



# FUNDAMENTAL ISSUES IN ENERGY HARVESTING

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GEORGE HATHAWAY

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**SOCIETY  
FOR  
SCIENTIFIC  
EXPLORATION**

1  
00:00:17,830 --> 00:00:15,669  
let's move on to the next talk

2  
00:00:20,790 --> 00:00:17,840  
as you see there really is quite a

3  
00:00:22,150 --> 00:00:20,800  
variety of different presentations

4  
00:00:23,750 --> 00:00:22,160  
and

5  
00:00:26,230 --> 00:00:23,760  
this next one is certainly going to be

6  
00:00:29,429 --> 00:00:26,240  
something very different again

7  
00:00:32,470 --> 00:00:29,439  
this is a talk by george hathaway

8  
00:00:36,310 --> 00:00:32,480  
and george hathaway has a

9  
00:00:38,310 --> 00:00:36,320  
very interesting background uh he's he

10  
00:00:40,630 --> 00:00:38,320  
is an electrical engineer from the

11  
00:00:43,270 --> 00:00:40,640  
university of toronto

12  
00:00:46,790 --> 00:00:43,280  
uh he's worked in a lot of different

13  
00:00:48,950 --> 00:00:46,800

areas uh material science pulsed power

14

00:00:50,389 --> 00:00:48,960

quantum optics elec energy and

15

00:00:56,069 --> 00:00:50,399

propulsion

16

00:01:03,830 --> 00:01:01,029

he is really uh the indiana jones of

17

00:01:07,190 --> 00:01:03,840

uh new energy research in the sense that

18

00:01:09,510 --> 00:01:07,200

he's this swashbuckler who's gone around

19

00:01:11,030 --> 00:01:09,520

testing different sorts of energy

20

00:01:14,950 --> 00:01:11,040

technologies

21

00:01:17,350 --> 00:01:14,960

from all sorts of places uh he's one of

22

00:01:19,670 --> 00:01:17,360

the most fascinating people i know you

23

00:01:22,390 --> 00:01:19,680

can sit and talk for hours

24

00:01:24,830 --> 00:01:22,400

and he'll never repeat what he's uh told

25

00:01:27,190 --> 00:01:24,840

you before about his his his energy

26

00:01:29,510 --> 00:01:27,200

research today

27

00:01:32,390 --> 00:01:29,520

he's going to be telling us a little bit

28

00:01:35,749 --> 00:01:32,400

about that the title of his talk is

29

00:01:37,910 --> 00:01:35,759

fundamental issues in energy harvesting

30

00:01:38,789 --> 00:01:37,920

so george

31

00:01:40,630 --> 00:01:38,799

thank you

32

00:01:42,630 --> 00:01:40,640

let me share my screen everyone hear me

33

00:01:44,789 --> 00:01:42,640

i presume

34

00:01:55,350 --> 00:01:44,799

i hope so okay

35

00:01:59,550 --> 00:01:57,510

all right

36

00:02:01,910 --> 00:01:59,560

well uh welcome members of the

37

00:02:05,030 --> 00:02:01,920

anti-eddington league

38

00:02:06,230 --> 00:02:05,040

i uh appreciate the uh

39

00:02:11,110 --> 00:02:06,240

once again

40

00:02:14,470 --> 00:02:11,120

the uh the honor to be uh uh amongst uh

41

00:02:17,190 --> 00:02:14,480

all these uh uh forward thinkers and uh

42

00:02:19,270 --> 00:02:17,200

um folk who uh have uh

43

00:02:23,350 --> 00:02:19,280

been able to overcome

44

00:02:24,710 --> 00:02:23,360

their uh junior college or university

45

00:02:29,510 --> 00:02:24,720

uh

46

00:02:32,070 --> 00:02:29,520

first law violations

47

00:02:33,509 --> 00:02:32,080

uh and uh uh

48

00:02:35,430 --> 00:02:33,519

hoping to uh

49

00:02:38,229 --> 00:02:35,440

proceed into the uh

50

00:02:39,589 --> 00:02:38,239

the the next uh realm of uh i guess it's

51

00:02:41,990 --> 00:02:39,599

number four

52

00:02:42,949 --> 00:02:42,000

in uh in daniel's uh

53

00:02:44,790 --> 00:02:42,959

um

54

00:02:56,869 --> 00:02:44,800

uh

55

00:03:00,869 --> 00:02:56,879

need and as jim josheski had talked

56

00:03:03,670 --> 00:03:00,879

about earlier um uh hopefully prevent uh

57

00:03:05,589 --> 00:03:03,680

what he calls a uh

58

00:03:06,790 --> 00:03:05,599

dragon king

59

00:03:10,070 --> 00:03:06,800

scenario

60

00:03:13,830 --> 00:03:10,080

and if we can convert some of these

61

00:03:14,550 --> 00:03:13,840

ideas into something that is widespread

62

00:03:16,390 --> 00:03:14,560

why

63

00:03:18,470 --> 00:03:16,400

widely available

64

00:03:21,830 --> 00:03:18,480

and at uh reasonable cost

65

00:03:23,030 --> 00:03:21,840

and uh can be uh installed as commercial

66

00:03:26,149 --> 00:03:23,040

devices

67

00:03:28,229 --> 00:03:26,159

uh then we are uh

68

00:03:33,509 --> 00:03:28,239

many steps along that road

69

00:03:35,030 --> 00:03:33,519

and uh as i mentioned in a previous talk

70

00:03:41,110 --> 00:03:35,040

my

71

00:03:43,030 --> 00:03:41,120

at hathaway research as sort of a

72

00:03:44,149 --> 00:03:43,040

go-between or bridge

73

00:03:46,550 --> 00:03:44,159

between

74

00:03:49,509 --> 00:03:46,560

the um

75

00:03:52,149 --> 00:03:49,519

the the inventions that we're seeing now

76

00:03:54,710 --> 00:03:52,159

uh at this conference and in others uh

77

00:03:58,710 --> 00:03:54,720

and the uh the commercial realm

78

00:04:02,949 --> 00:03:58,720

and so uh i've been concentrating uh a

79

00:04:07,030 --> 00:04:02,959

lot uh on in my past work on looking at

80

00:04:09,110 --> 00:04:07,040

uh rather large-scale effects uh as i

81

00:04:10,550 --> 00:04:09,120

had mentioned earlier um

82

00:04:11,429 --> 00:04:10,560

the uh

83

00:04:15,270 --> 00:04:11,439

the

84

00:04:17,189 --> 00:04:15,280

issue uh with a lot of investors uh is

85

00:04:21,189 --> 00:04:17,199

can i see something that i could put on

86

00:04:24,070 --> 00:04:21,199

a table or can i uh build a plant uh

87

00:04:28,150 --> 00:04:24,080

with or uh even i know make make

88

00:04:31,270 --> 00:04:28,160

something as uh as i had uh asked for

89

00:04:33,749 --> 00:04:31,280

discussed in a previous talk can we make

90

00:04:34,870 --> 00:04:33,759

a coffee pot size something and have

91

00:04:37,749 --> 00:04:34,880

air flow

92

00:04:40,310 --> 00:04:37,759

through it and maybe a a

93

00:04:42,550 --> 00:04:40,320

a catalytic converter of the the type

94

00:04:43,510 --> 00:04:42,560

that daniel has talked about

95

00:04:47,670 --> 00:04:43,520

and

96

00:04:53,030 --> 00:04:47,680

your uh

97

00:04:54,469 --> 00:04:53,040

anyway um those are the kinds of things

98

00:04:57,909 --> 00:04:54,479

that i have been

99

00:04:59,590 --> 00:04:57,919

examining uh over uh quite a long time

100

00:05:00,390 --> 00:04:59,600

and um

101

00:05:09,990 --> 00:05:00,400

uh

102

00:05:12,230 --> 00:05:10,000

kinds of things that i've been

103

00:05:15,189 --> 00:05:12,240

investigating many of which you might

104

00:05:16,870 --> 00:05:15,199

know already from a thermodynamic

105

00:05:19,990 --> 00:05:16,880

standpoint

106

00:05:21,510 --> 00:05:20,000

some of which will be clearly

107

00:05:23,110 --> 00:05:21,520

capable of

108

00:05:25,350 --> 00:05:23,120

of analysis

109

00:05:27,990 --> 00:05:25,360

thermodynamically and some not

110

00:05:31,430 --> 00:05:28,000

and i will end the uh the talk as i

111

00:05:34,230 --> 00:05:31,440

usually do if i have time to uh

112

00:05:37,110 --> 00:05:34,240

take a look at some of the pitfalls and

113

00:05:39,270 --> 00:05:37,120

problems in the uh the measurement of

114

00:05:40,230 --> 00:05:39,280

the kinds of systems that i've come

115

00:05:41,590 --> 00:05:40,240

across

116

00:05:43,830 --> 00:05:41,600

in the past

117

00:05:52,390 --> 00:05:44,790

uh

118

00:05:54,870 --> 00:05:52,400

this

119

00:05:56,150 --> 00:05:54,880

conference and especially today

120

00:06:02,950 --> 00:05:56,160

the

121

00:06:06,230 --> 00:06:02,960

in particular and uh

122

00:06:07,670 --> 00:06:06,240

we i don't think i need to uh to dwell

123

00:06:10,469 --> 00:06:07,680

on any of these

124

00:06:11,590 --> 00:06:10,479

in in any great at any great length

125

00:06:14,870 --> 00:06:11,600

um

126

00:06:17,029 --> 00:06:14,880

the conservation of energy uh is the uh

127

00:06:20,550 --> 00:06:17,039

generally the one that

128

00:06:23,189 --> 00:06:20,560

uh i have been asked to

129

00:06:26,070 --> 00:06:23,199

pontificate you might say on for both

130

00:06:28,230 --> 00:06:26,080

investors and inventors uh who claim

131

00:06:30,710 --> 00:06:28,240

that uh a system that they

132

00:06:34,469 --> 00:06:30,720

uh have worked on

133

00:06:36,550 --> 00:06:34,479

has generates energy from nothing um

134

00:06:41,430 --> 00:06:36,560

less

135

00:06:42,790 --> 00:06:41,440

expended on the uh the entropy end of

136

00:06:44,309 --> 00:06:42,800

things uh

137

00:06:47,189 --> 00:06:44,319

namely uh

138

00:06:49,510 --> 00:06:47,199

the the second law the the the uh

139

00:06:50,950 --> 00:06:49,520

spontaneous heat flow law

140

00:06:53,029 --> 00:06:50,960

anyway um

141

00:06:54,390 --> 00:06:53,039

be that as it may uh

142

00:06:56,469 --> 00:06:54,400

we've gone through

143

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

um the various uh

144

00:07:01,990 --> 00:06:58,560

easy types of uh

145

00:07:03,990 --> 00:07:02,000

of analysis and i think it was um

146

00:07:05,670 --> 00:07:04,000

daniel who mentioned that

147

00:07:09,029 --> 00:07:05,680

he had

148

00:07:12,629 --> 00:07:09,039

come across what is it 21 different

149

00:07:14,550 --> 00:07:12,639

formulations of thermodynamic laws

150

00:07:17,189 --> 00:07:14,560

perhaps the second law only which is

151

00:07:20,070 --> 00:07:17,199

quite amazing um

152

00:07:23,189 --> 00:07:20,080

from the engineering standpoint uh

153

00:07:26,469 --> 00:07:23,199

we have uh steam engine type of

154

00:07:28,550 --> 00:07:26,479

of of work producers using uh the

155

00:07:29,830 --> 00:07:28,560

difference in heat between

156

00:07:30,790 --> 00:07:29,840

different temperature i should say

157

00:07:32,790 --> 00:07:30,800

between

158

00:07:33,589 --> 00:07:32,800

a hot reservoir and a cold

159

00:07:35,270 --> 00:07:33,599

and

160

00:07:36,469 --> 00:07:35,280

we also have

161

00:07:38,790 --> 00:07:36,479

um

162

00:07:40,150 --> 00:07:38,800

refrigeration types uh as you can see

163

00:07:43,029 --> 00:07:40,160

i'm looking at this from an engineering

164

00:07:47,029 --> 00:07:43,039

standpoint uh where we can extract

165

00:07:48,150 --> 00:07:47,039

energy from a uh a cold reservoir

166

00:07:52,550 --> 00:07:48,160

and

167

00:07:56,469 --> 00:07:52,560

dump it into a hot reservoir one thing

168

00:07:59,749 --> 00:07:56,479

that uh i haven't noticed in the uh the

169

00:08:00,869 --> 00:07:59,759

discussions so far is whether

170

00:08:02,629 --> 00:08:00,879

any

171

00:08:04,790 --> 00:08:02,639

uh

172

00:08:05,990 --> 00:08:04,800

analysis has been done or consideration

173

00:08:07,510 --> 00:08:06,000

thought

174

00:08:09,909 --> 00:08:07,520

given to

175

00:08:12,550 --> 00:08:09,919

not only increasing say the heat

176

00:08:14,869 --> 00:08:12,560

or heat flow to a hot reservoir

177

00:08:17,189 --> 00:08:14,879

but removing heat

178

00:08:19,270 --> 00:08:17,199

from a reservoir

179

00:08:20,629 --> 00:08:19,280

all of the systems that we've been

180

00:08:22,550 --> 00:08:20,639

talking about

181

00:08:26,469 --> 00:08:22,560

as far as i can recall

182

00:08:28,629 --> 00:08:26,479

talk about increasing heat or heat flow

183

00:08:30,390 --> 00:08:28,639

from the hot reservoir back to the hot

184

00:08:32,070 --> 00:08:30,400

reservoir

185

00:08:35,029 --> 00:08:32,080

and i'd be interested to find out

186

00:08:36,709 --> 00:08:35,039

whether there are any ways of of

187

00:08:40,870 --> 00:08:36,719

removing heat

188

00:08:45,190 --> 00:08:40,880

spontaneously from from a bath uh and uh

189

00:08:48,550 --> 00:08:45,200

given the fact that uh a lot of folk are

190

00:08:51,350 --> 00:08:48,560

are concerned about uh global warming uh

191

00:08:55,110 --> 00:08:51,360

maybe uh if we could uh determine that

192

00:08:57,990 --> 00:08:55,120

uh there's a way of of uh treating a

193

00:08:59,350 --> 00:08:58,000

cold bath as a

194

00:09:03,190 --> 00:08:59,360

as a way of

195

00:09:06,710 --> 00:09:03,200

uh as a as a reservoir that can be uh

196

00:09:08,630 --> 00:09:06,720

pumped into namely uh or cold or heat

197

00:09:10,070 --> 00:09:08,640

removed from it uh that would be an

198

00:09:11,509 --> 00:09:10,080

interesting uh

199

00:09:12,470 --> 00:09:11,519

different approach

200

00:09:13,590 --> 00:09:12,480

so

201  
00:09:15,430 --> 00:09:13,600  
um

202  
00:09:17,269 --> 00:09:15,440  
i think it was uh daniel also who

203  
00:09:19,590 --> 00:09:17,279  
mentioned the uh

204  
00:09:20,630 --> 00:09:19,600  
the the two uh main

205  
00:09:23,430 --> 00:09:20,640  
uh

206  
00:09:24,470 --> 00:09:23,440  
second law statements the the kelvin

207  
00:09:26,949 --> 00:09:24,480  
planck

208  
00:09:27,910 --> 00:09:26,959  
uh and i call it reverse steam engine

209  
00:09:29,829 --> 00:09:27,920  
statement

210  
00:09:30,630 --> 00:09:29,839  
uh and i bring this up

211  
00:09:35,509 --> 00:09:30,640  
as

212  
00:09:37,670 --> 00:09:35,519  
make a cyclic device which receives heat

213  
00:09:38,870 --> 00:09:37,680

from a hot reservoir and produces work

214

00:09:40,310 --> 00:09:38,880

um

215

00:09:42,389 --> 00:09:40,320

and

216

00:09:45,750 --> 00:09:42,399

what is interesting to me is uh the word

217

00:09:47,590 --> 00:09:45,760

cyclic and the

218

00:09:50,790 --> 00:09:47,600

the uh comparison

219

00:09:52,150 --> 00:09:50,800

uh between cyclic and spontaneous

220

00:09:54,470 --> 00:09:52,160

which

221

00:09:55,990 --> 00:09:54,480

is a sort of a metaphysical

222

00:09:58,389 --> 00:09:56,000

uh

223

00:10:00,470 --> 00:09:58,399

distinction that

224

00:10:03,269 --> 00:10:00,480

i've been wrestling with

225

00:10:04,870 --> 00:10:03,279

which comes up in the clausius

226

00:10:07,110 --> 00:10:04,880

and i caught the say the reverse

227

00:10:09,910 --> 00:10:07,120

refrigeration statement then it was

228

00:10:11,750 --> 00:10:09,920

impossible to make a cyclic device which

229

00:10:14,310 --> 00:10:11,760

spontaneously and you've got those two

230

00:10:17,590 --> 00:10:14,320

words together uh without external work

231

00:10:19,750 --> 00:10:17,600

transfers heat uh from a cold body to uh

232

00:10:22,069 --> 00:10:19,760

to a hot body it's according to clausius

233

00:10:23,670 --> 00:10:22,079

that's not the case however uh it was

234

00:10:25,750 --> 00:10:23,680

shown i can't remember it was boltzmann

235

00:10:27,590 --> 00:10:25,760

or uh who it was that um

236

00:10:29,269 --> 00:10:27,600

i showed that these

237

00:10:30,470 --> 00:10:29,279

these two statements are actually

238

00:10:34,069 --> 00:10:30,480

equivalent

239

00:10:36,389 --> 00:10:34,079

um and uh they constitute uh a what was

240

00:10:37,990 --> 00:10:36,399

considered an iron clad at least to

241

00:10:39,990 --> 00:10:38,000

eddington's view

242

00:10:42,790 --> 00:10:40,000

uh um

243

00:10:44,870 --> 00:10:42,800

and and others uh view that uh uh

244

00:10:47,190 --> 00:10:44,880

there's no way we're going to uh

245

00:10:49,670 --> 00:10:47,200

circumvent either the first or the

246

00:10:53,910 --> 00:10:49,680

second law

247

00:10:56,790 --> 00:10:53,920

however i also have a question comes up

248

00:10:58,829 --> 00:10:56,800

with regard to

249

00:11:00,470 --> 00:10:58,839

how we define heat

250

00:11:05,190 --> 00:11:00,480

and

251

00:11:07,670 --> 00:11:05,200

these these statements

252

00:11:10,550 --> 00:11:07,680

um do they apply to systems as i say at

253

00:11:13,509 --> 00:11:10,560

the bottom here where heat is defined

254

00:11:16,069 --> 00:11:13,519

also to include random electromagnetic

255

00:11:18,310 --> 00:11:16,079

or em like fluctuations for example uh

256

00:11:22,069 --> 00:11:18,320

zero point fluctuations so they

257

00:11:24,550 --> 00:11:22,079

i i bring that up uh also uh reminding

258

00:11:26,790 --> 00:11:24,560

uh us that uh tom vallone

259

00:11:29,509 --> 00:11:26,800

uh initiated that uh

260

00:11:32,389 --> 00:11:29,519

i think that idea that perhaps uh some

261

00:11:35,110 --> 00:11:32,399

of our system boundaries should include

262

00:11:37,670 --> 00:11:35,120

um a consideration of zero-point

263

00:11:38,790 --> 00:11:37,680

fluctuations as uh

264

00:11:42,630 --> 00:11:38,800

i

265

00:11:44,870 --> 00:11:42,640

garrett's pub

266

00:11:47,340 --> 00:11:44,880

presentation after mine

267

00:11:48,710 --> 00:11:47,350

which i hope i'll leave lots of time for

268

00:11:49,670 --> 00:11:48,720

[Music]

269

00:11:51,910 --> 00:11:49,680

or

270

00:11:55,030 --> 00:11:51,920

something like

271

00:11:57,350 --> 00:11:55,040

if you know anything about

272

00:11:59,110 --> 00:11:57,360

low energy nuclear reactions you you

273

00:12:00,949 --> 00:11:59,120

probably have come across the so-called

274

00:12:02,470 --> 00:12:00,959

widow larsen theory

275

00:12:03,670 --> 00:12:02,480

uh which

276  
00:12:06,629 --> 00:12:03,680  
requires

277  
00:12:07,430 --> 00:12:06,639  
these magic surface plasma oscillations

278  
00:12:09,269 --> 00:12:07,440  
to

279  
00:12:11,910 --> 00:12:09,279  
suddenly bubble up

280  
00:12:15,430 --> 00:12:11,920  
into a larger or a much higher energy

281  
00:12:16,550 --> 00:12:15,440  
state which allows the conversion of uh

282  
00:12:19,190 --> 00:12:16,560  
of

283  
00:12:21,110 --> 00:12:19,200  
nucleons to uh to neutrons and and

284  
00:12:25,190 --> 00:12:21,120  
stimulates the low energy nuclear

285  
00:12:27,590 --> 00:12:25,200  
actions in their view would that also be

286  
00:12:29,990 --> 00:12:27,600  
considered heat

287  
00:12:31,590 --> 00:12:30,000  
and there are a number of other areas

288  
00:12:33,829 --> 00:12:31,600

that uh

289

00:12:36,790 --> 00:12:33,839

where the the definition of heat in

290

00:12:39,910 --> 00:12:36,800

terms in thermodynamic terms is rather

291

00:12:40,710 --> 00:12:39,920

fluid you might say and it's hard to pin

292

00:12:43,509 --> 00:12:40,720

down

293

00:12:46,230 --> 00:12:43,519

and and that usually allows an escape

294

00:12:49,350 --> 00:12:46,240

route for folk who claim that they are

295

00:12:50,629 --> 00:12:49,360

uh violating or are adjusting

296

00:12:53,350 --> 00:12:50,639

the uh

297

00:12:55,110 --> 00:12:53,360

the thermodynamics of their system uh

298

00:12:56,389 --> 00:12:55,120

because uh

299

00:12:58,389 --> 00:12:56,399

they are saying well we're not

300

00:13:00,949 --> 00:12:58,399

introducing heat we're not worried about

301  
00:13:03,509 --> 00:13:00,959  
heat we're talking about surface plasma

302  
00:13:08,069 --> 00:13:03,519  
oscillations or something like that

303  
00:13:10,069 --> 00:13:08,079  
so uh interesting uh definitional issues

304  
00:13:12,629 --> 00:13:10,079  
from time to time

305  
00:13:13,990 --> 00:13:12,639  
i've shared these screens before

306  
00:13:24,470 --> 00:13:14,000  
uh

307  
00:13:26,949 --> 00:13:24,480  
my daughter um

308  
00:13:29,350 --> 00:13:26,959  
building something up from bits and

309  
00:13:30,069 --> 00:13:29,360  
pieces or helping to build stuff up from

310  
00:13:31,350 --> 00:13:30,079  
uh

311  
00:13:32,710 --> 00:13:31,360  
from

312  
00:13:36,470 --> 00:13:32,720  
an assembly of

313  
00:13:37,190 --> 00:13:36,480

of uh components into a unified hole

314

00:13:39,189 --> 00:13:37,200

which

315

00:13:40,790 --> 00:13:39,199

you might consider as neg entropy or

316

00:13:43,110 --> 00:13:40,800

reverse entropy

317

00:13:46,230 --> 00:13:43,120

and here's what happens when there's all

318

00:13:49,350 --> 00:13:46,240

too much stimulation things just tend to

319

00:13:51,590 --> 00:13:49,360

flatten out uh into a a lower energy

320

00:13:52,790 --> 00:13:51,600

state um

321

00:13:55,030 --> 00:13:52,800

after uh

322

00:13:56,150 --> 00:13:55,040

after a day's a day of hard work at the

323

00:13:58,069 --> 00:13:56,160

lab

324

00:14:00,230 --> 00:13:58,079

um

325

00:14:01,910 --> 00:14:00,240

so uh

326

00:14:04,150 --> 00:14:01,920

let's take a look at

327

00:14:05,430 --> 00:14:04,160

some of thermodynamic

328

00:14:08,870 --> 00:14:05,440

issues

329

00:14:10,710 --> 00:14:08,880

with regard to the ability to measure

330

00:14:12,389 --> 00:14:10,720

these things at least at the scale that

331

00:14:13,189 --> 00:14:12,399

i've been involved with

332

00:14:14,829 --> 00:14:13,199

and

333

00:14:18,389 --> 00:14:14,839

as i say here

334

00:14:20,310 --> 00:14:18,399

um generally which i've been uh mostly

335

00:14:22,069 --> 00:14:20,320

involved with first law although this is

336

00:14:24,310 --> 00:14:22,079

a conference

337

00:14:25,189 --> 00:14:24,320

today's mostly second law

338

00:14:28,710 --> 00:14:25,199

issues

339

00:14:31,590 --> 00:14:30,470  
concentrate a little bit on first law

340

00:14:34,790 --> 00:14:31,600  
because

341

00:14:36,629 --> 00:14:34,800  
uh it's usually the most relevant at

342

00:14:39,670 --> 00:14:36,639  
what i call macro or

343

00:14:42,829 --> 00:14:39,680  
uh which is the cosmic scale or miso

344

00:14:45,269 --> 00:14:42,839  
which is say the lab scale

345

00:14:46,949 --> 00:14:45,279  
um uh devices that that i've been

346

00:14:48,310 --> 00:14:46,959  
involved with mostly

347

00:14:50,790 --> 00:14:48,320  
and in

348

00:14:53,750 --> 00:14:50,800  
uh these kinds of systems assist the

349

00:14:55,030 --> 00:14:53,760  
boundaries which are extremely important

350

00:14:57,110 --> 00:14:55,040  
to uh

351

00:14:59,750 --> 00:14:57,120

to take into account are much more

352

00:15:02,710 --> 00:14:59,760

easily defined

353

00:15:04,389 --> 00:15:02,720

in general i should say and therefore uh

354

00:15:07,509 --> 00:15:04,399

more straightforward to measure and

355

00:15:09,670 --> 00:15:07,519

determine the validity of the devices

356

00:15:11,430 --> 00:15:09,680

that are claiming to have

357

00:15:13,829 --> 00:15:11,440

circumvented or

358

00:15:16,550 --> 00:15:13,839

completely negated

359

00:15:18,069 --> 00:15:16,560

the first law

360

00:15:21,110 --> 00:15:18,079

the second law

361

00:15:23,430 --> 00:15:21,120

is more relevant in my understanding and

362

00:15:25,509 --> 00:15:23,440

my experience to more micro scale and

363

00:15:27,110 --> 00:15:25,519

nano scale energy interactions as we've

364

00:15:31,590 --> 00:15:27,120

been talking about uh

365

00:15:35,189 --> 00:15:31,600

uh professor lee talking about uh um

366

00:15:35,910 --> 00:15:35,199

protons uh in involved in atp

367

00:15:55,350 --> 00:15:35,920

uh

368

00:15:57,350 --> 00:15:55,360

um and they're generally more difficult

369

00:16:00,790 --> 00:15:57,360

in terms of measurement

370

00:16:03,430 --> 00:16:00,800

uh to set the system boundaries and and

371

00:16:07,829 --> 00:16:03,440

and then and and measure and as garrett

372

00:16:11,030 --> 00:16:07,839

has asked uh just a few moments ago uh

373

00:16:13,030 --> 00:16:11,040

in uh professor lee's

374

00:16:14,069 --> 00:16:13,040

biological discussions are there any

375

00:16:17,110 --> 00:16:14,079

other

376

00:16:19,430 --> 00:16:17,120  
reactions that could take place

377

00:16:20,870 --> 00:16:19,440  
that might contribute to the heat

378

00:16:23,430 --> 00:16:20,880  
that

379

00:16:27,430 --> 00:16:23,440  
the t term the environmental term

380

00:16:30,710 --> 00:16:27,440  
perhaps uh that would cause um the uh

381

00:16:31,509 --> 00:16:30,720  
uh the pmf to be as high as it is and

382

00:16:33,590 --> 00:16:31,519  
and

383

00:16:36,389 --> 00:16:33,600  
i'm sure professor lee has looked at all

384

00:16:38,310 --> 00:16:36,399  
these and as his uh

385

00:16:41,269 --> 00:16:38,320  
answer um

386

00:16:44,069 --> 00:16:41,279  
clearly showed but it it certainly uh is

387

00:16:46,310 --> 00:16:44,079  
required to think uh outside the

388

00:16:49,189 --> 00:16:46,320

constraints of the system that you're

389

00:16:52,310 --> 00:16:49,199

looking at uh to see what other flows of

390

00:16:54,629 --> 00:16:52,320

energy may need to be accounted for

391

00:16:55,749 --> 00:16:54,639

which is fairly obvious but i'll state

392

00:16:57,350 --> 00:16:55,759

it anyway

393

00:16:58,629 --> 00:16:57,360

um

394

00:17:01,990 --> 00:16:58,639

so

395

00:17:03,670 --> 00:17:02,000

typically as i say

396

00:17:05,029 --> 00:17:03,680

thermodynamic

397

00:17:07,429 --> 00:17:05,039

law violations

398

00:17:09,189 --> 00:17:07,439

in in my uh

399

00:17:10,549 --> 00:17:09,199

my understanding and the kinds of work

400

00:17:11,350 --> 00:17:10,559

that i've been doing

401  
00:17:13,990 --> 00:17:11,360  
uh

402  
00:17:17,029 --> 00:17:14,000  
result from several things

403  
00:17:18,789 --> 00:17:17,039  
most prevalent being faulty or

404  
00:17:20,710 --> 00:17:18,799  
incomplete measurements

405  
00:17:25,429 --> 00:17:20,720  
and

406  
00:17:28,789 --> 00:17:25,439  
end of the talk

407  
00:17:31,270 --> 00:17:28,799  
when i go through my endless lists of

408  
00:17:32,630 --> 00:17:31,280  
pitfalls and concerns

409  
00:17:35,430 --> 00:17:32,640  
about

410  
00:17:37,830 --> 00:17:35,440  
how to measure systems especially uh in

411  
00:17:41,190 --> 00:17:37,840  
this case energetic systems whereas uh

412  
00:17:42,070 --> 00:17:41,200  
my last talk uh yesterday was more in

413  
00:17:43,029 --> 00:17:42,080

force

414

00:17:45,350 --> 00:17:43,039

uh

415

00:17:46,710 --> 00:17:45,360

and and gravitational or force

416

00:17:48,789 --> 00:17:46,720

measurement systems

417

00:17:50,070 --> 00:17:48,799

and measurements in this case uh i'm

418

00:17:52,549 --> 00:17:50,080

talking about

419

00:17:53,669 --> 00:17:52,559

primarily energy and power uh

420

00:17:54,710 --> 00:17:53,679

measurements

421

00:17:56,870 --> 00:17:54,720

um

422

00:18:01,830 --> 00:17:56,880

and and this is the

423

00:18:05,990 --> 00:18:01,840

this is usually uh actually 90 uh 90

424

00:18:06,950 --> 00:18:06,000

of the uh the claims that come my way uh

425

00:18:09,909 --> 00:18:06,960

can be

426

00:18:12,789 --> 00:18:09,919

uh put to rest by uh

427

00:18:14,549 --> 00:18:12,799

by pointing out the inconsistencies or

428

00:18:16,789 --> 00:18:14,559

the incomplete

429

00:18:19,510 --> 00:18:16,799

measurements or the incorrect

430

00:18:22,230 --> 00:18:19,520

application of measuring instruments to

431

00:18:25,590 --> 00:18:22,240

the task at hand

432

00:18:29,270 --> 00:18:27,590

as i say i'm working more at the lab

433

00:18:29,990 --> 00:18:29,280

scale

434

00:18:32,789 --> 00:18:30,000

the

435

00:18:34,950 --> 00:18:32,799

seen in

436

00:18:37,029 --> 00:18:34,960

over previous days including say atomic

437

00:18:40,310 --> 00:18:37,039

force microscopy

438

00:18:43,750 --> 00:18:40,320

and uh and and very tiny thermocouples

439

00:18:46,549 --> 00:18:43,760

and things of that nature

440

00:18:48,710 --> 00:18:46,559

most of the folk on this

441

00:18:52,310 --> 00:18:48,720

at this conference are pretty well

442

00:18:55,270 --> 00:18:52,320

versed in the kinds of pitfalls and

443

00:18:56,390 --> 00:18:55,280

concerns that might

444

00:18:59,350 --> 00:18:56,400

show themselves

445

00:19:00,789 --> 00:18:59,360

uh to produce uh prosaic explanations

446

00:19:04,070 --> 00:19:00,799

for what they're seeing

447

00:19:07,510 --> 00:19:04,080

uh but in general the kinds of uh

448

00:19:09,590 --> 00:19:07,520

devices that have come my way um

449

00:19:12,710 --> 00:19:09,600

have not had that kind of

450

00:19:15,590 --> 00:19:12,720

very precise analysis of

451  
00:19:17,270 --> 00:19:15,600  
the the measurements required uh to

452  
00:19:18,630 --> 00:19:17,280  
verify the claims

453  
00:19:21,190 --> 00:19:18,640  
um also

454  
00:19:24,310 --> 00:19:21,200  
uh incorrect system boundary definitions

455  
00:19:26,950 --> 00:19:24,320  
has been a great plague uh as was uh

456  
00:19:28,950 --> 00:19:26,960  
emphasized before uh god likes the

457  
00:19:31,750 --> 00:19:28,960  
crystals of the devils like the devil

458  
00:19:33,990 --> 00:19:31,760  
likes uh the the devils in the

459  
00:19:36,870 --> 00:19:34,000  
uh the interstices uh of the

460  
00:19:38,870 --> 00:19:36,880  
intersection between uh between these

461  
00:19:40,070 --> 00:19:38,880  
the steady state you might say

462  
00:19:43,270 --> 00:19:40,080  
um

463  
00:19:46,789 --> 00:19:43,280

and without uh making sure that you have

464

00:19:49,669 --> 00:19:46,799

well-defined uh system boundaries um

465

00:19:54,390 --> 00:19:49,679

it's it's difficult to uh make uh solid

466

00:19:57,430 --> 00:19:54,400

predictions about the time

467

00:20:00,310 --> 00:19:57,440

time progress of a particular system or

468

00:20:03,029 --> 00:20:00,320

the uh the steady-state sys

469

00:20:05,110 --> 00:20:03,039

steady-state claims

470

00:20:07,190 --> 00:20:05,120

and of course there's

471

00:20:08,390 --> 00:20:07,200

the energy inputs and outputs are the

472

00:20:09,669 --> 00:20:08,400

have they been

473

00:20:13,909 --> 00:20:09,679

uh

474

00:20:14,789 --> 00:20:13,919

analyzed and accounted for

475

00:20:23,270 --> 00:20:14,799

uh

476

00:20:25,190 --> 00:20:23,280

the or inventors say well

477

00:20:28,070 --> 00:20:25,200

my the previous version of this device

478

00:20:30,470 --> 00:20:28,080

that that i've improved on was shown to

479

00:20:31,750 --> 00:20:30,480

work therefore mine must show

480

00:20:32,549 --> 00:20:31,760

mine must work

481

00:20:40,710 --> 00:20:32,559

um

482

00:20:42,549 --> 00:20:40,720

uh a an inventor's reliance on

483

00:20:45,510 --> 00:20:42,559

on earlier

484

00:20:48,470 --> 00:20:45,520

versions of their device and that

485

00:20:51,750 --> 00:20:48,480

happens with alarming regularity

486

00:20:53,750 --> 00:20:51,760

uh in the uh you can see

487

00:20:56,149 --> 00:20:53,760

any any number of these kinds of things

488

00:20:58,549 --> 00:20:56,159

on the internet um

489

00:21:00,230 --> 00:20:58,559

these these energy claims

490

00:21:06,549 --> 00:21:00,240

so

491

00:21:09,909 --> 00:21:06,559

uh energy concepts um which i'll bring

492

00:21:13,110 --> 00:21:09,919

up i'm only going to bring up two um

493

00:21:15,029 --> 00:21:13,120

one that hasn't been discussed uh

494

00:21:17,029 --> 00:21:15,039

at all in this uh

495

00:21:20,630 --> 00:21:17,039

this conference

496

00:21:23,110 --> 00:21:20,640

uh is the uh idea of lo schmidt uh in

497

00:21:25,669 --> 00:21:23,120

the 19th century i'll i'll get into that

498

00:21:27,590 --> 00:21:25,679

in a bit and uh then i'll

499

00:21:30,630 --> 00:21:27,600

i'll take a look at uh

500

00:21:34,070 --> 00:21:30,640

whidham larsen in in

501  
00:21:35,909 --> 00:21:34,080  
a tiny bit of detail as well uh as as a

502  
00:21:39,510 --> 00:21:35,919  
theory for the

503  
00:21:42,310 --> 00:21:39,520  
claimed uh energy production uh from low

504  
00:21:45,990 --> 00:21:42,320  
energy nuclear reactions or as it's

505  
00:21:47,590 --> 00:21:46,000  
colloquially known cold fusion

506  
00:21:49,110 --> 00:21:47,600  
and

507  
00:21:50,149 --> 00:21:49,120  
um

508  
00:21:51,990 --> 00:21:50,159  
lo schmidt

509  
00:21:54,950 --> 00:21:52,000  
here

510  
00:21:57,750 --> 00:21:54,960  
for those who aren't familiar with it

511  
00:21:59,990 --> 00:21:57,760  
hypothesized as you can read that

512  
00:22:02,070 --> 00:22:00,000  
a simple column of gas

513  
00:22:03,990 --> 00:22:02,080

uh in a gravitational field so for

514

00:22:08,630 --> 00:22:04,000

instance a uh

515

00:22:10,390 --> 00:22:08,640

a column uh in a cylinder of uh

516

00:22:13,270 --> 00:22:10,400

of gas like

517

00:22:16,549 --> 00:22:13,280

can be any kind of gas uh that you can

518

00:22:19,750 --> 00:22:16,559

apply in low schmidt's case a kinetic

519

00:22:21,110 --> 00:22:19,760

theory of gas too which is not the case

520

00:22:22,310 --> 00:22:21,120

uh

521

00:22:25,830 --> 00:22:22,320

but a um

522

00:22:27,909 --> 00:22:25,840

a gas that doesn't uh react

523

00:22:31,510 --> 00:22:27,919

with any other gases

524

00:22:34,310 --> 00:22:31,520

monoatomic or diatomic but

525

00:22:36,230 --> 00:22:34,320

a single gas in a gravitational field

526  
00:22:37,510 --> 00:22:36,240  
spontaneously becomes hotter at the

527  
00:22:38,470 --> 00:22:37,520  
bottom

528  
00:22:42,070 --> 00:22:38,480  
well

529  
00:22:43,270 --> 00:22:42,080  
reasoned as i say here that any

530  
00:22:46,390 --> 00:22:43,280  
collision

531  
00:22:48,390 --> 00:22:46,400  
between molecules in that column

532  
00:22:51,029 --> 00:22:48,400  
and and a lot of those collisions would

533  
00:22:53,669 --> 00:22:51,039  
be vertically or uh

534  
00:22:55,430 --> 00:22:53,679  
almost vertically um

535  
00:22:59,110 --> 00:22:55,440  
would on average send one molecule

536  
00:23:00,070 --> 00:22:59,120  
upwards but as it goes up it loses speed

537  
00:23:02,710 --> 00:23:00,080  
whereas

538  
00:23:06,630 --> 00:23:02,720

those going downwards resulting from the

539

00:23:09,430 --> 00:23:06,640

collision with gain speed and um

540

00:23:12,630 --> 00:23:09,440

by the using the kinetic theory of

541

00:23:15,430 --> 00:23:12,640

passes um those at the bottom would

542

00:23:19,510 --> 00:23:15,440

therefore be vibrating more more quickly

543

00:23:22,630 --> 00:23:19,520

and be by definition hotter than those

544

00:23:25,590 --> 00:23:22,640

gas molecules at the top of the column

545

00:23:28,230 --> 00:23:25,600

so you could manage to construct a

546

00:23:29,270 --> 00:23:28,240

simple heat engine such as this one

547

00:23:30,870 --> 00:23:29,280

from the

548

00:23:34,390 --> 00:23:30,880

the low schmidt

549

00:23:36,710 --> 00:23:34,400

was

550

00:23:38,549 --> 00:23:36,720

an example of the simplest

551  
00:23:41,909 --> 00:23:38,559  
that i had come across before this

552  
00:23:44,070 --> 00:23:41,919  
conference uh um

553  
00:23:46,630 --> 00:23:44,080  
questioning of uh

554  
00:23:49,110 --> 00:23:46,640  
of of uh

555  
00:23:51,590 --> 00:23:49,120  
the thermodynamic laws and

556  
00:23:54,710 --> 00:23:51,600  
uh this is a a typical

557  
00:23:56,470 --> 00:23:54,720  
um picture of uh low schmidt's device

558  
00:23:59,430 --> 00:23:56,480  
there it is the column of gas with the

559  
00:24:01,590 --> 00:23:59,440  
dots in it and usually uh

560  
00:24:03,750 --> 00:24:01,600  
most analysis as i mentioned down at the

561  
00:24:07,830 --> 00:24:03,760  
bottom omit the environmental

562  
00:24:10,950 --> 00:24:07,840  
temperature the delta q there

563  
00:24:13,430 --> 00:24:10,960

going into the column

564

00:24:17,029 --> 00:24:13,440

they only consider gravity

565

00:24:19,750 --> 00:24:17,039

as the quote driving force

566

00:24:21,350 --> 00:24:19,760

and you can see that uh

567

00:24:23,830 --> 00:24:21,360

the the heat

568

00:24:26,070 --> 00:24:23,840

the heat flows in the column

569

00:24:28,070 --> 00:24:26,080

uh basically or the the differential in

570

00:24:31,590 --> 00:24:28,080

heat uh is

571

00:24:33,269 --> 00:24:31,600

uh between the uh cold molecules

572

00:24:35,590 --> 00:24:33,279

becoming

573

00:24:38,710 --> 00:24:35,600

hotter at the bottom and if you connect

574

00:24:41,190 --> 00:24:38,720

the bottom to the top using a heat

575

00:24:42,470 --> 00:24:41,200

engine you could theoretically produce

576  
00:24:43,750 --> 00:24:42,480  
heat

577  
00:24:47,029 --> 00:24:43,760  
from

578  
00:24:48,710 --> 00:24:47,039  
something what is that something yeah if

579  
00:24:50,950 --> 00:24:48,720  
uh if the environmental temperature is

580  
00:24:53,909 --> 00:24:50,960  
removed you put it in a very well

581  
00:24:55,590 --> 00:24:53,919  
insulated uh container this bottle of

582  
00:24:56,870 --> 00:24:55,600  
this column of gas

583  
00:24:59,350 --> 00:24:56,880  
the only other

584  
00:25:01,029 --> 00:24:59,360  
force you might say acting on this is

585  
00:25:04,549 --> 00:25:01,039  
gravity

586  
00:25:06,230 --> 00:25:04,559  
is this a gravitational heat engine

587  
00:25:07,190 --> 00:25:06,240  
well um

588  
00:25:09,350 --> 00:25:07,200

it's a

589

00:25:10,230 --> 00:25:09,360

question that has vexed a number of

590

00:25:11,350 --> 00:25:10,240

people

591

00:25:13,110 --> 00:25:11,360

um

592

00:25:15,590 --> 00:25:13,120

and

593

00:25:17,590 --> 00:25:15,600

for example boltzmann uh

594

00:25:19,190 --> 00:25:17,600

considered it as i said an intriguing

595

00:25:22,549 --> 00:25:19,200

idea but incorrect

596

00:25:25,430 --> 00:25:22,559

um using uh uh velocity reversal and

597

00:25:28,789 --> 00:25:25,440

time reversal uh uh

598

00:25:31,029 --> 00:25:28,799

um considerations um especially of

599

00:25:33,269 --> 00:25:31,039

mechanical processes and

600

00:25:35,590 --> 00:25:33,279

nowadays the question of

601  
00:25:37,110 --> 00:25:35,600  
the validity of the kinetic theory of

602  
00:25:39,029 --> 00:25:37,120  
gas

603  
00:25:41,510 --> 00:25:39,039  
brings into question

604  
00:25:43,669 --> 00:25:41,520  
low schmidt's ideas

605  
00:25:45,669 --> 00:25:43,679  
and

606  
00:25:48,230 --> 00:25:45,679  
it's uh interesting that boltzmann

607  
00:25:49,110 --> 00:25:48,240  
brought in time asymmetry

608  
00:25:53,110 --> 00:25:49,120  
to

609  
00:25:55,110 --> 00:25:53,120  
argue against a claimed violation

610  
00:25:57,029 --> 00:25:55,120  
one thing i haven't

611  
00:25:59,750 --> 00:25:57,039  
seen or heard in this

612  
00:26:04,310 --> 00:25:59,760  
uh in the conference is uh

613  
00:26:06,950 --> 00:26:04,320

at least in today's uh activity has been

614

00:26:09,909 --> 00:26:06,960

the influence of time and i brought that

615

00:26:12,870 --> 00:26:09,919

up uh with regard to the second law i

616

00:26:13,669 --> 00:26:12,880

mean an explanation or a an explication

617

00:26:16,630 --> 00:26:13,679

of

618

00:26:19,990 --> 00:26:16,640

time symmetry uh or time asymmetry in

619

00:26:22,630 --> 00:26:20,000

some of these uh systems uh whether that

620

00:26:25,029 --> 00:26:22,640

would uh um

621

00:26:26,870 --> 00:26:25,039

go to towards uh questioning the the

622

00:26:29,510 --> 00:26:26,880

validity of applying

623

00:26:32,390 --> 00:26:29,520

uh thermodynamic considerations to some

624

00:26:34,630 --> 00:26:32,400

of these uh ideas uh such as uh

625

00:26:36,470 --> 00:26:34,640

uh have been talked about by uh paul

626

00:26:39,110 --> 00:26:36,480

thibodeau's uh

627

00:26:41,190 --> 00:26:39,120

and others um

628

00:26:42,950 --> 00:26:41,200

and another uh argument against lotion

629

00:26:45,110 --> 00:26:42,960

that there have been quite a few

630

00:26:48,870 --> 00:26:45,120

uh have been

631

00:26:49,669 --> 00:26:48,880

to do with uh velocity distributions and

632

00:26:54,149 --> 00:26:49,679

and

633

00:26:56,630 --> 00:26:54,159

all sorts of them um

634

00:26:59,029 --> 00:26:56,640

that uh have uh uh

635

00:27:01,669 --> 00:26:59,039

suggested well lo schmidt's uh out to

636

00:27:04,830 --> 00:27:01,679

lunch there's no possible way that a

637

00:27:07,909 --> 00:27:04,840

gravitational field of being a

638

00:27:09,990 --> 00:27:07,919

conservative field

639

00:27:12,870 --> 00:27:10,000

therefore can do no work how could it do

640

00:27:13,750 --> 00:27:12,880

work on a system

641

00:27:14,549 --> 00:27:13,760

and

642

00:27:16,230 --> 00:27:14,559

then

643

00:27:18,310 --> 00:27:16,240

another question is

644

00:27:19,350 --> 00:27:18,320

if this is the case is gravity actually

645

00:27:22,950 --> 00:27:19,360

producing

646

00:27:25,029 --> 00:27:22,960

a a neg entropy state

647

00:27:26,470 --> 00:27:25,039

a more ordered state

648

00:27:27,909 --> 00:27:26,480

um

649

00:27:30,230 --> 00:27:27,919

in in

650

00:27:32,710 --> 00:27:30,240

providing uh work which is an or more

651

00:27:35,110 --> 00:27:32,720

ordered state out than the

652

00:27:36,789 --> 00:27:35,120

this ensemble of uh

653

00:27:40,149 --> 00:27:36,799

gas molecules

654

00:27:44,230 --> 00:27:40,159

uh well oddly enough uh back in uh

655

00:27:46,630 --> 00:27:44,240

back in 2002 uh someone uh

656

00:27:50,070 --> 00:27:46,640

published a paper saying well in fact

657

00:27:51,430 --> 00:27:50,080

i've measured uh a temperature gradient

658

00:28:06,870 --> 00:27:51,440

uh

659

00:28:08,710 --> 00:28:06,880

container so um

660

00:28:11,750 --> 00:28:08,720

it's interesting that uh someone's

661

00:28:14,230 --> 00:28:11,760

actually gone ahead and measured that

662

00:28:15,990 --> 00:28:14,240

i haven't uh looked into the details of

663

00:28:18,549 --> 00:28:16,000

it uh

664

00:28:20,230 --> 00:28:18,559

that much but

665

00:28:22,549 --> 00:28:20,240

to first order

666

00:28:23,830 --> 00:28:22,559

it looks like a reasonable experiment

667

00:28:25,190 --> 00:28:23,840

um

668

00:28:26,870 --> 00:28:25,200

then

669

00:28:28,789 --> 00:28:26,880

i ask uh

670

00:28:31,350 --> 00:28:28,799

whether there's any relationship between

671

00:28:33,909 --> 00:28:31,360

lo schmidt's idea and what you're going

672

00:28:34,870 --> 00:28:33,919

to hear from from garrett

673

00:28:35,590 --> 00:28:34,880

uh

674

00:28:42,870 --> 00:28:35,600

and

675

00:28:45,510 --> 00:28:42,880

of a force uh acting on a an ensemble of

676

00:28:46,310 --> 00:28:45,520

moving particles for instance

677

00:28:47,110 --> 00:28:46,320

and

678

00:28:49,590 --> 00:28:47,120

can

679

00:28:52,230 --> 00:28:49,600

gravity do con as a conservative force

680

00:28:54,549 --> 00:28:52,240

do any as i say sustained work on a

681

00:28:56,630 --> 00:28:54,559

system uh but maybe

682

00:28:59,510 --> 00:28:56,640

can gravity act in the low schmidt case

683

00:29:00,630 --> 00:28:59,520

as an asymmetric maxwell demons and

684

00:29:03,590 --> 00:29:00,640

we've

685

00:29:06,230 --> 00:29:03,600

heard uh from previous speakers on

686

00:29:08,389 --> 00:29:06,240

the requirement for asymmetry in a

687

00:29:09,430 --> 00:29:08,399

number of these systems

688

00:29:11,750 --> 00:29:09,440

um

689

00:29:13,909 --> 00:29:11,760

that apparently uh

690

00:29:15,350 --> 00:29:13,919

that that violate one or two of the of

691

00:29:16,230 --> 00:29:15,360

the laws

692

00:29:18,789 --> 00:29:16,240

um

693

00:29:21,350 --> 00:29:18,799

and can uh in the low schmidt case or a

694

00:29:22,789 --> 00:29:21,360

generalization of low schmidt uh use

695

00:29:25,029 --> 00:29:22,799

gravity uh

696

00:29:27,190 --> 00:29:25,039

as a as i say segregating particle

697

00:29:29,110 --> 00:29:27,200

velocities and thus allowing a heat

698

00:29:32,149 --> 00:29:29,120

engine um

699

00:29:33,029 --> 00:29:32,159

i have my doubts but uh it's it's a

700

00:29:35,909 --> 00:29:33,039

question

701  
00:29:38,789 --> 00:29:35,919  
um compare that to what garrett will be

702  
00:29:41,269 --> 00:29:38,799  
talking about is

703  
00:29:43,750 --> 00:29:41,279  
asking whether in fact uh zero point

704  
00:29:45,510 --> 00:29:43,760  
fluctuations uh can be considered a

705  
00:29:47,909 --> 00:29:45,520  
conservative force

706  
00:29:51,510 --> 00:29:47,919  
uh and uh therefore the lowest energy

707  
00:29:53,430 --> 00:29:51,520  
state but the addition of a an asymmetry

708  
00:29:56,149 --> 00:29:53,440  
um

709  
00:29:58,870 --> 00:29:56,159  
as you'll see the casimir cavity uh on

710  
00:30:01,590 --> 00:29:58,880  
one side of his device therefore making

711  
00:30:04,549 --> 00:30:01,600  
it asymmetrical provides the net needed

712  
00:30:08,710 --> 00:30:04,559  
asymmetry to segregate zero-point energy

713  
00:30:10,710 --> 00:30:08,720

flow you might say um so there may be uh

714

00:30:13,830 --> 00:30:10,720

an interesting correlation between those

715

00:30:15,909 --> 00:30:13,840

two ideas uh resulting in uh

716

00:30:17,190 --> 00:30:15,919

perhaps a deeper understanding of what's

717

00:30:19,029 --> 00:30:17,200

going on

718

00:30:21,590 --> 00:30:19,039

in some of these areas

719

00:30:26,070 --> 00:30:21,600

um i'll go to uh

720

00:30:29,990 --> 00:30:26,080

eleanor now very let's see uh

721

00:30:30,870 --> 00:30:30,000

to uh to just uh do a a specific uh

722

00:30:36,630 --> 00:30:30,880

uh

723

00:30:37,990 --> 00:30:36,640

how folk have concerned been concerned

724

00:30:40,710 --> 00:30:38,000

about

725

00:30:42,950 --> 00:30:40,720

how any any kind of

726

00:30:44,870 --> 00:30:42,960

nuclear reactions at room temperatures

727

00:30:46,470 --> 00:30:44,880

could possibly take place

728

00:30:49,590 --> 00:30:46,480

um and i

729

00:30:53,029 --> 00:30:49,600

reminded of heising as

730

00:30:55,190 --> 00:30:53,039

reality requirements for uh uh

731

00:30:57,509 --> 00:30:55,200

low energy and nuclear reactions to take

732

00:30:59,350 --> 00:30:57,519

place

733

00:31:01,590 --> 00:30:59,360

first and foremost obviously is how the

734

00:31:03,190 --> 00:31:01,600

coulomb barrier could be possibly

735

00:31:06,310 --> 00:31:03,200

circumvented

736

00:31:12,389 --> 00:31:06,320

by having these uh the protons uh for

737

00:31:16,470 --> 00:31:14,389

overcome a a

738

00:31:19,430 --> 00:31:16,480

coupon barrier between them and and

739

00:31:20,549 --> 00:31:19,440

produce uh other particles like neutrons

740

00:31:21,669 --> 00:31:20,559

um

741

00:31:23,830 --> 00:31:21,679

and uh

742

00:31:26,389 --> 00:31:23,840

and if there are neutrons being produced

743

00:31:30,789 --> 00:31:26,399

uh where are the neutron emissions

744

00:31:36,710 --> 00:31:33,909

cold fusion results uh as well as uh

745

00:31:38,950 --> 00:31:36,720

gamma uh or x-rays uh as a result of

746

00:31:40,149 --> 00:31:38,960

these uh so-called acclaimed fusion

747

00:31:41,430 --> 00:31:40,159

processes

748

00:31:42,710 --> 00:31:41,440

well

749

00:31:45,350 --> 00:31:42,720

uh two guys

750

00:31:47,509 --> 00:31:45,360

uh widowman larson

751  
00:31:49,590 --> 00:31:47,519  
put together a theory that attempted to

752  
00:31:50,549 --> 00:31:49,600  
answer all these criticisms by the way

753  
00:31:56,710 --> 00:31:50,559  
there are other

754  
00:31:59,110 --> 00:31:56,720  
um try to answer

755  
00:32:00,549 --> 00:31:59,120  
these these three prisons what i'm going

756  
00:32:02,789 --> 00:32:00,559  
to concentrate on

757  
00:32:06,310 --> 00:32:02,799  
uh very briefly on uh

758  
00:32:10,470 --> 00:32:06,320  
on whitman larson uh only to bring up

759  
00:32:13,909 --> 00:32:10,480  
um they uh the idea that uh um

760  
00:32:15,590 --> 00:32:13,919  
they had they considered that uh as you

761  
00:32:16,470 --> 00:32:15,600  
can see in the next

762  
00:32:18,950 --> 00:32:16,480  
um

763  
00:32:22,070 --> 00:32:18,960

one of their papers

764

00:32:23,990 --> 00:32:22,080

and uh i don't know you can see my uh

765

00:32:26,230 --> 00:32:24,000

my uh pointer here

766

00:32:28,549 --> 00:32:26,240

but uh it was shown that collective

767

00:32:31,909 --> 00:32:28,559

plasma oscillations

768

00:32:34,630 --> 00:32:31,919

on the surface of say a palladium uh

769

00:32:37,350 --> 00:32:34,640

a piece of metal contributes some of

770

00:32:39,509 --> 00:32:37,360

their electric energy to an electron

771

00:32:41,430 --> 00:32:39,519

so the following reactions become

772

00:32:43,909 --> 00:32:41,440

kinematically allowed

773

00:32:45,990 --> 00:32:43,919

so the idea here

774

00:32:48,070 --> 00:32:46,000

was that

775

00:32:50,950 --> 00:32:48,080

by some

776

00:32:53,909 --> 00:32:50,960

uh stochastic miracle i guess

777

00:32:56,950 --> 00:32:53,919

uh surface plasma oscillations which are

778

00:32:58,630 --> 00:32:56,960

were really not well defined

779

00:32:59,669 --> 00:32:58,640

could combine

780

00:33:02,230 --> 00:32:59,679

uh

781

00:33:04,789 --> 00:33:02,240

would would nudge electrons to combine

782

00:33:06,230 --> 00:33:04,799

with protons and produce the neutrons

783

00:33:08,830 --> 00:33:06,240

um

784

00:33:12,789 --> 00:33:08,840

unfortunately there's never been

785

00:33:14,950 --> 00:33:12,799

a a uh a reasonable uh thermodynamic

786

00:33:17,269 --> 00:33:14,960

analysis that i've seen of whiddam and

787

00:33:18,710 --> 00:33:17,279

larson my own take is that

788

00:33:22,230 --> 00:33:18,720

um

789

00:33:26,230 --> 00:33:22,240

there's an entropic uh problem here uh

790

00:33:29,990 --> 00:33:26,240

with uh what is the how how a um

791

00:33:32,950 --> 00:33:30,000

a spontaneously uh disorganized state

792

00:33:35,909 --> 00:33:32,960

namely stochastically uh

793

00:33:38,310 --> 00:33:35,919

uh variation variability in in a

794

00:33:39,830 --> 00:33:38,320

background state of oscillations can

795

00:33:40,950 --> 00:33:39,840

suddenly combine

796

00:33:43,430 --> 00:33:40,960

perhaps

797

00:33:47,909 --> 00:33:43,440

like a rogue wave as uh

798

00:33:50,630 --> 00:33:47,919

as jim jypsky talked about earlier into

799

00:33:54,549 --> 00:33:50,640

an energy state that is high enough to

800

00:33:57,350 --> 00:33:54,559

propel electrons uh into protons and

801  
00:33:59,830 --> 00:33:57,360  
produce the necessary neutrons um i'm

802  
00:34:02,470 --> 00:33:59,840  
finding that uh rather difficult to

803  
00:34:03,669 --> 00:34:02,480  
uh to understand at least

804  
00:34:06,870 --> 00:34:03,679  
and uh

805  
00:34:08,950 --> 00:34:06,880  
my question is uh does uh widow larson

806  
00:34:11,430 --> 00:34:08,960  
theory therefore violate

807  
00:34:12,389 --> 00:34:11,440  
the at least the calvin planck view

808  
00:34:15,190 --> 00:34:12,399  
um

809  
00:34:15,370 --> 00:34:15,200  
however there's been no definitive

810  
00:34:16,950 --> 00:34:15,380  
uh

811  
00:34:19,510 --> 00:34:16,960  
[Music]

812  
00:34:21,990 --> 00:34:19,520  
verification of

813  
00:34:23,990 --> 00:34:22,000

low energy nuclear reaction claims and

814

00:34:26,149 --> 00:34:24,000

i'll now come out of theory a little bit

815

00:34:27,430 --> 00:34:26,159

and look at experiments

816

00:34:29,909 --> 00:34:27,440

um

817

00:34:31,510 --> 00:34:29,919

or commercial products after decades

818

00:34:34,470 --> 00:34:31,520

pawns and fleischmann were in

819

00:34:36,230 --> 00:34:34,480

1989. what have we seen since

820

00:34:37,750 --> 00:34:36,240

we've seen

821

00:34:40,629 --> 00:34:37,760

pronouncements that oh we've got

822

00:34:43,109 --> 00:34:40,639

something yes the spouwar and others

823

00:34:45,270 --> 00:34:43,119

have uh navy have

824

00:34:49,430 --> 00:34:45,280

seen obvious traces of

825

00:34:52,510 --> 00:34:49,440

of neutrons therefore verifying this uh

826

00:34:55,750 --> 00:34:52,520

possibility that uh uh

827

00:34:58,069 --> 00:34:55,760

thermodynamics uh begone uh

828

00:35:00,069 --> 00:34:58,079

we've we've got uh low energy we've got

829

00:35:04,150 --> 00:35:00,079

nuclear reactions from a low energy

830

00:35:08,950 --> 00:35:04,160

source like uh um ambient heat uh

831

00:35:09,910 --> 00:35:08,960

from uh in a a low energy nuclear action

832

00:35:11,190 --> 00:35:09,920

um

833

00:35:12,069 --> 00:35:11,200

experiment

834

00:35:15,270 --> 00:35:12,079

um

835

00:35:16,870 --> 00:35:15,280

and uh the the latest thing was the the

836

00:35:21,290 --> 00:35:16,880

navy attempted to revive interests that

837

00:35:22,790 --> 00:35:21,300

i mentioned in 2019 without much success

838

00:35:24,069 --> 00:35:22,800

[Music]

839

00:35:28,710 --> 00:35:24,079

the

840

00:35:31,750 --> 00:35:28,720

experimental

841

00:35:34,150 --> 00:35:31,760

capability for uh determining heat

842

00:35:35,190 --> 00:35:34,160

transfer is the what is

843

00:35:37,430 --> 00:35:35,200

uh

844

00:35:41,109 --> 00:35:37,440

colloquially known as the mother of all

845

00:35:42,150 --> 00:35:41,119

calorimeters or moak which was developed

846

00:35:44,710 --> 00:35:42,160

at

847

00:35:48,950 --> 00:35:44,720

hal put off's of advanced studies uh

848

00:35:51,430 --> 00:35:48,960

around 2004 2005 by uh scott little uh

849

00:35:54,310 --> 00:35:51,440

they their resident uh uh engineer and

850

00:35:57,109 --> 00:35:54,320

uh thermodynamicist um

851  
00:35:59,270 --> 00:35:57,119  
and uh there's a diagram uh that you can

852  
00:36:01,510 --> 00:35:59,280  
see of the complexity of this

853  
00:36:02,550 --> 00:36:01,520  
this device which was specifically

854  
00:36:03,750 --> 00:36:02,560  
designed

855  
00:36:06,150 --> 00:36:03,760  
for

856  
00:36:08,230 --> 00:36:06,160  
looking at the validity and testing the

857  
00:36:10,390 --> 00:36:08,240  
validity of uh low energy nuclear

858  
00:36:12,790 --> 00:36:10,400  
reactions and you can see some of the

859  
00:36:15,030 --> 00:36:12,800  
the features on the right uh one i'd

860  
00:36:18,390 --> 00:36:15,040  
like to point out is uh

861  
00:36:21,349 --> 00:36:18,400  
the the third point there the size shape

862  
00:36:23,589 --> 00:36:21,359  
and i say shape temperature and location

863  
00:36:25,349 --> 00:36:23,599

within the chamber you can see the heat

864

00:36:28,710 --> 00:36:25,359

exchanger the calibration heater in the

865

00:36:32,550 --> 00:36:28,720

center that's uh the cell is sort of on

866

00:36:34,710 --> 00:36:32,560

the right of the center uh right here

867

00:36:37,829 --> 00:36:34,720

just as a as an interesting point a lot

868

00:36:44,470 --> 00:36:40,790

calorimeters have been developed to show

869

00:36:46,069 --> 00:36:44,480

apparently energy gains in low energy

870

00:36:46,870 --> 00:36:46,079

nuclear reactions

871

00:36:48,790 --> 00:36:46,880

but

872

00:36:49,750 --> 00:36:48,800

when you move the cell

873

00:36:52,470 --> 00:36:49,760

or

874

00:36:55,430 --> 00:36:52,480

you move the sample that you're dousing

875

00:36:57,589 --> 00:36:55,440

with hydrogen from one place to another

876

00:36:59,670 --> 00:36:57,599

in the calorimeter you get different

877

00:37:01,670 --> 00:36:59,680

readings uh this is one of the only

878

00:37:02,950 --> 00:37:01,680

calorimeters where it doesn't matter

879

00:37:05,829 --> 00:37:02,960

where you put

880

00:37:06,550 --> 00:37:05,839

the sample with respect to thermocouples

881

00:37:11,030 --> 00:37:06,560

and

882

00:37:14,390 --> 00:37:11,040

uh

883

00:37:17,910 --> 00:37:14,400

measurements and

884

00:37:20,790 --> 00:37:17,920

um scott has uh looked at uh

885

00:37:23,030 --> 00:37:20,800

uh a bunch of uh different kinds of

886

00:37:24,390 --> 00:37:23,040

energy devices

887

00:37:25,670 --> 00:37:24,400

to show

888

00:37:27,829 --> 00:37:25,680

to

889

00:37:28,870 --> 00:37:27,839  
at least that 0.1 relative accuracy

890

00:37:30,550 --> 00:37:28,880  
there's

891

00:37:32,310 --> 00:37:30,560  
no excess heat

892

00:37:34,310 --> 00:37:32,320  
in in these

893

00:37:37,230 --> 00:37:34,320  
these devices here a couple of photos of

894

00:37:40,470 --> 00:37:37,240  
it you can see the size

895

00:37:41,589 --> 00:37:40,480  
of it relative to

896

00:37:43,990 --> 00:37:41,599  
the lab

897

00:37:46,870 --> 00:37:44,000  
and uh there's the the main chamber

898

00:37:48,870 --> 00:37:46,880  
inside that white box it's uh actively

899

00:37:51,910 --> 00:37:48,880  
thermal insulated so it's got active

900

00:37:53,510 --> 00:37:51,920  
thermal insulation uh whereas most other

901  
00:37:56,230 --> 00:37:53,520  
calorimeters are

902  
00:37:59,990 --> 00:37:56,240  
passively insulated um

903  
00:38:02,870 --> 00:38:00,000  
and there's a cell test cell inside that

904  
00:38:05,349 --> 00:38:02,880  
that test chamber

905  
00:38:06,870 --> 00:38:05,359  
so uh

906  
00:38:08,230 --> 00:38:06,880  
here's uh

907  
00:38:09,190 --> 00:38:08,240  
some examples

908  
00:38:11,109 --> 00:38:09,200  
and those

909  
00:38:13,349 --> 00:38:11,119  
i'd call the um

910  
00:38:15,349 --> 00:38:13,359  
low energy nuclear reactions uh

911  
00:38:17,349 --> 00:38:15,359  
an example of

912  
00:38:18,550 --> 00:38:17,359  
of uh microscale

913  
00:38:19,829 --> 00:38:18,560

energy

914

00:38:22,390 --> 00:38:19,839

activity

915

00:38:25,270 --> 00:38:22,400

or concepts and inventions

916

00:38:28,230 --> 00:38:25,280

there are tons of

917

00:38:30,550 --> 00:38:28,240

lab scale concepts

918

00:38:33,510 --> 00:38:30,560

many of which i've

919

00:38:36,710 --> 00:38:33,520

had the fortune or misfortune of of

920

00:38:38,230 --> 00:38:36,720

examining uh which um

921

00:38:39,750 --> 00:38:38,240

have uh

922

00:38:42,630 --> 00:38:39,760

have issues you might say with a

923

00:38:44,870 --> 00:38:42,640

thermodynamic laws um

924

00:38:48,630 --> 00:38:44,880

randy mills uh brilliant light or

925

00:38:49,990 --> 00:38:48,640

hydrino uh devices is one example i will

926

00:38:50,870 --> 00:38:50,000

uh show

927

00:38:55,990 --> 00:38:50,880

uh

928

00:38:58,870 --> 00:38:56,000

greno's underwater arc explosions in a

929

00:39:02,069 --> 00:38:58,880

previous talk uh yesterday

930

00:39:03,670 --> 00:39:02,079

um as for fun i'll bring up a couple of

931

00:39:04,790 --> 00:39:03,680

others

932

00:39:07,910 --> 00:39:04,800

that

933

00:39:09,750 --> 00:39:07,920

have to do with uh

934

00:39:12,790 --> 00:39:09,760

solid state you might say no moving

935

00:39:15,349 --> 00:39:12,800

parts uh energy generation from nothing

936

00:39:16,950 --> 00:39:15,359

basically and then a rotary device uh

937

00:39:18,150 --> 00:39:16,960

actually from canada

938

00:39:20,310 --> 00:39:18,160

uh

939

00:39:23,430 --> 00:39:20,320

in a short time let's see how we're

940

00:39:25,109 --> 00:39:23,440

doing yep um

941

00:39:27,990 --> 00:39:25,119

here's uh

942

00:39:31,510 --> 00:39:28,000

here's an announcement from uh

943

00:39:33,910 --> 00:39:31,520

the most recent uh version of uh mills

944

00:39:35,990 --> 00:39:33,920

um brilliant light power if you haven't

945

00:39:37,990 --> 00:39:36,000

uh seen it already it uh

946

00:39:40,630 --> 00:39:38,000

started as uh

947

00:39:45,270 --> 00:39:40,640

mills was is a uh

948

00:39:48,230 --> 00:39:45,280

a doctor uh a medical uh an md who's uh

949

00:39:50,870 --> 00:39:48,240

published a work uh that shows the

950

00:39:52,950 --> 00:39:50,880

masses uh was able to derive the masses

951  
00:39:55,670 --> 00:39:52,960  
of uh fundamental particles

952  
00:39:57,030 --> 00:39:55,680  
um in in several papers which actually

953  
00:39:59,670 --> 00:39:57,040  
were

954  
00:40:00,790 --> 00:39:59,680  
pretty well received and peer-reviewed

955  
00:40:03,510 --> 00:40:00,800  
based on

956  
00:40:05,030 --> 00:40:03,520  
that understanding he developed what he

957  
00:40:09,109 --> 00:40:05,040  
called a

958  
00:40:11,589 --> 00:40:09,119  
a low energy state of hydrogen

959  
00:40:13,510 --> 00:40:11,599  
and this low energy state of hydrogen

960  
00:40:14,950 --> 00:40:13,520  
called the hydrino

961  
00:40:17,030 --> 00:40:14,960  
um

962  
00:40:20,390 --> 00:40:17,040  
and and this was years years and years

963  
00:40:21,829 --> 00:40:20,400

ago uh he uh he started this

964

00:40:26,390 --> 00:40:21,839

this path

965

00:40:28,630 --> 00:40:26,400

and uh um as you can see uh from this

966

00:40:32,069 --> 00:40:28,640

you can read it um

967

00:40:33,990 --> 00:40:32,079

uh from a very humble beginning of uh

968

00:40:35,910 --> 00:40:34,000

describing um

969

00:40:37,670 --> 00:40:35,920

the development the possibility of

970

00:40:39,670 --> 00:40:37,680

hydrinos

971

00:40:41,910 --> 00:40:39,680

we come up to

972

00:40:44,150 --> 00:40:41,920

dark matter and

973

00:40:45,750 --> 00:40:44,160

unified matter and

974

00:40:48,069 --> 00:40:45,760

harnessing

975

00:40:53,109 --> 00:40:48,079

catalytically this

976  
00:40:55,990 --> 00:40:53,119  
dark matter directly into uh a an energy

977  
00:40:58,150 --> 00:40:56,000  
device called the hydrino

978  
00:41:00,550 --> 00:40:58,160  
brilliant high-energy light wow look at

979  
00:41:01,589 --> 00:41:00,560  
all this it's amazing

980  
00:41:03,030 --> 00:41:01,599  
and

981  
00:41:05,510 --> 00:41:03,040  
with this

982  
00:41:07,829 --> 00:41:05,520  
simple idea he has

983  
00:41:10,630 --> 00:41:07,839  
gone on to

984  
00:41:11,910 --> 00:41:10,640  
attract uh quite a following as well as

985  
00:41:13,990 --> 00:41:11,920  
a lot of money

986  
00:41:15,589 --> 00:41:14,000  
to develop some of his

987  
00:41:18,630 --> 00:41:15,599  
his uh

988  
00:41:20,550 --> 00:41:18,640

original ideas into what he claims is a

989

00:41:24,309 --> 00:41:20,560

an energy production device

990

00:41:25,750 --> 00:41:24,319

um the basis of his claim

991

00:41:27,990 --> 00:41:25,760

is uh

992

00:41:31,349 --> 00:41:28,000

is shown in the uh

993

00:41:36,630 --> 00:41:31,359

in this white uh box on the right

994

00:41:39,910 --> 00:41:36,640

and uh basically somehow atomic hydrogen

995

00:41:40,950 --> 00:41:39,920

is uh reacts with a with a catalyst

996

00:41:44,550 --> 00:41:40,960

and

997

00:41:48,230 --> 00:41:44,560

by some means energy is transferred from

998

00:41:49,910 --> 00:41:48,240

atomic hydrogen to the catalyst

999

00:41:52,550 --> 00:41:49,920

which forms uh

1000

00:41:55,510 --> 00:41:52,560

an eye on itself

1001  
00:41:56,550 --> 00:41:55,520  
and this is by the way uh directly from

1002  
00:41:59,829 --> 00:41:56,560  
his uh

1003  
00:42:00,630 --> 00:41:59,839  
uh an early website uh on uh

1004  
00:42:01,750 --> 00:42:00,640  
on

1005  
00:42:05,190 --> 00:42:01,760  
what

1006  
00:42:07,670 --> 00:42:05,200  
and uh

1007  
00:42:09,829 --> 00:42:07,680  
the negative at least he's very kind

1008  
00:42:12,870 --> 00:42:09,839  
enough to remind us that uh an electron

1009  
00:42:13,670 --> 00:42:12,880  
is a negative entity uh drops to a lower

1010  
00:42:16,470 --> 00:42:13,680  
shell

1011  
00:42:18,390 --> 00:42:16,480  
uh squeezes down

1012  
00:42:20,550 --> 00:42:18,400  
closer to the proton

1013  
00:42:24,870 --> 00:42:20,560

thank you for telling us positive

1014

00:42:27,190 --> 00:42:24,880

to form a a reduced size hydrogen atom

1015

00:42:29,270 --> 00:42:27,200

called hydrino

1016

00:42:31,270 --> 00:42:29,280

now there's already a thermodynamic

1017

00:42:32,550 --> 00:42:31,280

concern here about what

1018

00:42:33,349 --> 00:42:32,560

is

1019

00:42:37,670 --> 00:42:33,359

the

1020

00:42:38,630 --> 00:42:37,680

lowest energy state

1021

00:42:41,109 --> 00:42:38,640

um

1022

00:42:45,270 --> 00:42:41,119

and uh whether it's possible to actually

1023

00:42:48,150 --> 00:42:45,280

reduce um a a an entity to a

1024

00:42:50,470 --> 00:42:48,160

state with lower energy than the lowest

1025

00:42:52,230 --> 00:42:50,480

energy uh understand

1026  
00:42:53,990 --> 00:42:52,240  
the lowest energy state

1027  
00:42:55,349 --> 00:42:54,000  
uh and

1028  
00:42:56,630 --> 00:42:55,359  
uh i

1029  
00:42:59,990 --> 00:42:56,640  
i i

1030  
00:43:01,349 --> 00:43:00,000  
question uh of course this uh this claim

1031  
00:43:05,030 --> 00:43:01,359  
um

1032  
00:43:07,030 --> 00:43:05,040  
that uh by doing that you release energy

1033  
00:43:09,270 --> 00:43:07,040  
uh in the form of heat

1034  
00:43:10,829 --> 00:43:09,280  
which then can be uh used

1035  
00:43:13,190 --> 00:43:10,839  
to uh

1036  
00:43:14,069 --> 00:43:13,200  
to operate machinery and things like

1037  
00:43:16,309 --> 00:43:14,079  
that

1038  
00:43:17,910 --> 00:43:16,319

uh and then there's a

1039

00:43:22,390 --> 00:43:17,920

cycling

1040

00:43:24,470 --> 00:43:22,400

whole thing back uh again

1041

00:43:25,430 --> 00:43:24,480

but um

1042

00:43:28,069 --> 00:43:25,440

with

1043

00:43:30,150 --> 00:43:28,079

not only is the um

1044

00:43:33,750 --> 00:43:30,160

the or the thermodynamics you might say

1045

00:43:35,829 --> 00:43:33,760

of uh going from a hydrogen atom to a

1046

00:43:38,470 --> 00:43:35,839

lower energy state than than the lowest

1047

00:43:41,670 --> 00:43:38,480

energy state a problem uh but then he

1048

00:43:45,109 --> 00:43:41,680

says now if you add a lot of electricity

1049

00:43:50,710 --> 00:43:45,119

uh by means of uh ionized uh

1050

00:43:54,150 --> 00:43:50,720

uh or by uh an arc an electric arc um

1051  
00:43:56,950 --> 00:43:54,160  
then the space charge around the uh

1052  
00:43:58,630 --> 00:43:56,960  
these ionized electrons is eliminated

1053  
00:44:01,510 --> 00:43:58,640  
uh and

1054  
00:44:03,990 --> 00:44:01,520  
this process this reaction so-called

1055  
00:44:05,190 --> 00:44:04,000  
becomes massively high

1056  
00:44:07,109 --> 00:44:05,200  
um

1057  
00:44:09,109 --> 00:44:07,119  
and i ask a couple of questions based on

1058  
00:44:11,589 --> 00:44:09,119  
this

1059  
00:44:14,390 --> 00:44:11,599  
and just a reminder that mill's atomic

1060  
00:44:16,470 --> 00:44:14,400  
theory is based on on classical uh

1061  
00:44:17,990 --> 00:44:16,480  
rather than quantum mechanics and it's

1062  
00:44:19,750 --> 00:44:18,000  
been criticized

1063  
00:44:22,309 --> 00:44:19,760

roundly by uh

1064

00:44:22,910 --> 00:44:22,319

various people including uh

1065

00:44:24,870 --> 00:44:22,920

in

1066

00:44:25,990 --> 00:44:24,880

2005.

1067

00:44:27,589 --> 00:44:26,000

anyway

1068

00:44:30,630 --> 00:44:27,599

uh i

1069

00:44:32,950 --> 00:44:30,640

i i'm not going to go through this but

1070

00:44:36,550 --> 00:44:32,960

in any detail but

1071

00:44:39,510 --> 00:44:36,560

some of mill's supporters or claim that

1072

00:44:40,870 --> 00:44:39,520

they have done their own

1073

00:44:42,069 --> 00:44:40,880

tests on this

1074

00:44:44,230 --> 00:44:42,079

and uh

1075

00:44:46,870 --> 00:44:44,240

have come up with a confirmation of what

1076

00:44:49,589 --> 00:44:46,880

mills was saying however i brought up at

1077

00:44:52,550 --> 00:44:49,599

least 14 points

1078

00:44:53,990 --> 00:44:52,560

against or questions of uh on one of

1079

00:44:54,950 --> 00:44:54,000

these uh papers

1080

00:44:57,430 --> 00:44:54,960

um

1081

00:45:00,390 --> 00:44:57,440

to uh uh

1082

00:45:03,430 --> 00:45:00,400

to try to satisfy to my uh

1083

00:45:06,550 --> 00:45:03,440

my understanding how uh well or not well

1084

00:45:08,950 --> 00:45:06,560

the uh these analysis analyses have been

1085

00:45:09,990 --> 00:45:08,960

done and they've in my opinion not been

1086

00:45:13,589 --> 00:45:10,000

well done

1087

00:45:16,069 --> 00:45:13,599

um anyway here's a uh the most recent

1088

00:45:16,829 --> 00:45:16,079

version of mills device

1089

00:45:27,430 --> 00:45:16,839

uh

1090

00:45:30,150 --> 00:45:27,440

the hydrino formation on the catalyst

1091

00:45:33,670 --> 00:45:30,160

uh in this chamber and

1092

00:45:36,069 --> 00:45:33,680

uh when you apply a very high voltage to

1093

00:45:39,190 --> 00:45:36,079

from capacitors to this uh the

1094

00:45:42,069 --> 00:45:39,200

electrodes in here uh a huge explosion

1095

00:45:44,390 --> 00:45:42,079

takes place sending a column of

1096

00:45:47,990 --> 00:45:44,400

conducting material in this case uh

1097

00:45:49,270 --> 00:45:48,000

liquid silver through these this mhd

1098

00:45:51,270 --> 00:45:49,280

generator

1099

00:45:54,150 --> 00:45:51,280

and uh cycling

1100

00:45:56,470 --> 00:45:54,160

back and forth and he claims that uh

1101  
00:45:58,950 --> 00:45:56,480  
by means of the production of hydrinos

1102  
00:46:01,670 --> 00:45:58,960  
in here he can get excess energy well

1103  
00:46:03,589 --> 00:46:01,680  
over above the

1104  
00:46:06,390 --> 00:46:03,599  
energy required to drive the whole

1105  
00:46:07,990 --> 00:46:06,400  
system including capacitors to

1106  
00:46:09,109 --> 00:46:08,000  
make the arcs and the

1107  
00:46:11,670 --> 00:46:09,119  
and the

1108  
00:46:14,309 --> 00:46:11,680  
pumps to pump the silver in and stuff

1109  
00:46:16,550 --> 00:46:14,319  
like that anyway here's the most recent

1110  
00:46:19,750 --> 00:46:16,560  
version of it and it's attracted a lot

1111  
00:46:21,750 --> 00:46:19,760  
of attention and uh but no one seems to

1112  
00:46:24,470 --> 00:46:21,760  
have done much

1113  
00:46:26,470 --> 00:46:24,480

uh analysis on the input energy side

1114

00:46:29,349 --> 00:46:26,480

which is the most difficult namely the

1115

00:46:32,950 --> 00:46:29,359

formation of arcs

1116

00:46:36,309 --> 00:46:32,960

i will go and skip over uh peter greno's

1117

00:46:37,990 --> 00:46:36,319

work which i've i talked about yesterday

1118

00:46:41,589 --> 00:46:38,000

that's peter grinneau in the bottom

1119

00:46:44,870 --> 00:46:41,599

right and that's a junior version of me

1120

00:46:45,829 --> 00:46:44,880

and we're looking at one of his uh

1121

00:46:48,790 --> 00:46:45,839

water

1122

00:46:52,550 --> 00:46:48,800

fog experiments where he claimed that

1123

00:46:54,790 --> 00:46:52,560

the kinetic energy reduced produced by

1124

00:46:58,150 --> 00:46:54,800

underwater electric explosions is

1125

00:47:01,829 --> 00:46:58,160

greater than the uh

1126

00:47:03,990 --> 00:47:01,839

the energy required to provide the ark

1127

00:47:06,630 --> 00:47:04,000

namely to charge capacitors which are

1128

00:47:07,510 --> 00:47:06,640

then discharged to provide an arc under

1129

00:47:08,470 --> 00:47:07,520

water

1130

00:47:11,589 --> 00:47:08,480

and

1131

00:47:13,910 --> 00:47:11,599

as i mentioned yesterday i uh published

1132

00:47:15,750 --> 00:47:13,920

a couple of papers with peter um

1133

00:47:18,630 --> 00:47:15,760

attempting to show that uh

1134

00:47:21,430 --> 00:47:18,640

this was an energy producing device

1135

00:47:23,349 --> 00:47:21,440

uh it wasn't in violation actually of

1136

00:47:25,270 --> 00:47:23,359

first law because we

1137

00:47:26,470 --> 00:47:25,280

determined that the energy came from the

1138

00:47:29,030 --> 00:47:26,480

sun

1139

00:47:32,470 --> 00:47:29,040

uh in a in a particular cyclic manner

1140

00:47:35,430 --> 00:47:32,480

but uh uh upon uh re uh

1141

00:47:37,430 --> 00:47:35,440

uh analyzing exactly what the uh the

1142

00:47:39,910 --> 00:47:37,440

what was going on in the arc uh we

1143

00:47:41,510 --> 00:47:39,920

determined i determined that uh

1144

00:47:43,990 --> 00:47:41,520

the energetics were not as we had

1145

00:47:45,670 --> 00:47:44,000

originally claimed i had to retract that

1146

00:47:47,670 --> 00:47:45,680

um

1147

00:47:49,510 --> 00:47:47,680

anyway uh that was a

1148

00:47:53,349 --> 00:47:49,520

a

1149

00:47:55,990 --> 00:47:53,359

discussion of of peter greno's

1150

00:47:58,069 --> 00:47:56,000

activity then we come to a typical

1151  
00:48:00,870 --> 00:47:58,079  
example what you'll find on the internet

1152  
00:48:03,190 --> 00:48:00,880  
of a uh a system that claims to produce

1153  
00:48:05,190 --> 00:48:03,200  
energy from permanent magnets in this

1154  
00:48:07,829 --> 00:48:05,200  
case there's a

1155  
00:48:11,270 --> 00:48:07,839  
a permanent magnet here and a couple of

1156  
00:48:12,790 --> 00:48:11,280  
coils uh in a circular

1157  
00:48:14,150 --> 00:48:12,800  
loop and

1158  
00:48:15,430 --> 00:48:14,160  
little coils

1159  
00:48:17,109 --> 00:48:15,440  
uh

1160  
00:48:19,030 --> 00:48:17,119  
that are here

1161  
00:48:21,270 --> 00:48:19,040  
change the flux

1162  
00:48:24,470 --> 00:48:21,280  
from a permanent magnet

1163  
00:48:25,910 --> 00:48:24,480

from one side to the other from one

1164

00:48:28,069 --> 00:48:25,920

side of a yoke to the other through

1165

00:48:30,230 --> 00:48:28,079

these pickup coils and the claim is that

1166

00:48:32,390 --> 00:48:30,240

the energy output from these pickup

1167

00:48:35,270 --> 00:48:32,400

coils is greater than the energy

1168

00:48:38,150 --> 00:48:35,280

required to deflect the

1169

00:48:40,069 --> 00:48:38,160

uh to deflect the flux

1170

00:48:41,030 --> 00:48:40,079

um and

1171

00:48:45,990 --> 00:48:41,040

uh

1172

00:48:48,069 --> 00:48:46,000

bearden tom bearden wasn't the first to

1173

00:48:50,309 --> 00:48:48,079

uh develop this kind of device but he's

1174

00:48:52,230 --> 00:48:50,319

the most famous um

1175

00:48:54,549 --> 00:48:52,240

and as i say the alternating flux

1176

00:48:55,349 --> 00:48:54,559

generates a current uh

1177

00:48:58,790 --> 00:48:55,359

in

1178

00:49:01,030 --> 00:48:58,800

uh claim was that the power used by the

1179

00:49:04,390 --> 00:49:01,040

switching coils was less than the power

1180

00:49:06,390 --> 00:49:04,400

output in clear violation the first law

1181

00:49:08,549 --> 00:49:06,400

and the proponents claimed that the

1182

00:49:09,829 --> 00:49:08,559

permanent magnet actually was a source

1183

00:49:11,670 --> 00:49:09,839

of power

1184

00:49:13,589 --> 00:49:11,680

uh which slowly degrades over time

1185

00:49:15,990 --> 00:49:13,599

that's how they got around

1186

00:49:17,990 --> 00:49:16,000

claims uh or concerns that they're

1187

00:49:19,109 --> 00:49:18,000

violating first law

1188

00:49:21,349 --> 00:49:19,119

and

1189

00:49:24,309 --> 00:49:21,359

um a permanent magnet of course is not a

1190

00:49:26,950 --> 00:49:24,319

source of power

1191

00:49:29,430 --> 00:49:26,960

it produces a uh

1192

00:49:32,950 --> 00:49:29,440

a conservative field you might say and

1193

00:49:35,030 --> 00:49:32,960

it only degrades negligibly over time

1194

00:49:36,630 --> 00:49:35,040

anyway uh

1195

00:49:37,910 --> 00:49:36,640

to the from the uh

1196

00:49:41,670 --> 00:49:37,920

um

1197

00:49:45,430 --> 00:49:41,680

semi-sublime ridiculous here's a uh

1198

00:49:46,710 --> 00:49:45,440

a rotary device which claims to violate

1199

00:49:50,950 --> 00:49:46,720

lenses law

1200

00:49:54,470 --> 00:49:52,710

first law

1201  
00:49:56,390 --> 00:49:54,480  
systems

1202  
00:49:59,109 --> 00:49:56,400  
in rotating

1203  
00:50:01,109 --> 00:49:59,119  
in a rotating configuration but here's a

1204  
00:50:03,109 --> 00:50:01,119  
example of someone who claims to be

1205  
00:50:05,829 --> 00:50:03,119  
skirting lenses law here are permanent

1206  
00:50:06,950 --> 00:50:05,839  
little disc permanent magnets on this

1207  
00:50:11,510 --> 00:50:06,960  
rotor

1208  
00:50:14,150 --> 00:50:11,520  
drive driven by this uh motor and they

1209  
00:50:17,190 --> 00:50:14,160  
they come across uh and close to these

1210  
00:50:18,069 --> 00:50:17,200  
pickup coils and the claim is that uh

1211  
00:50:19,190 --> 00:50:18,079  
um

1212  
00:50:20,870 --> 00:50:19,200  
that

1213  
00:50:23,030 --> 00:50:20,880

you can reduce

1214

00:50:24,309 --> 00:50:23,040

the power driving

1215

00:50:32,309 --> 00:50:24,319

the

1216

00:50:36,390 --> 00:50:32,319

relationship between speed and magnetic

1217

00:50:38,710 --> 00:50:36,400

flux and therefore uh you can

1218

00:50:41,430 --> 00:50:38,720

circumvent lenses law and this is the

1219

00:50:45,030 --> 00:50:41,440

inventor here a canadian fellow near

1220

00:50:46,230 --> 00:50:45,040

ottawa ontario uh who claims that uh

1221

00:50:48,950 --> 00:50:46,240

he can

1222

00:50:52,790 --> 00:50:48,960

produce excess energy essentially by uh

1223

00:50:57,910 --> 00:50:55,190

and he interprets his uh

1224

00:50:59,430 --> 00:50:57,920

he shows that the motor speed up uh can

1225

00:51:01,750 --> 00:50:59,440

occur when uh

1226

00:51:04,630 --> 00:51:01,760

his motor generator system is at a

1227

00:51:07,670 --> 00:51:04,640

particular uh apparently low energy

1228

00:51:11,109 --> 00:51:07,680

state and therefore he can gain energy

1229

00:51:13,190 --> 00:51:11,119

from this speed up which is not the case

1230

00:51:14,549 --> 00:51:13,200

no increase in power violation of the

1231

00:51:15,349 --> 00:51:14,559

first law

1232

00:51:18,230 --> 00:51:15,359

um

1233

00:51:19,910 --> 00:51:18,240

induction or he just forgot that can

1234

00:51:21,589 --> 00:51:19,920

operate in a range where torque actually

1235

00:51:23,270 --> 00:51:21,599

decreases with speed

1236

00:51:25,030 --> 00:51:23,280

and

1237

00:51:25,910 --> 00:51:25,040

anyway

1238

00:51:27,030 --> 00:51:25,920

we will

1239

00:51:29,349 --> 00:51:27,040

end

1240

00:51:31,109 --> 00:51:29,359

this part with

1241

00:51:34,309 --> 00:51:31,119

the consideration of lenses law as a

1242

00:51:35,589 --> 00:51:34,319

magnetic version of the first law

1243

00:51:37,589 --> 00:51:35,599

and

1244

00:51:38,710 --> 00:51:37,599

states that when a magnetic flux is

1245

00:51:40,630 --> 00:51:38,720

increased

1246

00:51:43,910 --> 00:51:40,640

through a closed loop current is induced

1247

00:51:45,270 --> 00:51:43,920

that opposes the force and if there's no

1248

00:51:47,630 --> 00:51:45,280

opposition

1249

00:51:48,790 --> 00:51:47,640

um no work can be performed

1250

00:51:50,790 --> 00:51:48,800

[Music]

1251  
00:51:52,230 --> 00:51:50,800  
and this is uh

1252  
00:51:53,910 --> 00:51:52,240  
uh

1253  
00:51:56,309 --> 00:51:53,920  
exemplified if there's no

1254  
00:51:58,390 --> 00:51:56,319  
lens or newtonian back reaction the

1255  
00:52:00,549 --> 00:51:58,400  
source of flux can change however

1256  
00:52:04,230 --> 00:52:00,559  
uh however it wants but the coil does

1257  
00:52:05,670 --> 00:52:04,240  
not absorb any uh energy of motion so um

1258  
00:52:07,910 --> 00:52:05,680  
a lot of systems that i've been

1259  
00:52:09,589 --> 00:52:07,920  
investigated claim to have subverted

1260  
00:52:10,309 --> 00:52:09,599  
lenses law

1261  
00:52:14,309 --> 00:52:10,319  
but

1262  
00:52:16,150 --> 00:52:14,319  
uh clearly they don't

1263  
00:52:17,030 --> 00:52:16,160

um

1264

00:52:21,510 --> 00:52:17,040

so

1265

00:52:23,109 --> 00:52:21,520

uh that i can get into in the last

1266

00:52:24,470 --> 00:52:23,119

uh couple of minutes

1267

00:52:25,670 --> 00:52:24,480

um

1268

00:52:27,829 --> 00:52:25,680

the uh

1269

00:52:29,670 --> 00:52:27,839

the issues surrounding

1270

00:52:32,549 --> 00:52:29,680

measurement at least of the kinds of

1271

00:52:34,630 --> 00:52:32,559

systems that i've been involved with

1272

00:52:36,470 --> 00:52:34,640

and and why we need to

1273

00:52:37,589 --> 00:52:36,480

why we need to measure look taking a

1274

00:52:38,549 --> 00:52:37,599

step back

1275

00:52:40,549 --> 00:52:38,559

um

1276

00:52:43,270 --> 00:52:40,559

we need to uh

1277

00:52:45,750 --> 00:52:43,280

highlight as i say which factor which

1278

00:52:49,109 --> 00:52:45,760

measurement issues uh factor into the

1279

00:52:50,870 --> 00:52:49,119

evaluation of uncertainty it really is

1280

00:52:53,430 --> 00:52:50,880

an approach to

1281

00:52:54,790 --> 00:52:53,440

minimizing uncertainty that we're all

1282

00:52:59,430 --> 00:52:54,800

trying to get to

1283

00:53:00,710 --> 00:52:59,440

uh in in doing experiments of this kind

1284

00:53:03,430 --> 00:53:00,720

and most of the

1285

00:53:04,230 --> 00:53:03,440

properties are quantitative in nature

1286

00:53:05,910 --> 00:53:04,240

uh

1287

00:53:08,790 --> 00:53:05,920

and they

1288

00:53:11,270 --> 00:53:08,800

uh resolve themselves eventually into uh

1289

00:53:14,470 --> 00:53:11,280

a decision at least at my

1290

00:53:18,150 --> 00:53:14,480

uh end of things where i'm trying to

1291

00:53:20,470 --> 00:53:18,160

convince investors to

1292

00:53:22,710 --> 00:53:20,480

to help fund or be interested in

1293

00:53:24,069 --> 00:53:22,720

particular areas of

1294

00:53:26,069 --> 00:53:24,079

energy research

1295

00:53:30,150 --> 00:53:26,079

they have to make a decision and they

1296

00:53:31,670 --> 00:53:30,160

have to make a decision on the basis of

1297

00:53:33,349 --> 00:53:31,680

a comfort level in

1298

00:53:36,549 --> 00:53:33,359

in

1299

00:53:39,430 --> 00:53:36,559

and what i

1300

00:53:40,309 --> 00:53:39,440

need to do is to reduce the uncertainty

1301

00:53:50,630 --> 00:53:40,319

in

1302

00:53:52,870 --> 00:53:50,640

um

1303

00:53:54,150 --> 00:53:52,880

and also unless the methodology and

1304

00:53:55,910 --> 00:53:54,160

results of a measurement can be

1305

00:53:58,390 --> 00:53:55,920

transferred comprehensively enough in

1306

00:54:00,470 --> 00:53:58,400

other words can i describe to you the

1307

00:54:03,589 --> 00:54:00,480

results of a measurement

1308

00:54:06,870 --> 00:54:03,599

in terms that are comprehensible to you

1309

00:54:08,950 --> 00:54:06,880

it won't make much of a difference

1310

00:54:10,870 --> 00:54:08,960

and the lessons i've learned

1311

00:54:12,069 --> 00:54:10,880

some of them consider all relevant

1312

00:54:15,190 --> 00:54:12,079

explanations

1313

00:54:17,990 --> 00:54:15,200

uh to a particular problem and uh we've

1314

00:54:20,230 --> 00:54:18,000

heard lots of those in the conference so

1315

00:54:22,069 --> 00:54:20,240

far uh did you think of this and what

1316

00:54:24,150 --> 00:54:22,079

about that and

1317

00:54:25,589 --> 00:54:24,160

please give some thought to

1318

00:54:27,349 --> 00:54:25,599

this possibility

1319

00:54:29,190 --> 00:54:27,359

and is it possible to design the

1320

00:54:31,670 --> 00:54:29,200

simplest measurements

1321

00:54:33,510 --> 00:54:31,680

and the simplest system that will

1322

00:54:36,230 --> 00:54:33,520

validate or not the claims that are

1323

00:54:39,109 --> 00:54:36,240

being made uh don't keep adding more

1324

00:54:40,549 --> 00:54:39,119

components and more complications

1325

00:54:41,910 --> 00:54:40,559

because oh we better check on this

1326  
00:54:43,750 --> 00:54:41,920  
better check on that let's design the

1327  
00:54:44,950 --> 00:54:43,760  
simplest system look at the boundary

1328  
00:54:45,670 --> 00:54:44,960  
conditions

1329  
00:54:46,470 --> 00:54:45,680  
and

1330  
00:54:48,309 --> 00:54:46,480  
uh

1331  
00:54:50,150 --> 00:54:48,319  
and and

1332  
00:54:51,750 --> 00:54:50,160  
make our decisions measurement decisions

1333  
00:54:53,990 --> 00:54:51,760  
based on that

1334  
00:54:55,349 --> 00:54:54,000  
also ensure sufficient information is

1335  
00:54:57,589 --> 00:54:55,359  
available

1336  
00:55:01,349 --> 00:54:57,599  
make sure you look at the history of the

1337  
00:55:04,390 --> 00:55:02,549  
so that you

1338  
00:55:05,670 --> 00:55:04,400

can learn from what other mistakes

1339

00:55:09,190 --> 00:55:05,680

others have made

1340

00:55:10,870 --> 00:55:09,200

and always beware of confirmation bias

1341

00:55:13,589 --> 00:55:10,880

be concerned

1342

00:55:14,630 --> 00:55:13,599

when you think gee uh i got a

1343

00:55:16,630 --> 00:55:14,640

measurement

1344

00:55:19,349 --> 00:55:16,640

because i have a theory and the theory

1345

00:55:22,069 --> 00:55:19,359

predicts that this is going to happen

1346

00:55:23,190 --> 00:55:22,079

i set up an ex an experiment and i see

1347

00:55:26,710 --> 00:55:23,200

this happen

1348

00:55:27,670 --> 00:55:26,720

therefore my theory is correct

1349

00:55:28,950 --> 00:55:27,680

um

1350

00:55:31,990 --> 00:55:28,960

that that

1351  
00:55:33,670 --> 00:55:32,000  
you've got to be really uh careful of uh

1352  
00:55:36,309 --> 00:55:33,680  
falling into

1353  
00:55:37,750 --> 00:55:36,319  
confirmation bias uh

1354  
00:55:38,549 --> 00:55:37,760  
logical problems

1355  
00:55:40,950 --> 00:55:38,559  
and

1356  
00:55:43,030 --> 00:55:40,960  
concentration obviously on a claims

1357  
00:55:44,549 --> 00:55:43,040  
backed up of a reasonable theory

1358  
00:55:46,710 --> 00:55:44,559  
um

1359  
00:55:48,870 --> 00:55:46,720  
and uh let me see how we're doing i

1360  
00:55:50,870 --> 00:55:48,880  
better stop very soon

1361  
00:55:53,670 --> 00:55:50,880  
i will uh

1362  
00:55:56,630 --> 00:55:53,680  
direct people's attention if they wish

1363  
00:55:59,829 --> 00:55:56,640

to the second half of my nightmares in

1364

00:56:03,030 --> 00:55:59,839

the art of measuring uh or as i say what

1365

00:56:03,990 --> 00:56:03,040

could possibly go wrong chief

1366

00:56:05,910 --> 00:56:04,000

and

1367

00:56:08,390 --> 00:56:05,920

yesterday i talked about

1368

00:56:10,920 --> 00:56:08,400

the issues or some of the issues that

1369

00:56:12,150 --> 00:56:10,930

befall experimentalists

1370

00:56:13,190 --> 00:56:12,160

[Music]

1371

00:56:15,990 --> 00:56:13,200

in in

1372

00:56:18,630 --> 00:56:16,000

looking at forces and i have this part

1373

00:56:22,630 --> 00:56:18,640

um of the presentation uh should i have

1374

00:56:24,870 --> 00:56:22,640

the time that examines uh issues in

1375

00:56:26,710 --> 00:56:24,880

uh electrical power and energy power and

1376

00:56:29,510 --> 00:56:26,720

energy power and energy electromagnetic

1377

00:56:32,470 --> 00:56:29,520

effects etc you can see all this as well

1378

00:56:33,670 --> 00:56:32,480

and uh as an example of the density of

1379

00:56:34,549 --> 00:56:33,680

some of these

1380

00:56:36,710 --> 00:56:34,559

um

1381

00:56:39,910 --> 00:56:36,720

these issues uh here are just some

1382

00:56:42,230 --> 00:56:39,920

issues that i have come across um

1383

00:56:43,510 --> 00:56:42,240

just encapsulating and it cancelled a

1384

00:56:44,950 --> 00:56:43,520

couple of uh

1385

00:56:47,750 --> 00:56:44,960

a couple of phrases

1386

00:56:49,190 --> 00:56:47,760

uh for uh looking at uh electrical

1387

00:56:51,510 --> 00:56:49,200

energy and power

1388

00:56:53,190 --> 00:56:51,520

measurements and the division of

1389

00:56:54,309 --> 00:56:53,200

frequency i do it by division of

1390

00:56:56,069 --> 00:56:54,319

frequency

1391

00:56:58,390 --> 00:56:56,079

um and

1392

00:57:00,870 --> 00:56:58,400

power in rotating systems

1393

00:57:01,990 --> 00:57:00,880

uh what you have to be careful of

1394

00:57:03,990 --> 00:57:02,000

um

1395

00:57:05,349 --> 00:57:04,000

faraday cage issues

1396

00:57:07,109 --> 00:57:05,359

uh which are

1397

00:57:09,589 --> 00:57:07,119

not very well understood by a lot of

1398

00:57:12,950 --> 00:57:09,599

people at least those who have built

1399

00:57:15,190 --> 00:57:12,960

cages and or enclosures and found oh my

1400

00:57:17,270 --> 00:57:15,200

god it doesn't work the way i expected

1401  
00:57:18,630 --> 00:57:17,280  
there's a leakage here how come i

1402  
00:57:20,309 --> 00:57:18,640  
thought i'd just have to throw a bunch

1403  
00:57:22,549 --> 00:57:20,319  
of copper together and everything would

1404  
00:57:23,430 --> 00:57:22,559  
be fine that's not the case

1405  
00:57:25,990 --> 00:57:23,440  
anyway

1406  
00:57:27,030 --> 00:57:26,000  
lots of other issues that we can talk

1407  
00:57:29,750 --> 00:57:27,040  
about

1408  
00:57:31,349 --> 00:57:29,760  
offline if you wish

1409  
00:57:33,670 --> 00:57:31,359  
or you can

1410  
00:57:36,309 --> 00:57:33,680  
email me i can send you this or it'll be

1411  
00:57:37,829 --> 00:57:36,319  
these kinds of things will be available

1412  
00:57:40,549 --> 00:57:37,839  
on

1413  
00:57:44,549 --> 00:57:40,559

in some kind of form or another

1414

00:57:47,030 --> 00:57:44,559

once uh sse gets a hold of it

1415

00:57:47,910 --> 00:57:47,040

so you can see there's quite a bit of

1416

00:57:52,829 --> 00:57:47,920

of

1417

00:57:55,670 --> 00:57:52,839

before

1418

00:57:58,069 --> 00:57:55,680

reasonable uh analyses can be done thank

1419

00:58:00,630 --> 00:57:58,079

you very much

1420

00:58:03,109 --> 00:58:00,640

this

1421

00:58:05,270 --> 00:58:03,119

you know you've you've painted a

1422

00:58:07,270 --> 00:58:05,280

a broad canvas here

1423

00:58:08,950 --> 00:58:07,280

and uh there's a lot

1424

00:58:11,190 --> 00:58:08,960

for us to talk about

1425

00:58:13,910 --> 00:58:11,200

um unfortunately there's no time for

1426

00:58:14,950 --> 00:58:13,920

questions because we've run up to a full

1427

00:58:17,270 --> 00:58:14,960

hour

1428

00:58:19,990 --> 00:58:17,280

and so there will be

1429

00:58:21,190 --> 00:58:20,000

some discussion that we can have in

1430

00:58:23,910 --> 00:58:21,200

about an hour

1431

00:58:26,150 --> 00:58:23,920

yeah that's fine thank you discussion so

1432

00:58:27,910 --> 00:58:26,160

let's take a one minute break and then

1433

00:58:30,950 --> 00:58:27,920

we'll start the next session

1434

00:58:33,430 --> 00:58:30,960

can i ask george about clayton off

1435

00:58:34,309 --> 00:58:33,440

uh let's hold off uh for for an hour

1436

00:58:35,510 --> 00:58:34,319

okay