:02:45,695

THREE OF THEM.

2764

01:02:45,695 --> 01:02:46,596

AND IT'S GOT

2765

01:02:46,596 --> 01:02:47,697

MORE PROCESSING POWER.

2766

01:02:47,697 --> 01:02:48,865

IT'S A LITTLE EASIER TO

2767

01:02:48,865 --> 01:02:51,134

INTERFACE OTHER PAYLOADS ONTO.

2768

01:02:51,134 --> 01:02:52,034

>> OKAY.

2769

01:02:52,034 --> 01:02:53,202

>> SO THESE ARE PAYLOAD BAYS

2770

01:02:53,202 --> 01:02:55,571

HERE ON THE BOTTOM AND ONE

2771

01:02:55,571 --> 01:02:56,873

ON THE TOP, WHERE YOU CAN

2772

01:02:56,873 --> 01:02:58,107

JUST PLUG IN ANOTHER PAYLOAD

2773

01:02:58,107 --> 01:02:59,242

WITH DIFFERENT SENSORS.

2774

01:02:59,242 --> 01:03:00,109

>> OKAY, YEAH, LIKE SOME

2775

01:03:00,109 --> 01:03:00,943

INSTRUMENTS, MEASURES...

2776

01:03:00,943 --> 01:03:01,777

>> EXACTLY.

2777

01:03:01,777 --> 01:03:03,546

YOU CAN MEASURE CARBON DIOXIDE

2778

01:03:03,546 --> 01:03:05,014

ONBOARD OR RADIATION.

2779

01:03:05,014 --> 01:03:06,015

>> AH, I SEE.

2780

01:03:06,015 --> 01:03:09,051

>> SOUNDS. SO YES, AND THEN

2781

01:03:09,051 --> 01:03:11,487

WE ALSO WILL ACT AS FLYING

2782

01:03:11,487 --> 01:03:13,389

INSTRUMENT OR FLYING CAMERA.

2783

01:03:13,389 --> 01:03:16,058

SO GROUND CONTROLLERS CAN

2784

01:03:16,058 --> 01:03:17,627

ACTUALLY FLY THE ROBOT AROUND

2785

01:03:17,627 --> 01:03:18,761

AND THERE'S A HIGH DEFINITION

2786

01:03:18,761 --> 01:03:20,696

CAMERA ON IT SO THEY

2787

01:03:20,696 --> 01:03:21,898

CAN ACTUALLY OBSERVE

2788

01:03:21,898 --> 01:03:23,199

CREW ACTIVITIES.

2789

01:03:23,199 --> 01:03:24,267
SO CREW DOESN'T HAVE TO

2790

01:03:24,267 --> 01:03:25,501
ACTUALLY PLACE A CAMERA.

2791

01:03:25,501 --> 01:03:26,769
THE GROUND CONTROLLERS

2792

01:03:26,769 --> 01:03:27,670
JUST FLY UP--

2793

01:03:27,670 --> 01:03:28,604
>> SO THE CREW CAN TAKE ALL OF

2794

01:03:28,604 --> 01:03:29,539
THE SELFIES THAT THEY WANT?

2795

01:03:29,539 --> 01:03:30,840
>> THAT'S RIGHT, YEAH.

2796

01:03:30,840 --> 01:03:31,941
THAT'S REALLY THE GOAL HERE,

2797

01:03:31,941 --> 01:03:32,808
I THINK.

2798

01:03:32,808 --> 01:03:33,676
>> THERE IS A TOUCH SCREEN

2799

01:03:33,676 --> 01:03:34,544
ON THE FRONT, ALSO,

2800

01:03:34,544 --> 01:03:35,578
SO THE CREW CAN ALSO

2801
01:03:35,578 --> 01:03:37,079
INTERACT WITH THE ROBOT.

2802
01:03:37,079 --> 01:03:37,880
>> OH, COOL, OKAY.

2803
01:03:37,880 --> 01:03:38,681
SO YOU MENTIONED

2804
01:03:38,681 --> 01:03:39,715
THEY'RE FLYING ABOARD THE

2805
01:03:39,715 --> 01:03:41,117
INTERNATIONAL SPACE STATION.

2806
01:03:41,117 --> 01:03:42,285
HOW MANY OF THEM ARE GONNA BE--

2807
01:03:42,285 --> 01:03:43,286
ARE THERE GONNA BE?

2808
01:03:43,286 --> 01:03:44,053
>> THREE.

2809
01:03:44,053 --> 01:03:44,921
>> THERE'LL BE THREE ON BOARD.

2810
01:03:44,921 --> 01:03:45,855
WE ALSO WILL HAVE THREE

2811
01:03:45,855 --> 01:03:46,889
GROUND UNITS, SO WE CAN TEST

2812
01:03:46,889 --> 01:03:48,424
EVERYTHING OUT ON THE GROUND

2813
01:03:48,424 --> 01:03:49,792

BEFORE WE FLY IT.

2814

01:03:49,792 --> 01:03:50,760

>> OKAY, DO THEY HAVE

2815

01:03:50,760 --> 01:03:51,994

ANY CREATIVE NAMES,

2816

01:03:51,994 --> 01:03:52,762

KEEPING WITH THE BEE THEME?

2817

01:03:52,762 --> 01:03:53,563

>> THEY DO.

2818

01:03:53,563 --> 01:03:54,664

THEY ARE COLOR CODED.

2819

01:03:54,664 --> 01:03:56,265

AND THEY HAVE NICKNAMES,

2820

01:03:56,265 --> 01:03:57,700

SO THEY ARE ALL ASTROBEES.

2821

01:03:57,700 --> 01:03:58,634

>> OKAY.

2822

01:03:58,634 --> 01:04:00,403

>> BUT THEY EACH HAVE A NAME,

2823

01:04:00,403 --> 01:04:02,638

SO HONEY IS YELLOW.

2824

01:04:02,638 --> 01:04:03,706

>> OKAY.

2825

01:04:03,706 --> 01:04:05,308

>> BUMBLE IS BLUE.

2826

01:04:05,308 --> 01:04:06,475

AND QUEEN IS GREEN.

2827

01:04:06,475 --> 01:04:07,510

>> ALL RIGHT, OKAY.

2828

01:04:07,510 --> 01:04:09,145

>> SO YEAH, SO THAT WAY WE CAN

2829

01:04:09,145 --> 01:04:10,379

TELL THEM APART WHEN WE'RE

2830

01:04:10,379 --> 01:04:12,114

LOOKING AT VIDEO ON STATION,

2831

01:04:12,114 --> 01:04:13,449

CREW CAN TELL THEM APART.

2832

01:04:13,449 --> 01:04:15,451

THEY SAY, "OH, QUEEN STUCK TO

2833

01:04:15,451 --> 01:04:17,753

A VENT, SO, YOU KNOW,

2834

01:04:17,753 --> 01:04:19,121

RESCUE QUEEN," BUT...

2835

01:04:19,121 --> 01:04:20,489

>> AND YOU KNOW, I THINK--

2836

01:04:20,489 --> 01:04:21,490

DO WE HAVE--?

2837

01:04:21,490 --> 01:04:22,692

WE HAVE SOME ANIMATION.

2838

01:04:22,692 --> 01:04:23,960

WE HAVE A COUPLE OF IMAGES,

2839

01:04:23,960 --> 01:04:25,027

SO WE CAN GO AHEAD AND BRING

2840

01:04:25,027 --> 01:04:26,128

THAT UP ON SCREEN?

2841

01:04:26,128 --> 01:04:26,996

>> LET'S SEE

2842

01:04:26,996 --> 01:04:27,897

THE REAL DEAL ASTROBEE.

2843

01:04:27,897 --> 01:04:29,131

>> YEAH, SO THIS IS A COMPUTER

2844

01:04:29,131 --> 01:04:31,100

ANIMATION OF WHAT ASTROBEE

2845

01:04:31,100 --> 01:04:32,368

WILL LOOK LIKE ON STATION.

2846

01:04:32,368 --> 01:04:33,402

SO THERE'S A GREEN ONE,

2847

01:04:33,402 --> 01:04:34,503

SO THAT MUST BE QUEEN.

2848

01:04:34,503 --> 01:04:37,707

AND I SAID, IT CAN RUN

2849

01:04:37,707 --> 01:04:38,774

DIFFERENT EXPERIMENTS.

2850

01:04:38,774 --> 01:04:39,675

SO HERE IT'S USING ITS

2851
01:04:39,675 --> 01:04:42,011
MANIPULATOR TO GRAB SOMETHING.

2852
01:04:42,011 --> 01:04:44,213
OR PERHAPS EVEN MOVE CARGO,

2853
01:04:44,213 --> 01:04:45,147
SO WE HAVE TWO OF THEM

2854
01:04:45,147 --> 01:04:46,482
WORKING, COOPERATING.

2855
01:04:46,482 --> 01:04:47,416
>> OH, WOW, OKAY.

2856
01:04:47,416 --> 01:04:48,251
>> HAVE ONE PULLING

2857
01:04:48,251 --> 01:04:50,486
AND ONE PUSHING, SO THAT WAS

2858
01:04:50,486 --> 01:04:51,687
BLUE IN THE BACK THERE,

2859
01:04:51,687 --> 01:04:52,655
SO IT MUST HAVE BEEN

2860
01:04:52,655 --> 01:04:53,422
BUMBLE HELPING ALONG.

2861
01:04:53,422 --> 01:04:54,257
>> OKAY, YEAH.

2862
01:04:54,257 --> 01:04:54,991
HERE'S A QUESTION THAT

2863
01:04:54,991 --> 01:04:55,758

I'M WONDERING TOO.

2864

01:04:55,758 --> 01:04:57,059
HOW DOES IT FLY ON

2865

01:04:57,059 --> 01:04:57,893
THE SPACE STATION?

2866

01:04:57,893 --> 01:04:59,629
>> SO IT'S-- WHEN YOU LOOK

2867

01:04:59,629 --> 01:05:00,730
AT IT, IT'S KIND OF--

2868

01:05:00,730 --> 01:05:01,597
WE CALL IT-- IT'S SORT OF

2869

01:05:01,597 --> 01:05:02,565
LIKE A HAMBURGER, RIGHT?

2870

01:05:02,565 --> 01:05:03,599
EXCEPT IT FLIES THIS WAY.

2871

01:05:03,599 --> 01:05:05,768
AND EACH OF THE BUNS IS

2872

01:05:05,768 --> 01:05:07,270
A PROPULSION MODULE.

2873

01:05:07,270 --> 01:05:08,804
AND THERE IS AN IMPELLER,

2874

01:05:08,804 --> 01:05:10,206
A FAN, BASICALLY,

2875

01:05:10,206 --> 01:05:11,407
THAT PULLS AIR IN.

2876

01:05:11,407 --> 01:05:12,475

SO THIS ONLY WORKS

2877

01:05:12,475 --> 01:05:14,176

INSIDE THE SPACE STATION.

2878

01:05:14,176 --> 01:05:15,878

IT WON'T WORK OUTSIDE.

2879

01:05:15,878 --> 01:05:17,346

SO IT PULLS AIR IN

2880

01:05:17,346 --> 01:05:18,614

AND LIGHTLY PRESSURIZES

2881

01:05:18,614 --> 01:05:19,915

THE PROPULSION MODULE.

2882

01:05:19,915 --> 01:05:21,784

AND THEN ON EACH FACE,

2883

01:05:21,784 --> 01:05:23,252

THERE'S A NOZZLE, AND THEN

2884

01:05:23,252 --> 01:05:25,021

TWO HERE ON THE ENDS.

2885

01:05:25,021 --> 01:05:26,889

SO IT CAN FLY IN ANY DIRECTION

2886

01:05:26,889 --> 01:05:29,225

AND ROTATE AROUND ANY ACCESS.

2887

01:05:29,225 --> 01:05:31,027

SO THAT'S HOW IT FLIES.

2888

01:05:31,027 --> 01:05:31,927

>> HOW COOL.

2889

01:05:31,927 --> 01:05:32,795

>> THAT'S ACTUALLY PRETTY COOL.

2890

01:05:32,795 --> 01:05:33,562

>> AND THE WAY IT NAVIGATES

2891

01:05:33,562 --> 01:05:34,363

IS THERE ARE CAMERAS

2892

01:05:34,363 --> 01:05:35,464

IN THE FRONT, AND IT USES

2893

01:05:35,464 --> 01:05:37,266

ITS NAVIGATION CAMERA TO--

2894

01:05:37,266 --> 01:05:38,868

IT SEES FEATURES,

2895

01:05:38,868 --> 01:05:40,836

JUST NATURAL TEXTURES,

2896

01:05:40,836 --> 01:05:42,004

VISUAL TEXTURES,

2897

01:05:42,004 --> 01:05:42,972

IN THE SPACE STATION.

2898

01:05:42,972 --> 01:05:43,906

IT BUILDS A MAP,

2899

01:05:43,906 --> 01:05:44,740

AND THEN COMPARES

2900

01:05:44,740 --> 01:05:45,808

WHAT IT SEES TO ITS MAP

2901

01:05:45,808 --> 01:05:47,043

SO IT KNOWS WHERE IT IS.

2902

01:05:47,043 --> 01:05:48,044

>> AH, SO I WOULD SAY

2903

01:05:48,044 --> 01:05:49,612

IT'S ALMOST BEE-LIKE.

2904

01:05:49,612 --> 01:05:51,647

>> YES, AND IT BUZZES.

2905

01:05:51,647 --> 01:05:52,481

>> IT DOES?

2906

01:05:52,481 --> 01:05:54,083

>> WELL, IT'S GOT FANS GOING

2907

01:05:54,083 --> 01:05:55,084

AROUND IT, SO IT'S GOT

2908

01:05:55,084 --> 01:05:56,419

A LITTLE BIT OF A BUZZ TO IT.

2909

01:05:56,419 --> 01:05:57,653

SO THAT'S HOW IT BECAME KNOWN

2910

01:05:57,653 --> 01:05:58,487

AS ASTROBEE.

2911

01:05:58,487 --> 01:05:59,388

>> OH, REALLY? ALL RIGHT.

2912

01:05:59,388 --> 01:06:00,222

>> AND HOPEFULLY WILL BE BUSY

2913

01:06:00,222 --> 01:06:01,123

AS A BEE ON THERE.

2914

01:06:01,123 --> 01:06:02,325

>> OH, GOOD POINT, GOOD POINT.

2915

01:06:02,325 --> 01:06:03,559

IT ALL COMES TOGETHER.

2916

01:06:03,559 --> 01:06:04,427

>> IT DOES.

2917

01:06:04,427 --> 01:06:06,896

[LAUGHTER]

2918

01:06:06,896 --> 01:06:07,863

>> HEY, RICK.

2919

01:06:07,863 --> 01:06:08,898

>> HEY, HOW'S IT GOING ABBY?

2920

01:06:08,898 --> 01:06:10,499

>> PRETTY GOOD.

2921

01:06:10,499 --> 01:06:12,268

THANKS FOR DEMOING

2922

01:06:12,268 --> 01:06:13,302

ASTROBEEKEEPER.

2923

01:06:13,302 --> 01:06:14,203

>> OH, MY PLEASURE,

2924

01:06:14,203 --> 01:06:15,404

MY PLEASURE.

2925

01:06:15,404 --> 01:06:16,472

I'VE ALWAYS WANTED TO BE

2926

01:06:16,472 --> 01:06:18,674

A ASTROBEEKEEPER.

2927

01:06:18,674 --> 01:06:19,642

>> WHO HASN'T?

2928

01:06:19,642 --> 01:06:20,976

I MEAN, WE'VE ALL DREAMT

2929

01:06:20,976 --> 01:06:21,911

OF THAT.

2930

01:06:21,911 --> 01:06:22,812

SO RICK, WHERE DO YOU LAND

2931

01:06:22,812 --> 01:06:24,914

ON THE LUKE OR YODA QUESTION?

2932

01:06:24,914 --> 01:06:25,815

>> ON THE WHAT?

2933

01:06:25,815 --> 01:06:27,817

>> LUKE OR YODA?

2934

01:06:27,817 --> 01:06:28,718

>> YODA.

2935

01:06:28,718 --> 01:06:29,485

>> AND ALSO--

2936

01:06:29,485 --> 01:06:30,252

>> YODA HAS HAIR COMING OUT

2937

01:06:30,252 --> 01:06:31,020

OF HIS EARS.

2938

01:06:31,020 --> 01:06:32,054

LIKE, WHAT A GREAT--

2939

01:06:32,054 --> 01:06:33,289

WHAT GREAT CHARACTER DESIGN,

2940

01:06:33,289 --> 01:06:34,123

COME ON.

2941

01:06:34,123 --> 01:06:35,825

>> CHARACTER DESIGN.

2942

01:06:35,825 --> 01:06:37,493

>> FABULOUS, ALL RIGHT.

2943

01:06:37,493 --> 01:06:38,694

>> OKAY, WELL, THANK YOU

2944

01:06:38,694 --> 01:06:39,929

RICK AND MARIA.

2945

01:06:39,929 --> 01:06:40,896

IT'S BEEN A PLEASURE HAVING

2946

01:06:40,896 --> 01:06:41,897

YOU GUYS ON THE SHOW,

2947

01:06:41,897 --> 01:06:42,965

BUT WE ARE GONNA SEE YOU

2948

01:06:42,965 --> 01:06:43,799

A LITTLE BIT LATER,

2949

01:06:43,799 --> 01:06:44,600

BECAUSE WE HAVE TO VOTE

2950

01:06:44,600 --> 01:06:45,634

ON OUR COSTUMES.

2951

01:06:45,634 --> 01:06:46,535

>> YEAH.

2952

01:06:46,535 --> 01:06:48,137

>> VERY NICE BEEKEEPER COSTUME.

2953

01:06:48,137 --> 01:06:49,305

>> THAT'S RIGHT.

2954

01:06:49,305 --> 01:06:50,940

SO THANKS FOR BEING ON.

2955

01:06:50,940 --> 01:06:51,807

>> THANK YOU.

2956

01:06:51,807 --> 01:06:53,476

>> SO FOR OUR VIEWERS ON TWITCH,

2957

01:06:53,476 --> 01:06:55,077

DON'T FORGET. YOU GUYS CAN VOTE

2958

01:06:55,077 --> 01:06:56,078

FOR YOUR FAVORITE CONT--

2959

01:06:56,078 --> 01:06:57,279

YOUR FAVORITE COSTUMES,

2960

01:06:57,279 --> 01:06:58,714

AND IF YOU DO END UP USING

2961

01:06:58,714 --> 01:07:01,183

ANY OF THESE NASA INSPIRED

2962

01:07:01,183 --> 01:07:03,319

COSPLAY OR ANY SPACE THEME,

2963

01:07:03,319 --> 01:07:05,020

YOU CAN GO AHEAD AND TAG US

2964

01:07:05,020 --> 01:07:06,956
ON OUR SOCIAL MEDIA CHANNELS,

2965

01:07:06,956 --> 01:07:08,991
HASHTAG #NASACOSTUME.

2966

01:07:08,991 --> 01:07:10,092
>> YEAH, I'M GONNA GO CHECK

2967

01:07:10,092 --> 01:07:11,394
THAT OUT AFTER THIS.

2968

01:07:11,394 --> 01:07:12,928
SEE WHAT'S UP THERE.

2969

01:07:12,928 --> 01:07:14,296
ALL RIGHT, SO NEXT UP,

2970

01:07:14,296 --> 01:07:15,331
EVERYBODY KNOWS

2971

01:07:15,331 --> 01:07:16,665
MARY POPPINS, RIGHT?

2972

01:07:16,665 --> 01:07:18,200
SO OUR NASA VERSION IS

2973

01:07:18,200 --> 01:07:19,769
MARY TECHNO-POPPINS,

2974

01:07:19,769 --> 01:07:20,936
WITH SOME INNOVATIVE

2975

01:07:20,936 --> 01:07:23,005
NASA HEAT SHIELD TECHNOLOGY

2976

01:07:23,005 --> 01:07:23,839

THAT THEY'RE GONNA

2977

01:07:23,839 --> 01:07:24,740

TELL US ABOUT.

2978

01:07:24,740 --> 01:07:28,077

SO COME ON OUT, PAUL.

2979

01:07:28,077 --> 01:07:29,678

>> AND ROXANA.

2980

01:07:29,678 --> 01:07:32,882

>> AND ROXANA, HELLO.

2981

01:07:34,517 --> 01:07:38,020

YOU ARE ADORABLE.

2982

01:07:38,020 --> 01:07:38,888

SO WHY DON'T YOU GUYS

2983

01:07:38,888 --> 01:07:40,156

GO AHEAD AND COME ON UP.

2984

01:07:40,156 --> 01:07:43,459

>> JOIN US UP ON-- UP HERE.

2985

01:07:43,459 --> 01:07:45,127

>> SO CUTE, AND I LOVE

2986

01:07:45,127 --> 01:07:48,464

YOUR UMBRELLA.

2987

01:07:48,464 --> 01:07:51,767

>> THANK YOU, SO IF YOU GUYS

2988

01:07:51,767 --> 01:07:53,702

CAN INTRODUCE YOURSELF

2989

01:07:53,702 --> 01:07:55,171

AND LET US KNOW WHAT YOU

2990

01:07:55,171 --> 01:07:56,605

DO HERE AT AMES.

2991

01:07:56,605 --> 01:07:57,907

>> SURE, MY NAME IS

2992

01:07:57,907 --> 01:07:59,074

PAUL WERCINSKI.

2993

01:07:59,074 --> 01:08:00,843

I'M A AEROSPACE ENGINEER.

2994

01:08:00,843 --> 01:08:02,478

CURRENTLY THE PROJECT MANAGER

2995

01:08:02,478 --> 01:08:06,148

FOR ADEPT. AND WE'VE BEEN

2996

01:08:06,148 --> 01:08:08,150

WORKING HEAT SHIELDS AT AMES

2997

01:08:08,150 --> 01:08:10,486

HERE FOR QUITE A LONG WHILE,

2998

01:08:10,486 --> 01:08:11,887

AND THIS IS OUR LATEST

2999

01:08:11,887 --> 01:08:13,389

GENERATION OF A NEW TYPE

3000

01:08:13,389 --> 01:08:14,356

OF HEAT SHIELD.

3001
01:08:14,356 --> 01:08:15,991
>> OKAY, SO YOU MENTION ADEPT.

3002
01:08:15,991 --> 01:08:16,926
>> YES.

3003
01:08:16,926 --> 01:08:17,726
>> WHAT IS THAT?

3004
01:08:17,726 --> 01:08:18,494
BECAUSE I KNOW THERE'S

3005
01:08:18,494 --> 01:08:19,361
AN ACRONYM FOR EVERYTHING,

3006
01:08:19,361 --> 01:08:20,095
OF COURSE.

3007
01:08:20,095 --> 01:08:21,197
>> THERE IS.

3008
01:08:21,197 --> 01:08:23,299
ADEPT STANDS FOR ADAPTABLE,

3009
01:08:23,299 --> 01:08:25,267
DEPLOYABLE, ENTRY,

3010
01:08:25,267 --> 01:08:26,902
AND PLACEMENT TECHNOLOGY.

3011
01:08:26,902 --> 01:08:28,771
SO IT IS A MOUTHFUL.

3012
01:08:28,771 --> 01:08:31,106
THE WAY WE DESCRIBE IT IS JUST

3013
01:08:31,106 --> 01:08:32,875

WITH THE UMBRELLA ANALOGY,

3014

01:08:32,875 --> 01:08:35,711

IT'S STOWED ON THE GROUND

3015

01:08:35,711 --> 01:08:37,046

OR IN YOUR LAUNCH VEHICLE,

3016

01:08:37,046 --> 01:08:38,180

AND BEFORE IT GETS TO

3017

01:08:38,180 --> 01:08:39,682

A PLANET IT OPENS UP TO DO

3018

01:08:39,682 --> 01:08:40,950

ITS JOB AS A HEAT SHIELD.

3019

01:08:40,950 --> 01:08:42,151

>> OKAY. AND YOU KNOW,

3020

01:08:42,151 --> 01:08:43,819

I THINK WE HAVE

3021

01:08:43,819 --> 01:08:46,388

SOME FOOTAGE OF ADEPT.

3022

01:08:46,388 --> 01:08:47,189

SO CAN WE GO AHEAD AND GET

3023

01:08:47,189 --> 01:08:48,357

THAT BROUGHT ON SCREEN.

3024

01:08:48,357 --> 01:08:49,525

>> OH, YEAH.

3025

01:08:49,525 --> 01:08:52,027

THAT'S IT OPENING UP, HUH?

3026

01:08:52,027 --> 01:08:53,329

>> YES, THIS IS THE LAB HERE

3027

01:08:53,329 --> 01:08:55,431

AT AMES, AND THERE'S SOME OF

3028

01:08:55,431 --> 01:08:57,066

THE EARLY PROTOTYPES JUST

3029

01:08:57,066 --> 01:08:59,335

GOING THROUGH DEPLOYMENT.

3030

01:08:59,335 --> 01:09:00,436

AND HERE YOU'RE SEEING

3031

01:09:00,436 --> 01:09:01,837

THE ARC JETS ALSO HERE AT AMES.

3032

01:09:01,837 --> 01:09:02,805

THOSE ARE THE BEST

3033

01:09:02,805 --> 01:09:04,907

FACILITIES FOR SIMULATING

3034

01:09:04,907 --> 01:09:07,576

THE HIGH HEATING RATES

3035

01:09:07,576 --> 01:09:09,945

THAT PROBE OR A HEAT SHIELD

3036

01:09:09,945 --> 01:09:10,880

WILL SEE WHEN IT'S FLYING

3037

01:09:10,880 --> 01:09:11,981

INTO A PLANET'S SURFACE.

3038

01:09:11,981 --> 01:09:13,449

AND THERE'S ONE OF THE ADEPTS

3039

01:09:13,449 --> 01:09:14,950
IN THERE GLOWING RED HOT.

3040

01:09:14,950 --> 01:09:15,751
>> I WAS GOING TO SAY,

3041

01:09:15,751 --> 01:09:16,519
WHY DON'T YOU REMIND US,

3042

01:09:16,519 --> 01:09:17,186
ACTUALLY, WHAT IS IT

3043

01:09:17,186 --> 01:09:17,987
ABOUT HEAT SHIELDS?

3044

01:09:17,987 --> 01:09:19,054
WHAT ARE THEY USED FOR

3045

01:09:19,054 --> 01:09:20,523
AND WHEN ARE THEY NECESSARY?

3046

01:09:20,523 --> 01:09:22,057
>> SURE, WELL, HEAT SHIELDS

3047

01:09:22,057 --> 01:09:26,095
FOR ANY VEHICLE GOING TO MARS,

3048

01:09:26,095 --> 01:09:28,898
PUTTING THE ROVERS DOWN,

3049

01:09:28,898 --> 01:09:30,232
ASTRONAUTS RETURNING BACK

3050

01:09:30,232 --> 01:09:31,934
TO EARTH, ALL KINDS OF THINGS.

3051

01:09:31,934 --> 01:09:32,868

IF YOU'RE FLYING THROUGH

3052

01:09:32,868 --> 01:09:34,203

A PLANET'S ATMOSPHERE,

3053

01:09:34,203 --> 01:09:35,538

YOU NEED A HEAT SHIELD

3054

01:09:35,538 --> 01:09:36,805

TO PROTECT YOUR PAYLOAD

3055

01:09:36,805 --> 01:09:37,973

FROM BURNING UP, OR ELSE

3056

01:09:37,973 --> 01:09:39,174

YOU WOULD END UP LIKE

3057

01:09:39,174 --> 01:09:40,175

A METEORITE OR SOMETHING.

3058

01:09:40,175 --> 01:09:41,911

>> YEAH, YEAH, RIGHT.

3059

01:09:41,911 --> 01:09:42,978

A VERY SENSITIVE SHOOTING STAR.

3060

01:09:42,978 --> 01:09:44,013

>> OKAY, WELL, WE DON'T LEAVE

3061

01:09:44,013 --> 01:09:45,414

ROXANA LEFT OUT, SO PLEASE

3062

01:09:45,414 --> 01:09:46,415

TELL ME A LITTLE BIT ABOUT

3063

01:09:46,415 --> 01:09:48,050

WHAT YOU DO HERE AT AMES.

3064

01:09:48,050 --> 01:09:50,052

>> SO YES, MY NAME IS ROXANA,

3065

01:09:50,052 --> 01:09:52,655

AND WHAT I DO IS THE TRAVEL

3066

01:09:52,655 --> 01:09:55,024

REGIONALIZATION WITH ARMSTRONG

3067

01:09:55,024 --> 01:09:57,092

AND DEPLOYMENTS CAMPAIGN

3068

01:09:57,092 --> 01:09:58,294

HERE AT AMES.

3069

01:09:58,294 --> 01:09:59,528

>> OKAY.

3070

01:09:59,528 --> 01:10:00,963

YEAH, THAT'S PRETTY COOL.

3071

01:10:00,963 --> 01:10:03,465

SO, YOU TALKED A LITTLE BIT

3072

01:10:03,465 --> 01:10:04,466

ABOUT ENTRY.

3073

01:10:04,466 --> 01:10:06,001

SO WHAT EXACTLY-- WHAT DOES

3074

01:10:06,001 --> 01:10:08,270

ADEPT HOPE TO SOLVE?

3075

01:10:08,270 --> 01:10:09,672

>> UP TO NOW, WE'VE BEEN

3076

01:10:09,672 --> 01:10:11,173

BUILDING HEAT SHIELDS, WHICH

3077

01:10:11,173 --> 01:10:12,408

WE CALL RIGID HEAT SHIELDS.

3078

01:10:12,408 --> 01:10:13,542

SO, BASICALLY, THEY'RE

3079

01:10:13,542 --> 01:10:14,810

A BIG, SAUCER-LIKE DISH.

3080

01:10:14,810 --> 01:10:15,778

>> OKAY.

3081

01:10:15,778 --> 01:10:16,812

>> UH, COVERED WITH SPECIAL

3082

01:10:16,812 --> 01:10:18,447

MATERIALS-- BLADE OF MATERIALS,

3083

01:10:18,447 --> 01:10:21,016

A NOSE, UM, ARE MADE TO

3084

01:10:21,016 --> 01:10:22,184

SURVIVE THE HIGH HEATING

3085

01:10:22,184 --> 01:10:23,018

DURING ENTRY.

3086

01:10:23,018 --> 01:10:24,019

AND THOSE HAVE WORKED VERY WELL.

3087

01:10:24,019 --> 01:10:25,621

WE'VE USED THEM SUCCESSFULLY.

3088

01:10:25,621 --> 01:10:28,324

UM, BUT WHAT WE ARE SEEING NOW

3089

01:10:28,324 --> 01:10:29,792

IS OTHER MISSIONS

3090

01:10:29,792 --> 01:10:32,227

WHERE THESE HEAT SHIELDS,

3091

01:10:32,227 --> 01:10:33,596

UH, THAT WE NEED TO SATISFY

3092

01:10:33,596 --> 01:10:35,164

A MISSION NEEDS TO BE

3093

01:10:35,164 --> 01:10:37,866

EVEN BIGGER THAN WHAT OUR

3094

01:10:37,866 --> 01:10:39,335

LARGEST ROCKETS WE'RE DESIGNING

3095

01:10:39,335 --> 01:10:40,369

RIGHT NOW CAN CARRY.

3096

01:10:40,369 --> 01:10:41,270

>> OH, OKAY.

3097

01:10:41,270 --> 01:10:42,237

>> AND SO THAT'S THE WHOLE

3098

01:10:42,237 --> 01:10:44,340

MOTIVATION BEHIND, UH, THIS

3099

01:10:44,340 --> 01:10:46,442

UMBRELLA CONCEPT OF STOWING,

3100

01:10:46,442 --> 01:10:47,409

'CAUSE IT CAN NOW BE

3101

01:10:47,409 --> 01:10:48,410
IN A SMALLER SHAPE.

3102

01:10:48,410 --> 01:10:49,411
>> MM-HMM.

3103

01:10:49,411 --> 01:10:51,013
>> AND THEN ACTUALLY OPEN UP

3104

01:10:51,013 --> 01:10:52,681
TO A SIZE MUCH BIGGER

3105

01:10:52,681 --> 01:10:53,849
THAN WHAT THE ROCKET

3106

01:10:53,849 --> 01:10:54,783
COULD'VE ACCOMMODATED.

3107

01:10:54,783 --> 01:10:55,551
>> OKAY.

3108

01:10:55,551 --> 01:10:56,318
>> OKAY, YEAH.

3109

01:10:56,318 --> 01:10:57,319
SO, YEAH, IT'S MORE FLEXIBLE

3110

01:10:57,319 --> 01:10:59,521
FOR DIFFERENT SIZED VEHICLES,

3111

01:10:59,521 --> 01:11:00,356
SPACECRAFT.

3112

01:11:00,356 --> 01:11:01,223
>> EXACTLY. I MEAN,

3113

01:11:01,223 --> 01:11:02,458

PEOPLE HAVE CONCEIVED, UH--

3114

01:11:02,458 --> 01:11:04,360

THIS IS A SMALLER VERSION.

3115

01:11:04,360 --> 01:11:05,494

THIS IS JUST UNDER A METER

3116

01:11:05,494 --> 01:11:06,395

IN DIAMETER.

3117

01:11:06,395 --> 01:11:08,530

BUT THE ENGINEERS HAVE, UH,

3118

01:11:08,530 --> 01:11:09,932

LOOKED AT DESIGNS UP TO

3119

01:11:09,932 --> 01:11:11,934

16-18 METERS IN DIAMETER.

3120

01:11:11,934 --> 01:11:12,768

>> OH, WOW.

3121

01:11:12,768 --> 01:11:13,736

>> THINK ABOUT THAT.

3122

01:11:13,736 --> 01:11:16,505

UH, FOR DELIVERING LARGE,

3123

01:11:16,505 --> 01:11:18,273

ALMOST LIKE A SMALL HOUSE

3124

01:11:18,273 --> 01:11:19,441

TO THE SURFACE OF MARS

3125

01:11:19,441 --> 01:11:20,609

FOR HUMAN EXPLORATION.

3126

01:11:20,609 --> 01:11:22,511

YOU NEED A HEAT SHIELD THAT BIG.

3127

01:11:22,511 --> 01:11:23,646

AND WHEN YOU THINK ABOUT THAT,

3128

01:11:23,646 --> 01:11:25,314

THAT'S-- YOU CAN'T FIT THAT

3129

01:11:25,314 --> 01:11:26,415

IN A ROCKET, AS IT IS.

3130

01:11:26,415 --> 01:11:27,316

>> YEAH, YEAH, THAT MAKES

3131

01:11:27,316 --> 01:11:28,183

PERFECT SENSE.

3132

01:11:28,183 --> 01:11:29,051

SO, PEOPLE WANNA KNOW

3133

01:11:29,051 --> 01:11:29,885

WHAT IT'S MADE OF.

3134

01:11:29,885 --> 01:11:30,919

WHAT IS THIS FABRIC?

3135

01:11:30,919 --> 01:11:32,254

>> OH, THAT'S A GREAT QUESTION.

3136

01:11:32,254 --> 01:11:34,223

UM, THAT'S ESSENTIALLY

3137

01:11:34,223 --> 01:11:35,557

THE ENABLING TECHNOLOGY

3138

01:11:35,557 --> 01:11:36,425

WITH ADEPT.

3139

01:11:36,425 --> 01:11:38,260

THIS IS, UH, A THREE DIMENSIONAL

3140

01:11:38,260 --> 01:11:40,329

WOVEN CARBON FABRIC.

3141

01:11:40,329 --> 01:11:42,097

IT'S MADE FROM PURE CARBON YARN,

3142

01:11:42,097 --> 01:11:43,766

UM, AND CARBON IS

3143

01:11:43,766 --> 01:11:46,035

A GREAT MATERIAL FOR

3144

01:11:46,035 --> 01:11:47,202

HIGH-TEMPERATURE APPLICATIONS.

3145

01:11:47,202 --> 01:11:48,537

CARBON CAN SURVIVE VERY HIGH

3146

01:11:48,537 --> 01:11:50,105

TEMPERATURES AND STILL

3147

01:11:50,105 --> 01:11:51,640

RETAIN ITS PROPERTIES.

3148

01:11:51,640 --> 01:11:52,508

AND THAT'S WHAT WE'RE

3149

01:11:52,508 --> 01:11:53,742

LOOKING FOR IN THIS HEAT SHIELD.

3150

01:11:53,742 --> 01:11:54,777

>> COOL.

3151
01:11:54,777 --> 01:11:55,611
>> OKAY.

3152
01:11:55,611 --> 01:11:56,745
>> UM, MORE QUESTIONS.

3153
01:11:56,745 --> 01:11:57,946
UH, HOW MUCH TEMPERATURE

3154
01:11:57,946 --> 01:11:59,515
CAN IT WITHSTAND VERSUS

3155
01:11:59,515 --> 01:12:01,250
TRADITIONAL HEAT SHIELDS?

3156
01:12:01,250 --> 01:12:02,584
>> UH, IT'S ABOUT THE SAME

3157
01:12:02,584 --> 01:12:04,253
TEMPERATURE THAT A REGULAR

3158
01:12:04,253 --> 01:12:05,587
HEAT SHIELD WOULD SEE.

3159
01:12:05,587 --> 01:12:07,389
IT'S, UH, IN EXCESS OF THREE,

3160
01:12:07,389 --> 01:12:10,492
EVEN 3,500 DEGREES FAHRENHEIT.

3161
01:12:10,492 --> 01:12:11,493
THAT'S VERY HIGH.

3162
01:12:11,493 --> 01:12:12,628
YOU SAW IT GLOWING RED-HOT

3163
01:12:12,628 --> 01:12:13,629

IN THAT VIDEO.

3164

01:12:13,629 --> 01:12:14,363

>> YEAH.

3165

01:12:14,363 --> 01:12:15,197

>> SO, THAT'S-- THE BIG

3166

01:12:15,197 --> 01:12:16,598

CHALLENGE IS NOT ONLY DOES

3167

01:12:16,598 --> 01:12:18,100

THIS FABRIC HAVE TO STOW

3168

01:12:18,100 --> 01:12:19,468

AND OPEN UP LIKE AN UMBRELLA

3169

01:12:19,468 --> 01:12:21,103

AND TAKE ON THE PRESSURES,

3170

01:12:21,103 --> 01:12:22,938

IT'S GONNA GET REALLY HOT

3171

01:12:22,938 --> 01:12:24,373

AND STILL HAVE TO HOLD TOGETHER.

3172

01:12:24,373 --> 01:12:25,941

>> YEAH, UH, SPEAKING OF

3173

01:12:25,941 --> 01:12:27,743

HOLDING TOGETHER, SOMEBODY IS

3174

01:12:27,743 --> 01:12:29,144

THINKING IT MUST BE VERY STRONG

3175

01:12:29,144 --> 01:12:30,879

TO DEPLOY WHILE ENTERING

3176

01:12:30,879 --> 01:12:32,081

THE ATMOSPHERE.

3177

01:12:32,081 --> 01:12:34,850

>> UH, THE TRICK WE DO IS,

3178

01:12:34,850 --> 01:12:36,518

UM, THE DEPLOYMENT ACTUALLY

3179

01:12:36,518 --> 01:12:38,721

TAKES PLACE, UM, IN

3180

01:12:38,721 --> 01:12:40,322

OUR MISSION DESIGNS

3181

01:12:40,322 --> 01:12:41,523

LITERALLY DAYS BEFORE

3182

01:12:41,523 --> 01:12:42,424

IT ENTERS THE PLANET.

3183

01:12:42,424 --> 01:12:43,225

>> OH, OKAY.

3184

01:12:43,225 --> 01:12:44,560

>> SO, IT OPENS UP, UM, BEFORE

3185

01:12:44,560 --> 01:12:45,728

YOU ENTER THE ATMOSPHERE.

3186

01:12:45,728 --> 01:12:46,829

SO YOU'RE NOT SEEING ALL

3187

01:12:46,829 --> 01:12:48,564

THE FORCES THAT IT SEES

3188

01:12:48,564 --> 01:12:49,565

WHEN IT'S FLYING THROUGH

3189

01:12:49,565 --> 01:12:50,432

THE ATMOSPHERE.

3190

01:12:50,432 --> 01:12:51,333

IT'S OPENED UP,

3191

01:12:51,333 --> 01:12:52,701

LOCKED INTO PLACE, GIVES YOU

3192

01:12:52,701 --> 01:12:54,002

TIME EVEN TO CHECK IT OUT,

3193

01:12:54,002 --> 01:12:55,237

TO MAKE SURE IT'S-IT'S

3194

01:12:55,237 --> 01:12:56,739

THE WAY YOU WANT IT TO BE.

3195

01:12:56,739 --> 01:12:57,773

THEN YOU'RE READY TO GO TO

3196

01:12:57,773 --> 01:13:00,375

THE PLANET AND DO A MISSION.

3197

01:13:00,375 --> 01:13:01,310

>> OKAY, I SEE.

3198

01:13:01,310 --> 01:13:02,211

>> THAT'S PRETTY COOL.

3199

01:13:02,211 --> 01:13:02,978

WELL, THANK YOU,

3200

01:13:02,978 --> 01:13:04,213

BOTH PAUL AND ROXANA.

3201
01:13:04,213 --> 01:13:05,581
AND, ROXANA, I DO HAVE TO SAY,

3202
01:13:05,581 --> 01:13:06,715
YOUR OUTFIT IS VERY

3203
01:13:06,715 --> 01:13:08,517
SUPERCALIFRAGILISTICEXPI-

3204
01:13:08,517 --> 01:13:09,918
NASA-DOCIOUS.

3205
01:13:09,918 --> 01:13:11,120
>> YEAH, IT IS!

3206
01:13:11,120 --> 01:13:13,188
>> THANK YOU. IT'S REALLY

3207
01:13:13,188 --> 01:13:14,757
FUN INCORPORATING THIS.

3208
01:13:14,757 --> 01:13:16,058
>> EXCELLENT. SO YOU'LL

3209
01:13:16,058 --> 01:13:17,092
NEVER LOOK AT YOUR WORK

3210
01:13:17,092 --> 01:13:18,127
THE SAME AGAIN, I THINK.

3211
01:13:18,127 --> 01:13:20,996
>> NO, I PROBABLY WON'T.

3212
01:13:20,996 --> 01:13:22,264
>> EXCELLENT, THANK YOU GUYS.

3213
01:13:22,264 --> 01:13:23,198

>> OKAY, WELL, THANK YOU.

3214

01:13:23,198 --> 01:13:24,333

WE'LL CIRCLE BACK WITH

3215

01:13:24,333 --> 01:13:25,400

YOU GUYS A LITTLE BIT LATER,

3216

01:13:25,400 --> 01:13:26,301

WHEN WE GO AHEAD AND VOTE

3217

01:13:26,301 --> 01:13:27,636

ON OUR COSTUMES.

3218

01:13:27,636 --> 01:13:31,907

SO, EVERYONE IS FANS OF LOKI

3219

01:13:31,907 --> 01:13:33,208

FROM THE AVENGERS.

3220

01:13:33,208 --> 01:13:34,843

SO, WE ARE GONNA GO AHEAD

3221

01:13:34,843 --> 01:13:37,412

AND WELCOME OUR OWN VERSION.

3222

01:13:37,412 --> 01:13:40,182

WE CALL HER "LOW-BUDGET LOKI."

3223

01:13:40,182 --> 01:13:41,250

SO, LET'S GO AHEAD

3224

01:13:41,250 --> 01:13:44,586

AND COME ON OUT, LIZ.

3225

01:13:44,586 --> 01:13:45,854

YEAH!

3226

01:13:45,854 --> 01:13:48,957

[LAUGHING]

3227

01:13:48,957 --> 01:13:50,726

>> NICE TWIRL-- EXCELLENT.

3228

01:13:50,726 --> 01:13:54,563

>> NICE! FABULOUS.

3229

01:13:54,563 --> 01:13:55,597

>> COME ON.

3230

01:13:55,597 --> 01:13:58,133

>> COME ON UP.

3231

01:13:58,133 --> 01:13:59,134

>> OKAY, SO, PLEASE,

3232

01:13:59,134 --> 01:14:01,170

INTRODUCE YOURSELF AND TELL US

3233

01:14:01,170 --> 01:14:03,739

WHAT IT IS YOU DO HERE AT AMES.

3234

01:14:03,739 --> 01:14:05,707

>> YEAH, SO MY NAME IS LIZ HYDE

3235

01:14:05,707 --> 01:14:07,009

AND, UH, I'M A MECHANICAL

3236

01:14:07,009 --> 01:14:08,877

ENGINEER, A CONTRACTOR HERE

3237

01:14:08,877 --> 01:14:10,746

AT AMES RESEARCH CENTER,

3238

01:14:10,746 --> 01:14:12,614

WORKING ON SMALL SATS.

3239

01:14:12,614 --> 01:14:14,049

>> THAT'S A PRETTY SNAZZY CROWN

3240

01:14:14,049 --> 01:14:15,484

THAT YOU'VE GOT GOIN' ON THERE.

3241

01:14:15,484 --> 01:14:16,552

>> WELL DONE. WELL DONE.

3242

01:14:16,552 --> 01:14:17,486

DID YOU MAKE THAT YOURSELF?

3243

01:14:17,486 --> 01:14:18,320

>> YEAH, I KNOCKED THIS OUT

3244

01:14:18,320 --> 01:14:19,221

LAST NIGHT, WATCHIN'

3245

01:14:19,221 --> 01:14:20,022

THE BASEBALL GAME.

3246

01:14:20,022 --> 01:14:21,490

[LAUGHING]

3247

01:14:21,490 --> 01:14:22,825

>> SEE, NASA ENGINEERS.

3248

01:14:22,825 --> 01:14:23,892

>> WE CAN DO IT ALL.

3249

01:14:23,892 --> 01:14:24,793

>> OKAY, SO, YOU MENTIONED

3250

01:14:24,793 --> 01:14:25,627

A SMALL SATELLITE.

3251

01:14:25,627 --> 01:14:26,461

LIKE, WHAT IS THAT?

3252

01:14:26,461 --> 01:14:27,930

>> YES, UH, SO IT'S LITERALLY

3253

01:14:27,930 --> 01:14:29,064

A SMALL SATELLITE.

3254

01:14:29,064 --> 01:14:30,065

SO THIS IS A ONE-TO-ONE

3255

01:14:30,065 --> 01:14:31,934

SCALE MODEL, UM, OF

3256

01:14:31,934 --> 01:14:33,735

A CUBE SAT, SPECIFICALLY.

3257

01:14:33,735 --> 01:14:34,970

SO SMALL SATS ARE, YOU KNOW,

3258

01:14:34,970 --> 01:14:35,904

KINDA DONE BY SIDES.

3259

01:14:35,904 --> 01:14:37,172

BUT CUBE SATS ARE A VERY

3260

01:14:37,172 --> 01:14:38,240

SPECIFIC, STANDARDIZED

3261

01:14:38,240 --> 01:14:39,575

KIND OF--

3262

01:14:39,575 --> 01:14:40,642

>> OKAY, I THINK WE HAVE

3263

01:14:40,642 --> 01:14:41,977

AN IMAGE OF THAT.

3264

01:14:41,977 --> 01:14:42,911

CAN WE GO AHEAD AND GET THAT

3265

01:14:42,911 --> 01:14:44,146

BROUGHT UP ON-SCREEN?

3266

01:14:44,146 --> 01:14:45,514

>> YEAH, SO THAT'S AN IMAGE OF

3267

01:14:45,514 --> 01:14:46,648

A CUBE SAT, JUST LIKE THE ONE

3268

01:14:46,648 --> 01:14:47,716

I HAVE ON THE TABLE HERE.

3269

01:14:47,716 --> 01:14:49,718

AND SO THE KEY IS THAT THIS

3270

01:14:49,718 --> 01:14:52,754

IS A 10X10X10 CENTIMETER CUBE.

3271

01:14:52,754 --> 01:14:54,890

AND SO IT'S SORT OF TO KEEP

3272

01:14:54,890 --> 01:14:56,058

THINGS STANDARDIZED.

3273

01:14:56,058 --> 01:14:57,326

AND IF YOU WANTED TO

3274

01:14:57,326 --> 01:14:58,427

MAKE IT BIGGER, YOU COULD

3275

01:14:58,427 --> 01:15:00,662

STACK MORE OF THESE CUBES

3276

01:15:00,662 --> 01:15:01,630

ON TOP OF EACH OTHER.

3277

01:15:01,630 --> 01:15:02,497

SO, YEAH, YOU COULD HAVE

3278

01:15:02,497 --> 01:15:03,599

A 1U, 2U, 3U--

3279

01:15:03,599 --> 01:15:04,466

>> OH, YEAH.

3280

01:15:04,466 --> 01:15:05,300

>> A LOT OF STUFF WE'RE DOING

3281

01:15:05,300 --> 01:15:06,735

NOW IS ON, LIKE, THE 6U LEVEL.

3282

01:15:06,735 --> 01:15:07,970

AND STARTING TO POSE THINGS

3283

01:15:07,970 --> 01:15:08,871

BIGGER THAN THAT,

3284

01:15:08,871 --> 01:15:11,240

ON THE 12U LEVEL, JUST TO PACK

3285

01:15:11,240 --> 01:15:13,442

MORE THINGS INTO A BOX.

3286

01:15:13,442 --> 01:15:14,977

>> LIKE SCIENCE EXPERIMENTS OR--

3287

01:15:14,977 --> 01:15:15,978

>> YEAH, YEAH, EXACTLY.

3288

01:15:15,978 --> 01:15:17,479

SO, A LOT OF THE STUFF, UM--

3289

01:15:17,479 --> 01:15:18,513

CUBE SATS ARE KIND OF

3290

01:15:18,513 --> 01:15:19,948

VERY POPULAR NOWADAYS.

3291

01:15:19,948 --> 01:15:21,116

SORT OF ALL OVER INDUSTRY,

3292

01:15:21,116 --> 01:15:22,217

BOTH IN THE PRIVATE SECTOR

3293

01:15:22,217 --> 01:15:23,252

AND IN EDUCATION.

3294

01:15:23,252 --> 01:15:24,086

>> OH, COOL.

3295

01:15:24,086 --> 01:15:24,920

>> AND SORT OF, AT NASA,

3296

01:15:24,920 --> 01:15:25,754

WHAT WE'RE TRYIN' TO DO IS

3297

01:15:25,754 --> 01:15:27,022

KIND OF BE ON THE CUTTING EDGE

3298

01:15:27,022 --> 01:15:29,524

OF THAT. UM, SO, DOING NEW,

3299

01:15:29,524 --> 01:15:31,693

LIKE, PROPULSION TECHNOLOGY.

3300

01:15:31,693 --> 01:15:33,228

DOING SCIENCE EXPERIMENTS IS

3301

01:15:33,228 --> 01:15:34,696

WHAT WE DO A LOT HERE AT AMES.

3302

01:15:34,696 --> 01:15:36,431

BIOLOGY EXPERIMENTS ARE

3303

01:15:36,431 --> 01:15:37,866

KIND OF OUR BREAD AND BUTTER,

3304

01:15:37,866 --> 01:15:39,334

WHEN IT COMES TO SMALL

3305

01:15:39,334 --> 01:15:40,502

SATELLITE PAYLOADS.

3306

01:15:40,502 --> 01:15:41,536

>> VERY COOL.

3307

01:15:41,536 --> 01:15:42,671

>> SO, WHAT WOULD BE A BENEFIT

3308

01:15:42,671 --> 01:15:44,172

OF BUILDING A CUBE SAT AS

3309

01:15:44,172 --> 01:15:47,075

OPPOSED TO A LARGER SATELLITE?

3310

01:15:47,075 --> 01:15:48,377

>> YEAH, SO, IT REALLY

3311

01:15:48,377 --> 01:15:49,978

COMES DOWN TO TAKING ADVANTAGE

3312

01:15:49,978 --> 01:15:51,413

OF WHAT WE HAVE GIVEN TO US.

3313

01:15:51,413 --> 01:15:52,180

SO, IF YOU THINK--

3314

01:15:52,180 --> 01:15:53,081
IF YOU HAVE, LIKE, A BIG--

3315

01:15:53,081 --> 01:15:53,849
LIKE, IF YOU HAD

3316

01:15:53,849 --> 01:15:54,583
A FALCON 9 LAUNCH.

3317

01:15:54,583 --> 01:15:55,450
AND THEY'RE LAUNCHING

3318

01:15:55,450 --> 01:15:57,286
A BIG SATELLITE.

3319

01:15:57,286 --> 01:15:58,287
THERE'S ALL THIS EXTRA ROOM,

3320

01:15:58,287 --> 01:15:59,154
SORTA AT THE BOTTOM

3321

01:15:59,154 --> 01:16:00,155
THAT'S NOT BEING USED.

3322

01:16:00,155 --> 01:16:02,758
AND WE CAN FILL IN THAT SPACE

3323

01:16:02,758 --> 01:16:03,792
AND PUT A BUNCH OF

3324

01:16:03,792 --> 01:16:04,726
THESE CUBE SATS THAT,

3325

01:16:04,726 --> 01:16:05,661
AND JUST KIND OF TAG ALONG

3326

01:16:05,661 --> 01:16:06,428
FOR THE RIDE.

3327

01:16:06,428 --> 01:16:07,429
SO IT'S, YOU KNOW,

3328

01:16:07,429 --> 01:16:08,297
GETTING OPPORTUNITIES THAT

3329

01:16:08,297 --> 01:16:09,431
WE WOULDN'T NORMALLY HAVE.

3330

01:16:09,431 --> 01:16:10,565
>> OKAY, SO IT'S ALMOST LIKE

3331

01:16:10,565 --> 01:16:12,601
YOU'RE LOW-BUDGET, KIND OF

3332

01:16:12,601 --> 01:16:14,202
LIKE THIS COSTUME THAT YOU'RE

3333

01:16:14,202 --> 01:16:15,637
ROCKIN' OVER HERE.

3334

01:16:15,637 --> 01:16:17,372
>> EXACTLY.

3335

01:16:17,372 --> 01:16:18,607
>> OUTSTANDING. YEAH, I FEEL

3336

01:16:18,607 --> 01:16:19,942
THAT EVEN I COULD THROW

3337

01:16:19,942 --> 01:16:21,276
TOGETHER A LOKI T-SHIRT.

3338

01:16:21,276 --> 01:16:22,144

>> YES.

3339

01:16:22,144 --> 01:16:22,945

>> BUT I DON'T KNOW

3340

01:16:22,945 --> 01:16:24,479

IF I COULD MAKE THE HELMET.

3341

01:16:24,479 --> 01:16:26,448

AND YOUR COSTUME HAS BECOME

3342

01:16:26,448 --> 01:16:28,016

AN INSTANT FAVORITE ON THE CHAT.

3343

01:16:28,016 --> 01:16:28,951

SO, CONGRATULATIONS.

3344

01:16:28,951 --> 01:16:29,818

>> ALSO, FOR ALL OF YOU

3345

01:16:29,818 --> 01:16:30,953

MARVEL FANS OUT THERE,

3346

01:16:30,953 --> 01:16:32,020

THE OPENING SCENE FROM

3347

01:16:32,020 --> 01:16:33,622

THE AVENGERS, WHEN LOKI

3348

01:16:33,622 --> 01:16:35,190

IS STEALING THE TESSERACT,

3349

01:16:35,190 --> 01:16:36,391

THAT WAS FILMED AT

3350

01:16:36,391 --> 01:16:37,926

OUR NASA GLENN RESEARCH CENTER

3351

01:16:37,926 --> 01:16:39,428
IN OHIO.

3352

01:16:39,428 --> 01:16:40,362
>> VERY COOL.

3353

01:16:40,362 --> 01:16:41,430
>> SO, THAT'S HOW WE CAN TIE

3354

01:16:41,430 --> 01:16:43,165
THIS WHOLE THEME TOGETHER.

3355

01:16:43,165 --> 01:16:44,733
>> YEAH. I THINK WE-WE'RE

3356

01:16:44,733 --> 01:16:46,101
ALMOST GONNA HAVE TO LET YOU GO.

3357

01:16:46,101 --> 01:16:47,336
SO, QUICK QUESTION.

3358

01:16:47,336 --> 01:16:48,537
WOULD THAT-- A SATELLITE

3359

01:16:48,537 --> 01:16:49,838
LIKE THAT BE LAUNCHED

3360

01:16:49,838 --> 01:16:51,006
FROM THE SPACE STATION?

3361

01:16:51,006 --> 01:16:52,074
>> ABSOLUTELY.

3362

01:16:52,074 --> 01:16:53,275
UM, THERE'S A, YOU KNOW,

3363

01:16:53,275 --> 01:16:54,443

A COUPLE DIFFERENT WAYS THAT,

3364

01:16:54,443 --> 01:16:55,911

WHEN WE AT NASA HAVE

3365

01:16:55,911 --> 01:16:56,712

LAUNCHED SATELLITES FROM

3366

01:16:56,712 --> 01:16:57,579

THE SPACE STATION,

3367

01:16:57,579 --> 01:16:58,513

THEY HAVE A DEPLOYER UP THERE.

3368

01:16:58,513 --> 01:16:59,514

SO, IT'S REALLY WHEREVER

3369

01:16:59,514 --> 01:17:00,382

WE CAN DEPLOY THESE FROM.

3370

01:17:00,382 --> 01:17:01,249

IF IT'S A SPACE STATION,

3371

01:17:01,249 --> 01:17:02,384

IF IT'S A SEPARATE ROCKET.

3372

01:17:02,384 --> 01:17:03,118

>> MM-HMM.

3373

01:17:03,118 --> 01:17:04,186

>> UM, SORT OF WHOEVER

3374

01:17:04,186 --> 01:17:05,287

WILL GIVE US A RIDE, YOU KNOW.

3375

01:17:05,287 --> 01:17:06,054

>> YEAH, OKAY.

3376

01:17:06,054 --> 01:17:06,788

>> WE'LL GO FOR A RIDE.

3377

01:17:06,788 --> 01:17:07,522

>> YEAH, AND THEY'RE

3378

01:17:07,522 --> 01:17:08,256

SO SMALL THAT THERE ARE

3379

01:17:08,256 --> 01:17:09,024

MORE OPTIONS, MAYBE.

3380

01:17:09,024 --> 01:17:09,725

>> EXACTLY.

3381

01:17:09,725 --> 01:17:10,492

AND THAT'S SORT OF HOW,

3382

01:17:10,492 --> 01:17:11,493

YOU KNOW, YOU'RE SAVIN' MONEY

3383

01:17:11,493 --> 01:17:12,260

ALSO, AS WELL.

3384

01:17:12,260 --> 01:17:13,028

>> OH, YEAH.

3385

01:17:13,028 --> 01:17:13,762

>> ALL RIGHT, AWESOME,

3386

01:17:18,266 --> 01:17:14,563

LOW-BUDGET LOKI.

3387

01:17:18,266 --> 01:17:20,068

>> THANKS FOR COMIN'.

3388

01:17:20,068 --> 01:17:21,370

FABULOUS.

3389

01:17:21,370 --> 01:17:22,804
SO, WHO'S UP NEXT?

3390

01:17:22,804 --> 01:17:23,739
I'M EXCITED FOR THIS ONE,

3391

01:17:23,739 --> 01:17:25,073
I GOTTA SAY.

3392

01:17:25,073 --> 01:17:27,309
WHAT IF THE OLD MAN FROM "UP"

3393

01:17:27,309 --> 01:17:28,610
WORKED AT NASA?

3394

01:17:28,610 --> 01:17:29,978
EVER ASKED YOURSELF THAT?

3395

01:17:29,978 --> 01:17:30,746
>> I DO.

3396

01:17:30,746 --> 01:17:31,380
>> I'VE BEEN WONDERING

3397

01:17:31,380 --> 01:17:31,980
FOR A LONG TIME.

3398

01:17:31,980 --> 01:17:32,614
SO LET'S SAY HI TO

3399

01:17:32,614 --> 01:17:34,116
LAB COAT CARL.

3400

01:17:34,116 --> 01:17:35,283
COME ON OUT, SAMANTHA.

3401
01:17:35,283 --> 01:17:38,353
>> COME ON OUT!

3402
01:17:38,353 --> 01:17:42,024
>> OH, YES!

3403
01:17:42,024 --> 01:17:42,991
>> WELCOME.

3404
01:17:42,991 --> 01:17:45,660
>> SO CUTE!

3405
01:17:45,660 --> 01:17:46,528
>> HELLO, LADIES.

3406
01:17:46,528 --> 01:17:47,295
>> WELCOME, CARL.

3407
01:17:47,295 --> 01:17:47,929
>> WELCOME.

3408
01:17:47,929 --> 01:17:48,663
>> SAMANTHA.

3409
01:17:48,663 --> 01:17:49,498
>> THANK YOU.

3410
01:17:49,498 --> 01:17:50,232
THANK YOU.

3411
01:17:50,232 --> 01:17:51,099
>> EXCELLENT.

3412
01:17:51,099 --> 01:17:52,334
SO, TELL US YOUR NAME

3413
01:17:52,334 --> 01:17:54,102

AND A LITTLE ABOUT WHAT YOU DO.

3414

01:17:54,102 --> 01:17:56,405

>> I AM DR. SAMANTHA WATERS,

3415

01:17:56,405 --> 01:18:00,375

AND I WORK IN THE AEROBIOLOGY

3416

01:18:00,375 --> 01:18:02,310

LAB HERE AT NASA AMES

3417

01:18:02,310 --> 01:18:05,013

ON EXPOSING MICROORGANISMS

3418

01:18:05,013 --> 01:18:06,148

IN THE STRATOSPHERE--

3419

01:18:06,148 --> 01:18:07,282

OR EMIST.

3420

01:18:07,282 --> 01:18:07,949

>> OKAY.

3421

01:18:07,949 --> 01:18:08,617

>> EMIST EXPERIMENTS--

3422

01:18:08,617 --> 01:18:09,117

EXCELLENT.

3423

01:18:09,117 --> 01:18:10,118

YES, I GOT TO WRITE ABOUT

3424

01:18:10,118 --> 01:18:11,119

THIS ONE, SO I'VE HEARD

3425

01:18:11,119 --> 01:18:12,287

ABOUT THIS A BIT.

3426

01:18:12,287 --> 01:18:14,956

BUT TELL US, WHAT'S THE DEAL?

3427

01:18:14,956 --> 01:18:16,892

>> SO, AT THE BORDER OF

3428

01:18:16,892 --> 01:18:18,293

PLANETARY PROTECTION AND

3429

01:18:18,293 --> 01:18:19,428

THE SEARCH FOR EXTRATERRESTRIAL

3430

01:18:19,428 --> 01:18:21,363

LIFE, WE WANT TO LOOK AT

3431

01:18:21,363 --> 01:18:23,065

EXTREME MICRO-ORGANISMS.

3432

01:18:23,065 --> 01:18:24,533

AND WE CAN TAKE THEM

3433

01:18:24,533 --> 01:18:27,335

FOR A RIDE ON BALLOONS.

3434

01:18:27,335 --> 01:18:28,136

>> YOU KNOW, I THINK WE HAVE

3435

01:18:28,136 --> 01:18:29,838

AN IMAGE OF ONE OF THE BALLOONS

3436

01:18:29,838 --> 01:18:31,373

THAT YOU GUYS USE.

3437

01:18:31,373 --> 01:18:32,074

>> OKAY.

3438

01:18:32,074 --> 01:18:32,774

>> SO, CAN WE GET THAT?

3439

01:18:32,774 --> 01:18:34,709

>> SO NOT THOSE BALLOONS,

3440

01:18:34,709 --> 01:18:35,544

BUT ONE OF THESE.

3441

01:18:35,544 --> 01:18:36,278

>> YES, NOT THE BALLOONS

3442

01:18:36,278 --> 01:18:37,245

YOU CAN GET AT YOUR LOCAL

3443

01:18:37,245 --> 01:18:39,681

GROCERY STORE, BUT A BALLOON

3444

01:18:39,681 --> 01:18:40,615

FILLED WITH HELIUM.

3445

01:18:40,615 --> 01:18:42,751

SO, THIS IS AT GROUND LEVEL.

3446

01:18:42,751 --> 01:18:43,985

YOU CAN SEE A SMALL HUMAN

3447

01:18:43,985 --> 01:18:45,353

TO THE LEFT OF THE BALLOON,

3448

01:18:45,353 --> 01:18:46,254

FOR SCALE.

3449

01:18:46,254 --> 01:18:46,855

>> YEAH.

3450

01:18:46,855 --> 01:18:47,589

>> UM, AT GROUND LEVEL,

3451

01:18:47,589 --> 01:18:49,958

IT'S ABOUT 100 FEET TALL.

3452

01:18:49,958 --> 01:18:50,892

>> WOW, WOW, OKAY.

3453

01:18:50,892 --> 01:18:51,860

>> AS IT GOES UP, AND

3454

01:18:51,860 --> 01:18:53,595

THE EXTERNAL PRESSURE IS

3455

01:18:53,595 --> 01:18:55,263

LESS THAN THE INTERNAL PRESSURE,

3456

01:18:55,263 --> 01:18:56,431

IT CAN ACTUALLY EXPAND OUT

3457

01:18:56,431 --> 01:18:58,567

TO THE SIZE OF A STADIUM.

3458

01:18:58,567 --> 01:18:59,167

>> WOW.

3459

01:18:59,167 --> 01:18:59,668

>> WOW!

3460

01:18:59,668 --> 01:19:00,368

>> SO, VERY LARGE.

3461

01:19:00,368 --> 01:19:01,303

>> YEAH!

3462

01:19:01,303 --> 01:19:02,070

>> OKAY.

3463

01:19:02,070 --> 01:19:03,438

AND THAT IS GOING TO TRAVEL,

3464

01:19:03,438 --> 01:19:04,940

IF I RECALL THE TITLE OF

3465

01:19:04,940 --> 01:19:06,341

THIS ARTICLE I WORKED ON,

3466

01:19:06,341 --> 01:19:08,543

19 MILES UP.

3467

01:19:08,543 --> 01:19:09,678

>> IT GOES-- YES.

3468

01:19:09,678 --> 01:19:10,779

>> REALLY HIGH IN

3469

01:19:10,779 --> 01:19:12,214

THE ATMOSPHERE, RIGHT?

3470

01:19:12,214 --> 01:19:13,548

>> YES, IT GOES UP PAST

3471

01:19:13,548 --> 01:19:14,416

THE TROPOSPHERE, WHICH IS WHERE

3472

01:19:14,416 --> 01:19:16,218

THE MAJORITY OF ALL EARTH LIFE

3473

01:19:16,218 --> 01:19:17,319

IS FOUND, AND INTO

3474

01:19:17,319 --> 01:19:18,320

THE STRATOSPHERE, WHERE

3475

01:19:18,320 --> 01:19:20,622

WE ACTUALLY DO SAMPLE LIVING

3476
01:19:20,622 --> 01:19:22,290
MICROBES FROM THE STRATOSPHERE

3477
01:19:22,290 --> 01:19:23,425
THAT HAVE BEEN BLOWN UP THERE

3478
01:19:23,425 --> 01:19:24,392
DUE TO STORM SYSTEMS AND SUCH.

3479
01:19:24,392 --> 01:19:25,327
>> OH, OKAY.

3480
01:19:25,327 --> 01:19:26,361
SO HOW MIGHT YOU GO ABOUT

3481
01:19:26,361 --> 01:19:27,762
DOING THAT?

3482
01:19:27,762 --> 01:19:28,763
>> UH, SAMPLING THEM OR

3483
01:19:28,763 --> 01:19:30,265
TAKING THE BALLOONS UP?

3484
01:19:30,265 --> 01:19:32,100
>> UM, SAMPLING.

3485
01:19:32,100 --> 01:19:33,301
>> SO, THE BALLOONS

3486
01:19:33,301 --> 01:19:34,236
DON'T SAMPLE.

3487
01:19:34,236 --> 01:19:35,804
THE BALLOONS, WE ACTUALLY ADD

3488
01:19:35,804 --> 01:19:38,173

MICROORGANISMS ON THESE LITTLE

3489

01:19:38,173 --> 01:19:41,209

ALUMINUM PLATES OR COUPONS--

3490

01:19:41,209 --> 01:19:42,110

>> OH, WAIT, I HAVE ONE.

3491

01:19:42,110 --> 01:19:42,978

I HAVE ONE.

3492

01:19:42,978 --> 01:19:43,545

>> YES.

3493

01:19:43,545 --> 01:19:44,212

>> I HAVE NEVER SEEN

3494

01:19:44,212 --> 01:19:44,946

ONE OF THESE BEFORE.

3495

01:19:44,946 --> 01:19:46,314

>> YES, THEY'RE VERY TINY.

3496

01:19:46,314 --> 01:19:47,048

AND YOU CAN EVEN FIT THEM

3497

01:19:47,048 --> 01:19:47,816

IN YOUR POCKET.

3498

01:19:47,816 --> 01:19:49,284

>> IT LOOKS-- IT LOOKS LIKE

3499

01:19:49,284 --> 01:19:50,352

A DOG TAG, MAYBE.

3500

01:19:50,352 --> 01:19:51,086

>> IT DOES LOOK LIKE

3501

01:19:51,086 --> 01:19:51,853

A DOG TAG.

3502

01:19:51,853 --> 01:19:52,621

SO THEY'RE ALUMINUM,

3503

01:19:52,621 --> 01:19:54,656

THEY'RE THIN, AND WE CAN SPOT

3504

01:19:54,656 --> 01:19:56,191

MICROORGANISMS ON THEM,

3505

01:19:56,191 --> 01:19:57,592

SUCH AS IN THE PHOTO.

3506

01:19:57,592 --> 01:19:59,060

AND THEN TAKE THEM UP

3507

01:19:59,060 --> 01:20:00,795

FOR A RIDE ON THESE BALLOONS

3508

01:20:00,795 --> 01:20:02,931

AND EXPOSE THEM TO ALL OF

3509

01:20:02,931 --> 01:20:04,666

THE HARSH ENVIRONMENTAL INSULTS

3510

01:20:04,666 --> 01:20:06,034

IN THE STRATOSPHERE.

3511

01:20:06,034 --> 01:20:08,370

AND THOSE INSULTS ARE ACTUALLY,

3512

01:20:08,370 --> 01:20:10,605

UH, ONE ON ONE IN LINE WITH

3513

01:20:10,605 --> 01:20:11,806

WHAT, UH, MICROORGANISMS

3514

01:20:11,806 --> 01:20:13,308

WOULD EXPERIENCE ON

3515

01:20:13,308 --> 01:20:14,409

THE MARTIAN SURFACE.

3516

01:20:14,409 --> 01:20:16,111

>> OH, ON MARS, OKAY, OKAY.

3517

01:20:16,111 --> 01:20:17,479

SO THAT'S EARTH'S ATMOSPHERE

3518

01:20:17,479 --> 01:20:19,080

STANDING IN FOR

3519

01:20:19,080 --> 01:20:20,282

MARS CONDITIONS.

3520

01:20:20,282 --> 01:20:22,284

>> YES, THE-- UH, ON EARTH,

3521

01:20:22,284 --> 01:20:23,518

THE STRATOSPHERE IS ACTUALLY

3522

01:20:23,518 --> 01:20:25,587

THE BEST MARS ANALOG, SO

3523

01:20:25,587 --> 01:20:27,155

WE CAN EXPERIMENT THERE

3524

01:20:27,155 --> 01:20:28,757

FOR LONG TERM IN THE ANTARCTIC,

3525

01:20:28,757 --> 01:20:29,891

UH, WITH THESE BALLOONS

3526

01:20:29,891 --> 01:20:31,526

FOR UPWARDS OF TWO MONTHS.

3527

01:20:31,526 --> 01:20:32,994

>> OH, COOL, WOW.

3528

01:20:32,994 --> 01:20:34,429

>> SO HOW MIGHT OUR VIEWERS

3529

01:20:34,429 --> 01:20:36,932

AT HOME RECREATE THIS AMAZING

3530

01:20:36,932 --> 01:20:38,700

CARL ENSEMBLE THAT YOU'VE GOT

3531

01:20:38,700 --> 01:20:39,601

GOIN' ON OVER HERE?

3532

01:20:39,601 --> 01:20:40,435

>> I'M PRETTY SURE YOU CAN

3533

01:20:40,435 --> 01:20:41,736

GO TO YOUR LOCAL THRIFT STORE

3534

01:20:41,736 --> 01:20:44,906

AND GET A BOWTIE,

3535

01:20:44,906 --> 01:20:46,641

AND A WHITE SHIRT.

3536

01:20:46,641 --> 01:20:48,743

AND A MEDICAL SUPPLY STORE

3537

01:20:48,743 --> 01:20:49,778

WILL GIVE YOU ANY KIND OF

3538

01:20:49,778 --> 01:20:50,745

COLOR LAB COAT YOU COULD

3539

01:20:50,745 --> 01:20:52,847
WANT-- PINK, RED, BLUE.

3540

01:20:52,847 --> 01:20:54,916
AND THEN SOME GOGGLE--

3541

01:20:54,916 --> 01:20:55,984
OR SOME GLASSES WITHOUT

3542

01:20:55,984 --> 01:20:59,154
ANY LENSES IN THEM, AND A WIG.

3543

01:20:59,154 --> 01:21:00,288
>> FABULOUS.

3544

01:21:00,288 --> 01:21:00,989
YOU LOOK GREAT.

3545

01:21:00,989 --> 01:21:01,856
SO ARE YOU GOING TO WEAR THIS

3546

01:21:01,856 --> 01:21:03,191
ON HALLOWEEN, IN FACT?

3547

01:21:03,191 --> 01:21:04,125
>> UH, I WILL ACTUALLY BE AT

3548

01:21:04,125 --> 01:21:05,527
A CONFERENCE OVER IN

3549

01:21:05,527 --> 01:21:07,429
THE DC AREA, AND I WILL BE

3550

01:21:07,429 --> 01:21:08,763
DRESSED UP AS A WITCH

3551
01:21:08,763 --> 01:21:09,965
WITH SOME SKULLS AROUND.

3552
01:21:09,965 --> 01:21:10,865
>> OKAY, NICE.

3553
01:21:10,865 --> 01:21:12,367
>> YEAH, THAT IS HOW I WILL

3554
01:21:12,367 --> 01:21:13,168
FREAK OUT ALL OF

3555
01:21:13,168 --> 01:21:14,269
MY FELLOW SCIENTISTS.

3556
01:21:14,269 --> 01:21:15,403
>> ALL RIGHT, WELL,

3557
01:21:15,403 --> 01:21:17,005
THANK YOU, SAMANTHA.

3558
01:21:17,005 --> 01:21:18,740
>> THANK YOU FOR HAVING ME.

3559
01:21:18,740 --> 01:21:20,875
>> WE'LL SEE YOU IN A BIT.

3560
01:21:20,875 --> 01:21:24,145
>> OKAY, SO A GOOD NIGHT OF

3561
01:21:24,145 --> 01:21:26,081
SLEEP IS IMPORTANT IN SPACE,

3562
01:21:26,081 --> 01:21:27,649
AND THANKS TO OUR RESEARCHERS

3563
01:21:27,649 --> 01:21:29,517

HERE AT AMES, THE--

3564

01:21:29,517 --> 01:21:31,152

OUR ASTRONAUTS ARE ALERT

3565

01:21:31,152 --> 01:21:32,520

AND READY FOR A FULL DAY ABOARD

3566

01:21:32,520 --> 01:21:34,289

THE INTERNATIONAL SPACE STATION.

3567

01:21:34,289 --> 01:21:36,391

SO LET'S SAY HI TO OLIVIA,

3568

01:21:36,391 --> 01:21:39,527

AS ALERT ASTRONAUT, AND ERIN.

3569

01:21:39,527 --> 01:21:41,096

COME ON OUT.

3570

01:21:41,096 --> 01:21:42,864

>> YEAH, AW, THERE SHE IS.

3571

01:21:42,864 --> 01:21:45,767

HELLO, LADIES.

3572

01:21:45,767 --> 01:21:49,004

WAKE UP, ASTRONAUT.

3573

01:21:49,004 --> 01:21:50,905

WELL, YOU LOOK WELL RESTED.

3574

01:21:50,905 --> 01:21:52,574

WOW.

3575

01:21:52,574 --> 01:21:53,875

I'VE GOTTA HEAR MORE

3576
01:21:53,875 --> 01:21:55,577
ABOUT THIS.

3577
01:21:55,577 --> 01:21:57,212
>> SO, LADIES, TELL ME.

3578
01:21:57,212 --> 01:21:58,079
UH, FIRST, INTRODUCE

3579
01:21:58,079 --> 01:21:59,247
YOURSELVES, AND TELL ME

3580
01:21:59,247 --> 01:21:59,914
A LITTLE BIT ABOUT

3581
01:21:59,914 --> 01:22:01,149
WHAT YOU DO HERE.

3582
01:22:01,149 --> 01:22:02,183
>> OKAY, SO I'M

3583
01:22:02,183 --> 01:22:03,018
ERIN FLYNN-EVANS.

3584
01:22:03,018 --> 01:22:04,386
I'M A CIRCADIAN PHYSIOLOGIST,

3585
01:22:04,386 --> 01:22:05,687
AND I LEAD THE FATIGUE

3586
01:22:05,687 --> 01:22:07,656
COUNTERMEASURES LABORATORY HERE.

3587
01:22:07,656 --> 01:22:09,190
AND THIS IS OLIVIA.

3588
01:22:09,190 --> 01:22:10,425

>> YEAH, MY NAME IS OLIVIA.

3589

01:22:10,425 --> 01:22:11,793

UM, I'M A RESEARCH ASSISTANT

3590

01:22:11,793 --> 01:22:13,028

IN ERIN'S LAB.

3591

01:22:13,028 --> 01:22:14,329

I HELP OUT WITH A LOT OF

3592

01:22:14,329 --> 01:22:15,864

SLEEP RELATED PROJECTS.

3593

01:22:15,864 --> 01:22:17,365

>> OKAY, OKAY.

3594

01:22:17,365 --> 01:22:20,268

SO WHY FATIGUE COUNTERMEASURES?

3595

01:22:20,268 --> 01:22:22,537

>> SO, IT'S FUNNY-- YOU THINK,

3596

01:22:22,537 --> 01:22:23,972

WELL, I GO TO BED EVERY NIGHT

3597

01:22:23,972 --> 01:22:25,607

AND I HAVE NO PROBLEM SLEEPING.

3598

01:22:25,607 --> 01:22:26,408

WHY WOULD WE NEED TO

3599

01:22:26,408 --> 01:22:27,442

STUDY THIS IN SPACE?

3600

01:22:27,442 --> 01:22:29,411

BUT ACTUALLY, THERE ARE

3601
01:22:29,411 --> 01:22:30,578
A LOT OF CHALLENGES ASSOCIATED

3602
01:22:30,578 --> 01:22:31,546
WITH SLEEPING IN SPACE.

3603
01:22:31,546 --> 01:22:32,747
FIRSTLY, THE ASTRONAUTS ARE

3604
01:22:32,747 --> 01:22:34,015
FREE-FLOATING, AND SO

3605
01:22:34,015 --> 01:22:37,419
WE HAVE TO HAVE, UM, UH, WAYS

3606
01:22:37,419 --> 01:22:38,486
TO KEEP THEM SORT OF

3607
01:22:38,486 --> 01:22:40,055
STRAPPED DOWN SO THAT THEY CAN

3608
01:22:40,055 --> 01:22:41,356
SLEEP IN ONE PLACE.

3609
01:22:41,356 --> 01:22:42,057
>> YEAH.

3610
01:22:42,057 --> 01:22:42,791
>> UM, THEY'RE ALSO GOING

3611
01:22:42,791 --> 01:22:43,758
AROUND THE EARTH EVERY

3612
01:22:43,758 --> 01:22:45,093
90 MINUTES, AND SO THEY DON'T

3613
01:22:45,093 --> 01:22:46,227

GET A LIGHT-DARK CYCLE

3614

01:22:46,227 --> 01:22:47,729

LIKE WE GET HERE ON EARTH.

3615

01:22:47,729 --> 01:22:48,496

>> OKAY.

3616

01:22:48,496 --> 01:22:49,898

>> UM, WE'RE VERY TIED TO

3617

01:22:49,898 --> 01:22:51,466

OUR SOLAR DAY AND NIGHT.

3618

01:22:51,466 --> 01:22:52,734

AND SO WHEN IT'S NIGHT,

3619

01:22:52,734 --> 01:22:54,536

IT'S NOT JUST A SOCIAL CUE

3620

01:22:54,536 --> 01:22:55,603

FOR US TO GO TO SLEEP, BUT

3621

01:22:55,603 --> 01:22:56,938

WE ACTUALLY HAVE A BIOLOGICAL

3622

01:22:56,938 --> 01:22:58,640

CUE TO GO TO SLEEP.

3623

01:22:58,640 --> 01:22:59,474

AND THE ASTRONAUTS DON'T

3624

01:22:59,474 --> 01:23:01,309

HAVE THAT IN SPACE.

3625

01:23:01,309 --> 01:23:02,344

AND IT'S GOING TO BE EVEN WORSE

3626
01:23:02,344 --> 01:23:04,079
WHEN WE GO TO MARS BECAUSE

3627
01:23:04,079 --> 01:23:05,947
THE MARS DAY IS A LITTLE BIT

3628
01:23:05,947 --> 01:23:07,515
LONGER THAN THE EARTH DAY,

3629
01:23:07,515 --> 01:23:10,218
AND SO ASTRONAUTS WILL

3630
01:23:10,218 --> 01:23:11,586
HAVE TO BE ABLE TO ADAPT TO

3631
01:23:11,586 --> 01:23:12,587
THAT SLIGHTLY LONGER THAN

3632
01:23:12,587 --> 01:23:13,822
24-HOUR DAY.

3633
01:23:13,822 --> 01:23:14,522
>> YEAH.

3634
01:23:14,522 --> 01:23:15,190
>> AND SO WE DO RESEARCH

3635
01:23:15,190 --> 01:23:16,057
TO FIGURE OUT HOW THEY CAN

3636
01:23:16,057 --> 01:23:16,825
DO THAT.

3637
01:23:16,825 --> 01:23:17,425
>> EXCELLENT.

3638
01:23:17,425 --> 01:23:18,093

>> YOU KNOW, I THINK

3639

01:23:18,093 --> 01:23:19,227

WE HAVE SOME VIDEO.

3640

01:23:19,227 --> 01:23:20,895

>> DO WE?

3641

01:23:20,895 --> 01:23:22,597

OF AN EXPERIMENT IN YOUR LAB,

3642

01:23:22,597 --> 01:23:24,399

I GUESS?

3643

01:23:24,399 --> 01:23:26,901

>> YES, SO THIS IS AN EXAMPLE

3644

01:23:26,901 --> 01:23:27,936

OF THE TYPE OF EXPERIMENT

3645

01:23:27,936 --> 01:23:29,537

THAT WE DO IN THE LAB.

3646

01:23:29,537 --> 01:23:31,539

UM, THERE'S-- WE ARE A SLEEP

3647

01:23:31,539 --> 01:23:33,608

LAB, BUT MOST PEOPLE DON'T

3648

01:23:33,608 --> 01:23:34,943

ACTUALLY SLEEP IN

3649

01:23:34,943 --> 01:23:36,211

OUR SLEEP LAB.

3650

01:23:36,211 --> 01:23:37,145

UH, WE STUDY SLEEP

3651
01:23:37,145 --> 01:23:38,580
DEPRIVATION, TYPICALLY,

3652
01:23:38,580 --> 01:23:39,848
BECAUSE MOST OF THE POPULATIONS

3653
01:23:39,848 --> 01:23:41,216
THAT WE STUDY OFTEN HAVE TO

3654
01:23:41,216 --> 01:23:42,484
STAY AWAKE FOR EXTENDED

3655
01:23:42,484 --> 01:23:43,618
PERIODS OF TIME.

3656
01:23:43,618 --> 01:23:45,086
SO WE BRING THEM IN,

3657
01:23:45,086 --> 01:23:46,054
WE PUT THEM IN BED, AND THEN

3658
01:23:46,054 --> 01:23:47,055
WE KEEP THEM AWAKE FOR

3659
01:23:47,055 --> 01:23:49,057
30 TO 50 HOURS AND GIVE THEM

3660
01:23:49,057 --> 01:23:50,358
LOTS AND LOTS OF TESTS, AND

3661
01:23:50,358 --> 01:23:51,993
MEASURE THEIR BRAIN ACTIVITY.

3662
01:23:51,993 --> 01:23:53,762
>> WOW.

3663
01:23:53,762 --> 01:23:54,462

I DON'T KNOW IF I'D WANNA

3664

01:23:54,462 --> 01:23:55,497

TAKE PART IN THAT OR NOT.

3665

01:23:55,497 --> 01:23:56,097

>> YEAH.

3666

01:23:56,097 --> 01:23:58,032

>> SOUNDS INTERESTING, BUT...

3667

01:23:58,032 --> 01:23:59,000

MAYBE BETTER TO LEARN ABOUT IT

3668

01:23:59,000 --> 01:24:01,269

FROM YOU GUYS.

3669

01:24:01,269 --> 01:24:03,505

>> OKAY, SO I THINK WE HAVE

3670

01:24:03,505 --> 01:24:05,373

TIME FOR ONE QUICK QUESTION.

3671

01:24:05,373 --> 01:24:06,307

>> WELL, I WANNA JUST KNOW

3672

01:24:06,307 --> 01:24:07,542

A LITTLE BIT ABOUT THIS CAP

3673

01:24:07,542 --> 01:24:08,843

AND ALL THE WIRES.

3674

01:24:08,843 --> 01:24:09,711

WHAT'RE YOU MEASURING

3675

01:24:09,711 --> 01:24:10,378

WITH THAT?

3676

01:24:10,378 --> 01:24:11,579

>> YEAH, SO THIS IS, UM,

3677

01:24:11,579 --> 01:24:13,314

AN EEG CAP, UM, AND SO

3678

01:24:13,314 --> 01:24:15,083

WE'RE MEASURING BRAIN ACTIVITY.

3679

01:24:15,083 --> 01:24:17,385

SO WHEN WE STRAP THE CAP ONTO

3680

01:24:17,385 --> 01:24:18,586

ASTRONAUTS OR PEOPLE HERE

3681

01:24:18,586 --> 01:24:20,755

ON THE GROUND, UH, WE CAN STUDY

3682

01:24:20,755 --> 01:24:22,490

HOW ALERT THEY ARE, AND WE CAN

3683

01:24:22,490 --> 01:24:23,992

ALSO, UM, FIGURE OUT WHETHER

3684

01:24:23,992 --> 01:24:25,860

THEIR QUALITY OF SLEEP IS GOOD

3685

01:24:25,860 --> 01:24:27,462

TO DETERMINE WHETHER OR NOT

3686

01:24:27,462 --> 01:24:28,696

THEY'LL PERFORM WELL WHEN

3687

01:24:28,696 --> 01:24:30,031

WE HAVE THEM DO TASKS.

3688

01:24:30,031 --> 01:24:31,132

>> ALL RIGHT, SWEET.

3689

01:24:31,132 --> 01:24:31,933

WELL, THANK YOU.

3690

01:24:31,933 --> 01:24:32,634

>> AWESOME COSTUME.

3691

01:24:32,634 --> 01:24:33,535

>> THANK YOU.

3692

01:24:33,535 --> 01:24:36,237

>> SO I THINK WE ARE GONNA SAY

3693

01:24:36,237 --> 01:24:37,872

THANK YOU FOR HAVIN' YOU

3694

01:24:37,872 --> 01:24:39,174

JOIN US, LADIES.

3695

01:24:39,174 --> 01:24:40,275

BUT DON'T GO TOO FAR, BECAUSE

3696

01:24:40,275 --> 01:24:41,509

WE DO NEED TO VOTE ON

3697

01:24:41,509 --> 01:24:43,044

OUR COSTUMES.

3698

01:24:43,044 --> 01:24:43,978

>> SO YOU CAN POP OUT THERE

3699

01:24:43,978 --> 01:24:45,346

AND GET IN LINE, AND THEN

3700

01:24:45,346 --> 01:24:46,181

WE'RE GONNA BRING EVERYBODY

3701

01:24:46,181 --> 01:24:47,015

BACK OUT.

3702

01:24:47,015 --> 01:24:47,816

>> SOUNDS GOOD.

3703

01:24:47,816 --> 01:24:51,019

>> SO OUR VIEWERS CAN VOTE.

3704

01:24:51,019 --> 01:24:52,787

>> OKAY, SO WE'RE GOING TO

3705

01:24:52,787 --> 01:24:53,721

GO AHEAD AND BRING OUT

3706

01:24:53,721 --> 01:24:57,358

ALL OF OUR COSPLAY CONTESTANTS.

3707

01:24:57,358 --> 01:25:00,328

SO HERE IS ANOTHER LOOK AT

3708

01:25:00,328 --> 01:25:03,331

ALL OF OUR COSPLAY COSTUMES.

3709

01:25:03,331 --> 01:25:06,201

SO, UP FIRST, WE'VE GOT

3710

01:25:06,201 --> 01:25:08,870

ROBERT AS OUR JEDI

3711

01:25:08,870 --> 01:25:10,738

NO LONGER IN TRAINING.

3712

01:25:10,738 --> 01:25:12,507

>> AHA, THAT'S RIGHT.

3713

01:25:12,507 --> 01:25:14,042

>> WE'VE GOT RICK AS

3714

01:25:14,042 --> 01:25:17,378

ASTRO-BEEKEEPER.

3715

01:25:17,378 --> 01:25:18,947

WE'VE GOT ROXANA AS

3716

01:25:18,947 --> 01:25:22,250

OUR MARY TECHNO-POPPINS.

3717

01:25:22,250 --> 01:25:23,318

>> THINK WE NEED TO SQUEEZE

3718

01:25:23,318 --> 01:25:24,385

A LITTLE FURTHER.

3719

01:25:24,385 --> 01:25:25,587

>> WE'VE GOT LIZ AS

3720

01:25:25,587 --> 01:25:27,522

OUR LOW BUDGET LOKI.

3721

01:25:27,522 --> 01:25:28,456

>> MM-HMM.

3722

01:25:28,456 --> 01:25:30,058

>> AND THEN WE'VE GOT OLIVIA

3723

01:25:30,058 --> 01:25:32,794

AS OUR ASTRO ASTRONAUT--

3724

01:25:32,794 --> 01:25:33,595

OR, I'M SORRY,

3725

01:25:33,595 --> 01:25:34,863

OUR ALERT ASTRONAUT.

3726

01:25:34,863 --> 01:25:36,264

>> YEAH.

3727

01:25:36,264 --> 01:25:38,233

ALL RIGHT, TAKE A LOOK,

3728

01:25:38,233 --> 01:25:41,102

GET YOUR VOTES IN THE CHAT.

3729

01:25:41,102 --> 01:25:42,270

>> SO ABBY, I THINK--

3730

01:25:42,270 --> 01:25:44,239

DO WE HAVE A WINNER?

3731

01:25:44,239 --> 01:25:45,373

>> I DON'T KNOW.

3732

01:25:45,373 --> 01:25:47,308

I DON'T KNOW IF I CAN DECIDE.

3733

01:25:47,308 --> 01:25:49,444

ALL RIGHT, IT'S GONNA BE,

3734

01:25:49,444 --> 01:25:51,546

THE ASTRO-BEEKEEPER!

3735

01:25:51,546 --> 01:25:53,615

[LAUGHTER AND APPLAUSE]

3736

01:25:53,615 --> 01:25:54,415

>> YEAH.

3737

01:25:54,415 --> 01:25:56,518

>> AN ASTROBEE.

3738

01:25:56,518 --> 01:25:57,619

OUTSTANDING.

3739

01:25:57,619 --> 01:25:58,586

JUST SHOW US-- SHOW US

3740

01:25:58,586 --> 01:26:00,688

WHAT YOU GOT.

3741

01:26:00,688 --> 01:26:03,825

NICE, EXCELLENT.

3742

01:26:03,825 --> 01:26:04,559

>> WELL, THANK YOU FOR ALL OF

3743

01:26:04,559 --> 01:26:06,094

OUR COSPLAYERS FOR JOINING US

3744

01:26:06,094 --> 01:26:09,330

ON-ON OUR TWITCH SHOW TODAY.

3745

01:26:09,330 --> 01:26:10,431

AND ALSO, DON'T FORGET, IF YOU

3746

01:26:10,431 --> 01:26:12,166

DO END UP USING ANY OF THESE

3747

01:26:12,166 --> 01:26:14,035

LOOKS OR WEAR ANY NASA

3748

01:26:14,035 --> 01:26:15,937

SPACE-THEMED COSTUMES FOR

3749

01:26:15,937 --> 01:26:17,338

HALLOWEEN, WE WANNA SEE IT.

3750

01:26:17,338 --> 01:26:18,273

SO MAKE SURE YOU TAG US

3751
01:26:18,273 --> 01:26:19,741
IN ALL OF YOUR SOCIAL CHANNELS

3752
01:26:19,741 --> 01:26:22,911
HASHTAG #NASACOSTUME.

3753
01:26:22,911 --> 01:26:25,647
SO ABBY, IT LOOKS LIKE

3754
01:26:25,647 --> 01:26:27,682
YOU GUYS-- YOU'VE--

3755
01:26:27,682 --> 01:26:28,683
>> I'VE FOUND SO MANY

3756
01:26:28,683 --> 01:26:29,784
EXOPLANETS!

3757
01:26:29,784 --> 01:26:31,185
DO YOU SEE THEM?

3758
01:26:31,185 --> 01:26:32,420
SO KEPLER, IN THE END,

3759
01:26:32,420 --> 01:26:33,655
TAUGHT US THAT THERE ARE

3760
01:26:33,655 --> 01:26:36,157
MORE PLANETS THAN STARS.

3761
01:26:36,157 --> 01:26:37,325
SO I'M WEARING AS MANY AS

3762
01:26:37,325 --> 01:26:39,360
I COULD RIGHT NOW, JUST

3763
01:26:39,360 --> 01:26:40,328

'CAUSE I'M SO EXCITED

3764

01:26:40,328 --> 01:26:41,563

ABOUT EXOPLANETS.

3765

01:26:41,563 --> 01:26:43,298

SO I'M READY FOR HALLOWEEN!

3766

01:26:43,298 --> 01:26:44,432

>> I THINK YOU ARE.

3767

01:26:44,432 --> 01:26:45,333

>> ALL RIGHTY.

3768

01:26:45,333 --> 01:26:46,868

>> SO, UM, I JUST WANNA SAY

3769

01:26:46,868 --> 01:26:47,535

THANK YOU.

3770

01:26:47,535 --> 01:26:48,836

THIS HAS BEEN "NASA IN

3771

01:26:48,836 --> 01:26:50,038

"SILICON VALLEY LIVE,"

3772

01:26:50,038 --> 01:26:51,739

A CONVERSATIONAL SHOW OUT OF

3773

01:26:51,739 --> 01:26:53,441

NASA'S AMES RESEARCH CENTER

3774

01:26:53,441 --> 01:26:54,909

WITH THE VARIOUS SCIENTISTS,

3775

01:26:54,909 --> 01:26:56,911

RESEARCHERS, AND ALL-AROUND

3776

01:26:56,911 --> 01:26:58,413
COOL FOLKS HERE AT NASA,

3777

01:26:58,413 --> 01:26:59,447
WHERE WE TALK ABOUT ALL OF

3778

01:26:59,447 --> 01:27:00,848
YOUR NASA NERDY NEWS THAT

3779

01:27:00,848 --> 01:27:02,417
YOU NEED TO KNOW ABOUT.

3780

01:27:02,417 --> 01:27:04,152
AND IF YOU LIKE THAT, YOU CAN

3781

01:27:04,152 --> 01:27:06,487
FIND US ON TWITCH, ON YOUTUBE,

3782

01:27:06,487 --> 01:27:08,256
FACEBOOK, AND NASA TV.

3783

01:27:08,256 --> 01:27:09,190
AND IF YOU CAN'T WATCH US

3784

01:27:09,190 --> 01:27:11,225
LIVE, NO BIG DEAL-- WE HAVE

3785

01:27:11,225 --> 01:27:12,694
ALL OF OUR VIDEO ON DEMAND

3786

01:27:12,694 --> 01:27:14,295
AFTER THE SHOW IS OVER.

3787

01:27:14,295 --> 01:27:15,363
AND YOU CAN CATCH THE AUDIO

3788

01:27:15,363 --> 01:27:17,899

VERSION, UM, ON PODCAST

3789

01:27:17,899 --> 01:27:18,967

SERVICES THROUGHOUT

3790

01:27:18,967 --> 01:27:22,036

THE SOLAR SYSTEM AND BEYOND.

3791

01:27:22,036 --> 01:27:24,238

AND I DO WANT TO GIVE A HUGE

3792

01:27:24,238 --> 01:27:25,506

THANK YOU TO EVERYONE THAT

3793

01:27:25,506 --> 01:27:27,141

JOINED US, UM, ON

3794

01:27:27,141 --> 01:27:28,276

THE TWITCH CHAT.

3795

01:27:28,276 --> 01:27:29,544

WE'LL BE BACK ON THURSDAY,

3796

01:27:29,544 --> 01:27:32,180

NOVEMBER 8th, WHERE WE WILL BE

3797

01:27:32,180 --> 01:27:34,449

CELEBRATING NATIONAL STEM DAY

3798

01:27:34,449 --> 01:27:35,984

WITH A BUNCH OF AMAZING

3799

01:27:35,984 --> 01:27:37,452

NASA WOMEN.

3800

01:27:37,452 --> 01:27:38,453

>> CAN'T WAIT.

3801
01:27:38,453 --> 01:27:39,320
>> SO ON THAT NOTE--

3802
01:27:39,320 --> 01:27:41,489
>> SEE YOU LATER!

3803
01:27:41,489 --> 01:27:42,991
>> UGH, I'M OUT.

3804
01:27:42,991 --> 01:27:43,925
>> THAT'S RIGHT.

3805
01:27:43,925 --> 01:27:44,626
>> I'M OUT.

3806
01:27:44,626 --> 01:27:45,693
>> LOOSEN UP THE TIE.

3807
01:27:45,693 --> 01:27:46,694
>> GOODNIGHT.