



1
00:00:03,300 --> 00:00:07,570

[Music]

2
00:00:14,120 --> 00:00:11,660

and although I am a biologist and I'm in

3
00:00:16,180 --> 00:00:14,130

a biology session here I'm gonna mostly

4
00:00:19,130 --> 00:00:16,190

talk about the physics of the

5
00:00:23,120 --> 00:00:19,140

electromagnetic fields generated not

6
00:00:25,070 --> 00:00:23,130

from the body but from a caduceus coil

7
00:00:27,859 --> 00:00:25,080

which is another experimental way to

8
00:00:30,169 --> 00:00:27,869

generate what I call non classical

9
00:00:32,240 --> 00:00:30,179

electromagnetic fields because I believe

10
00:00:33,860 --> 00:00:32,250

that bioenergy which we've been talking

11
00:00:35,810 --> 00:00:33,870

about although there is an

12
00:00:38,510 --> 00:00:35,820

electromagnetic component the more

13
00:00:41,930 --> 00:00:38,520

exciting and interesting and anomalous

14

00:00:43,760 --> 00:00:41,940

effects are the non classical nature of

15

00:00:50,299 --> 00:00:43,770

the energy that's emitted by these

16

00:00:53,119 --> 00:00:50,309

fields do I need this or not okay so I

17

00:00:54,709 --> 00:00:53,129

want to start with the the in the title

18

00:00:57,200 --> 00:00:54,719

there's a lot of concepts in there so I

19

00:01:01,729 --> 00:00:57,210

want to start with the concept of what a

20

00:01:03,619 --> 00:01:01,739

longitudinal field is and in order to

21

00:01:06,140 --> 00:01:03,629

describe what a longitudinal

22

00:01:09,710 --> 00:01:06,150

electromagnetic field is which is a non

23

00:01:12,679 --> 00:01:09,720

classical form of the electromagnetic

24

00:01:18,770 --> 00:01:12,689

field I have to start with the classical

25

00:01:21,850 --> 00:01:18,780

electromagnetic fields that don't move

26

00:01:30,319 --> 00:01:21,860

or they do move but they propagate

27

00:01:32,030 --> 00:01:30,329

differently then this button does all I

28

00:01:34,100 --> 00:01:32,040

have to oh I'm sorry

29

00:01:37,719 --> 00:01:34,110

got you okay so here's the classic

30

00:01:40,039 --> 00:01:37,729

electromagnetic field which for those

31

00:01:42,109 --> 00:01:40,049

60% of the audience who are not

32

00:01:45,319 --> 00:01:42,119

physicists which I just learned in this

33

00:01:47,060 --> 00:01:45,329

conference looks like this it may not

34

00:01:48,859 --> 00:01:47,070

look like an ordinary electromagnetic

35

00:01:52,550 --> 00:01:48,869

field but you can see the electric and

36

00:01:55,389 --> 00:01:52,560

magnetic components which oscillate in a

37

00:01:58,819 --> 00:01:55,399

transverse or perpendicular direction to

38

00:02:00,920 --> 00:01:58,829

the direction of propagation of the

39

00:02:05,539 --> 00:02:00,930

field itself and that's why they're

40

00:02:08,930 --> 00:02:05,549

called transverse Hertzian force fields

41

00:02:11,780 --> 00:02:08,940

this is the classical definition of an

42

00:02:16,369 --> 00:02:11,790

electromagnetic field

43

00:02:17,809 --> 00:02:16,379

and what I want to talk about is is a

44

00:02:20,319 --> 00:02:17,819

different kind of field that doesn't

45

00:02:24,470 --> 00:02:20,329

have a transverse oscillation but a

46

00:02:27,259 --> 00:02:24,480

longitudinal oscillation so here's the

47

00:02:29,119 --> 00:02:27,269

physics part I will get to the biology

48

00:02:31,819 --> 00:02:29,129

promise we're in a biology session right

49

00:02:37,309 --> 00:02:31,829

so there is some biology in here so

50

00:02:39,199 --> 00:02:37,319

Maxwell's equations are complex and I'm

51
00:02:43,750 --> 00:02:39,209
not really qualified to talk much about

52
00:02:46,429 --> 00:02:43,760
them but I will anyway so they are

53
00:02:50,929 --> 00:02:46,439
described mathematically by these

54
00:02:53,929 --> 00:02:50,939
mathematical entities called E B and H

55
00:03:01,750 --> 00:02:53,939
which are mathematical entity vector

56
00:03:08,330 --> 00:03:04,550
mathematical constructs which are called

57
00:03:11,089 --> 00:03:08,340
potentials which underlie the vectors

58
00:03:13,429 --> 00:03:11,099
and in fact an electromagnetic force

59
00:03:16,369 --> 00:03:13,439
field can be described in terms of its

60
00:03:19,399 --> 00:03:16,379
potential components as well as its

61
00:03:22,399 --> 00:03:19,409
vector components and the a stands for

62
00:03:26,030 --> 00:03:22,409
the magnetic vector potential and fee is

63
00:03:28,189 --> 00:03:26,040

the scalar electrostatic potential ϕ

64

00:03:29,990 --> 00:03:28,199

will mention that later because that's

65

00:03:33,619 --> 00:03:30,000

an important concept but anyway

66

00:03:36,649 --> 00:03:33,629

traditionally the solving of Maxwell's

67

00:03:39,439 --> 00:03:36,659

equations are done within a certain set

68

00:03:41,750 --> 00:03:39,449

of confines it's as only a certain kind

69

00:03:43,550 --> 00:03:41,760

of algebra that's used there's only

70

00:03:47,800 --> 00:03:43,560

certain kind of operators or

71

00:03:50,360 --> 00:03:47,810

mathematical constructs that are allowed

72

00:03:52,550 --> 00:03:50,370

there are certain boundary conditions

73

00:03:54,170 --> 00:03:52,560

that are used and there are certain

74

00:03:58,039 --> 00:03:54,180

coordinates within those boundary

75

00:04:03,069 --> 00:03:58,049

conditions so in a sense the Maxwell's

76

00:04:06,289 --> 00:04:03,079

equations are limited by these

77

00:04:09,499 --> 00:04:06,299

conditions and when you solve the

78

00:04:11,360 --> 00:04:09,509

standard Maxwell Maxwell equation says

79

00:04:15,890 --> 00:04:11,370

lots of different forms when you solve

80

00:04:18,620 --> 00:04:15,900

the the classical form of the electro

81

00:04:21,560 --> 00:04:18,630

met the Maxwell's equations you look for

82

00:04:23,180 --> 00:04:21,570

wave-like solutions in fact there are so

83

00:04:25,519 --> 00:04:23,190

many different solutions you can get

84

00:04:27,250 --> 00:04:25,529

when you solve these equations but what

85

00:04:30,560 --> 00:04:27,260

we're interested in is wave-like

86

00:04:32,690 --> 00:04:30,570

solutions which describe the behavior of

87

00:04:36,379 --> 00:04:32,700

the classical electromagnetic fields now

88

00:04:41,240 --> 00:04:36,389

the behavior is the properties of the

89

00:04:43,760 --> 00:04:41,250

fields or the the propagation of the

90

00:04:46,940 --> 00:04:43,770

field and physicist and be obsessed with

91

00:04:50,810 --> 00:04:46,950

how these fields propagate and the speed

92

00:04:53,180 --> 00:04:50,820

that they propagate for example the

93

00:04:57,469 --> 00:04:53,190

behavior also has to do with the way

94

00:05:01,870 --> 00:04:57,479

that the fields interact with particles

95

00:05:04,219 --> 00:05:01,880

and the way that the these mathematical

96

00:05:06,560 --> 00:05:04,229

components interact with each other how

97

00:05:09,110 --> 00:05:06,570

the electric and magnetic components

98

00:05:11,779 --> 00:05:09,120

interact with each other and how the

99

00:05:15,290 --> 00:05:11,789

fields are transformed mathematicians

100

00:05:18,680 --> 00:05:15,300

love to take these equations and then

101

00:05:20,810 --> 00:05:18,690

transform them like put the put the

102

00:05:24,110 --> 00:05:20,820

equations in another set of coordinates

103

00:05:28,700 --> 00:05:24,120

and then what happens to the field so

104

00:05:31,219 --> 00:05:28,710

conceptually that's the kind of things

105

00:05:36,740 --> 00:05:31,229

that mathematicians do in classical

106

00:05:38,750 --> 00:05:36,750

field theory and what I'm now going to

107

00:05:41,510 --> 00:05:38,760

suggest is that there are some

108

00:05:42,890 --> 00:05:41,520

limitations to these classical oh I

109

00:05:46,310 --> 00:05:42,900

don't have to look very can look there

110

00:05:49,670 --> 00:05:46,320

hey that's cool right and I can sort of

111

00:05:52,040 --> 00:05:49,680

look at you at the same time so there as

112

00:05:54,079 --> 00:05:52,050

I said in the beginning that there you

113

00:05:55,610 --> 00:05:54,089

know Maxwell in order to even develop

114

00:05:59,329 --> 00:05:55,620

these equations Maxwell had to set

115

00:06:01,760 --> 00:05:59,339

certain limitations and these are some

116

00:06:03,409 --> 00:06:01,770

of the quotes limitations that force

117

00:06:06,079 --> 00:06:03,419

fields are considered to be uniform

118

00:06:09,219 --> 00:06:06,089

throughout space when in fact there are

119

00:06:13,070 --> 00:06:09,229

also non-uniform electromagnetic fields

120

00:06:16,579 --> 00:06:13,080

space is considered to be a Euclidean

121

00:06:19,279 --> 00:06:16,589

space which is usually modeled as a

122

00:06:21,760 --> 00:06:19,289

sphere or a cylinder when in fact there

123

00:06:25,339 --> 00:06:21,770

are all kinds of other spaces that

124

00:06:27,320 --> 00:06:25,349

physicists that now physicists consider

125

00:06:28,730 --> 00:06:27,330

but Maxwell did not consider make

126

00:06:32,120 --> 00:06:28,740

obviously it makes the mathematics a

127

00:06:34,940 --> 00:06:32,130

little more complicated the oscillations

128

00:06:37,550 --> 00:06:34,950

are assumed to be transverse and I've

129

00:06:39,830 --> 00:06:37,560

actually read in some

130

00:06:41,960 --> 00:06:39,840

articles that the longitudinal

131

00:06:45,080 --> 00:06:41,970

oscillations are not allowed in

132

00:06:47,720 --> 00:06:45,090

Maxwell's equations the velocity is

133

00:06:49,870 --> 00:06:47,730

considered to be less than or equal to

134

00:06:54,380 --> 00:06:49,880

the speed of light and in fact there are

135

00:06:57,040 --> 00:06:54,390

fields which propagate at superluminal

136

00:06:59,510 --> 00:06:57,050

speeds faster than the speed of light

137

00:07:02,390 --> 00:06:59,520

the Lorenz gauge is something I will

138

00:07:04,480 --> 00:07:02,400

talk about in a moment that's kind of

139

00:07:07,730 --> 00:07:04,490

for the role of non physicists it's it

140

00:07:11,930 --> 00:07:07,740

it's limited it's an arbitrary choice of

141

00:07:14,270 --> 00:07:11,940

one kind of gauge the Lorenz gauge when

142

00:07:16,280 --> 00:07:14,280

in fact there are many others and then

143

00:07:20,560 --> 00:07:16,290

they make all these mathematical

144

00:07:23,360 --> 00:07:20,570

assumptions like they set all these

145

00:07:26,600 --> 00:07:23,370

variables to zero like the magnetic

146

00:07:30,680 --> 00:07:26,610

charge density is set to zero the

147

00:07:32,510 --> 00:07:30,690

divergence of the electric components is

148

00:07:34,670 --> 00:07:32,520

set to zero that means

149

00:07:38,570 --> 00:07:34,680

kind of the divergence means like the

150

00:07:41,260 --> 00:07:38,580

expansion of the field is set to zero

151

00:07:43,100 --> 00:07:41,270

and these are kind of arbitrary

152

00:07:44,870 --> 00:07:43,110

definition you know why would you set

153

00:07:48,080 --> 00:07:44,880

that to zero and when the field can

154

00:07:50,270 --> 00:07:48,090

expand but it simplifies the mathematics

155

00:07:52,340 --> 00:07:50,280

so Maxwell had to do some kind of

156

00:07:55,100 --> 00:07:52,350

limitations and then there's the whole

157

00:08:00,110 --> 00:07:55,110

thing about the potential fields and the

158

00:08:02,570 --> 00:08:00,120

potential the a and the fie mathematical

159

00:08:05,000 --> 00:08:02,580

descriptions that describe the fields

160

00:08:07,520 --> 00:08:05,010

the potentials are not considered to be

161

00:08:12,020 --> 00:08:07,530

real they're a mathematical construct

162

00:08:15,140 --> 00:08:12,030

and then much much later Aaron often

163

00:08:17,870 --> 00:08:15,150

Bohm and several other people have

164

00:08:18,710 --> 00:08:17,880

actually demonstrated that potentials in

165

00:08:20,690 --> 00:08:18,720

fact are real

166

00:08:24,530 --> 00:08:20,700

and there are fields associated with

167

00:08:25,940 --> 00:08:24,540

them according to Maxwell Dickens

168

00:08:28,310 --> 00:08:25,950

potentials are considered to be

169

00:08:30,410 --> 00:08:28,320

instantaneous and they're described in

170

00:08:32,300 --> 00:08:30,420

terms of an arbitrary gauge function

171

00:08:34,880 --> 00:08:32,310

okay so these are what I would call the

172

00:08:40,820 --> 00:08:34,890

limitations of Maxwell's equations and

173

00:08:42,800 --> 00:08:40,830

then as a result of that oh okay okay

174

00:08:45,070 --> 00:08:42,810

the limitation so let's look in the

175

00:08:49,100 --> 00:08:45,080

mathematics a little bit more detail

176
00:08:49,810 --> 00:08:49,110
because the gauge I was talking about

177
00:08:53,560 --> 00:08:49,820
the gay

178
00:08:57,790 --> 00:08:53,570
theory before so gage theory is is a is

179
00:09:00,940 --> 00:08:57,800
a is a theory based on a certain kind of

180
00:09:04,060 --> 00:09:00,950
group theory mathematics that I've

181
00:09:07,560 --> 00:09:04,070
talked about which is abelian in nature

182
00:09:10,210 --> 00:09:07,570
it's a kind of vector algebra it

183
00:09:12,550 --> 00:09:10,220
associated with each mathematical group

184
00:09:16,570 --> 00:09:12,560
is a field which is called a gauge field

185
00:09:20,320 --> 00:09:16,580
and the gauge kind of refers to the

186
00:09:22,260 --> 00:09:20,330
degrees of freedom that are given when a

187
00:09:25,960 --> 00:09:22,270
field is transformed into another

188
00:09:28,750 --> 00:09:25,970

dimension and it's considered a bad

189

00:09:31,150 --> 00:09:28,760

thing if the field shouldn't change its

190

00:09:34,210 --> 00:09:31,160

properties when it's transformed in

191

00:09:36,310 --> 00:09:34,220

looked at in another set of coordinates

192

00:09:38,470 --> 00:09:36,320

so they always try to limit the number

193

00:09:41,350 --> 00:09:38,480

of degrees of freedom by a process

194

00:09:44,110 --> 00:09:41,360

called gauge fixing and gauge fixing

195

00:09:49,450 --> 00:09:44,120

therefore imposes certain limitations on

196

00:09:52,120 --> 00:09:49,460

the fields and that's again another kind

197

00:09:53,740 --> 00:09:52,130

of way in which the fields are limited

198

00:10:00,250 --> 00:09:53,750

in their properties and in their

199

00:10:02,380 --> 00:10:00,260

behavior gauge theory is again based on

200

00:10:05,230 --> 00:10:02,390

group theory and the groups are

201
00:10:08,290 --> 00:10:05,240
characterized primarily in terms of

202
00:10:09,760 --> 00:10:08,300
their topology and their symmetry and

203
00:10:11,920 --> 00:10:09,770
this is kind of all going to be

204
00:10:14,560 --> 00:10:11,930
important in a minute so hang with me on

205
00:10:18,940 --> 00:10:14,570
the physics part for a moment so the

206
00:10:22,690 --> 00:10:18,950
topology which which refers to like the

207
00:10:26,040 --> 00:10:22,700
shape of the space like I was talking

208
00:10:28,450 --> 00:10:26,050
about before is usually a sphere or

209
00:10:33,940 --> 00:10:28,460
technically it's called a manifold or a

210
00:10:36,910 --> 00:10:33,950
matrix which defines the field so you

211
00:10:39,250 --> 00:10:36,920
know typically they they consider the

212
00:10:42,970 --> 00:10:39,260
field is fundamental but the but the

213
00:10:44,830 --> 00:10:42,980

topology is secondary but in fact some

214

00:10:46,780 --> 00:10:44,840

modern physicists think it's the other

215

00:10:49,590 --> 00:10:46,790

way around that the topology or the

216

00:10:51,820 --> 00:10:49,600

shape of the field determines the

217

00:10:52,300 --> 00:10:51,830

characteristics and properties of the

218

00:10:54,850 --> 00:10:52,310

field

219

00:10:57,490 --> 00:10:54,860

but the top pilot in any case the

220

00:11:01,180 --> 00:10:57,500

topology imposes a boundary which is a

221

00:11:02,720 --> 00:11:01,190

kind of limitation on the field but it

222

00:11:05,500 --> 00:11:02,730

is a way of characterizing

223

00:11:09,280 --> 00:11:05,510

field particularly engage theory and

224

00:11:12,920 --> 00:11:09,290

even more important is the symmetry and

225

00:11:15,319 --> 00:11:12,930

typically the kind of local symmetry

226

00:11:17,300 --> 00:11:15,329

that was used by Maxwell and in

227

00:11:20,769 --> 00:11:17,310

Maxwell's equations is call is called

228

00:11:26,050 --> 00:11:20,779

the U one group symmetry which is a

229

00:11:28,250 --> 00:11:26,060

mathematical definition of unitary local

230

00:11:31,009 --> 00:11:28,260

symmetry okay

231

00:11:33,379 --> 00:11:31,019

now that comes important in a moment so

232

00:11:37,610 --> 00:11:33,389

it turns out as I said earlier that the

233

00:11:41,660 --> 00:11:37,620

Loretto the gauge that Maxwell chose was

234

00:11:44,420 --> 00:11:41,670

called the Lorenz or Coulomb gauge and

235

00:11:49,480 --> 00:11:44,430

there are alternatives to this kind of

236

00:11:52,759 --> 00:11:49,490

gauge that are that in use non abelian

237

00:11:56,540 --> 00:11:52,769

algebra that have a different kind of

238

00:11:59,990 --> 00:11:56,550

symmetry and in fact with these other

239

00:12:03,139 --> 00:12:00,000

gauges you can have engaged I mean sorry

240

00:12:06,009 --> 00:12:03,149

symmetry breaking which is which is not

241

00:12:08,689 --> 00:12:06,019

allowed in the classic theory

242

00:12:11,600 --> 00:12:08,699

longitudinal oscillations are allowed so

243

00:12:13,759 --> 00:12:11,610

it kind of opens up the limitations that

244

00:12:15,949 --> 00:12:13,769

Maxwell has imposed on the definition of

245

00:12:19,449 --> 00:12:15,959

electromagnetic field and these are the

246

00:12:23,420 --> 00:12:19,459

kind of names of the different kinds of

247

00:12:26,240 --> 00:12:23,430

gauges that are alternative to Lorentz

248

00:12:28,970 --> 00:12:26,250

gauge there's also alternative

249

00:12:30,980 --> 00:12:28,980

symmetries involved math and

250

00:12:32,930 --> 00:12:30,990

mathematicians you know love doing this

251

00:12:35,360 --> 00:12:32,940

kind of stuff in it well we don't have

252

00:12:39,189 --> 00:12:35,370

to stick to the U 1 gauge we have all

253

00:12:42,250 --> 00:12:39,199

kinds of gauges and all kinds of

254

00:12:45,199 --> 00:12:42,260

manifolds that can be used to actually

255

00:12:48,009 --> 00:12:45,209

define the nature and the properties of

256

00:12:54,650 --> 00:12:48,019

the field I'm saying all this because

257

00:12:57,889 --> 00:12:54,660

the these topologies or symmetries are

258

00:13:02,150 --> 00:12:57,899

defined here they are wrong but well

259

00:13:07,519 --> 00:13:02,160

well let's go back to this the SU gauges

260

00:13:10,759 --> 00:13:07,529

and so gauges and SL gauges are defined

261

00:13:14,769 --> 00:13:10,769

as higher order symmetries that generate

262

00:13:16,790 --> 00:13:14,779

higher order fields than the classic u 1

263

00:13:20,150 --> 00:13:16,800

symmetry

264

00:13:22,220 --> 00:13:20,160

electromagnetic field they have been

265

00:13:24,680 --> 00:13:22,230

called supersymmetry and they're

266

00:13:26,630 --> 00:13:24,690

associated with you know chiral but

267

00:13:29,660 --> 00:13:26,640

anyway it's the mathematics gets pretty

268

00:13:33,280 --> 00:13:29,670

complicated but just to visually show

269

00:13:35,840 --> 00:13:33,290

you some of the alternatives to a sphere

270

00:13:37,940 --> 00:13:35,850

needless to say they get a lot more

271

00:13:40,759 --> 00:13:37,950

complicated and the mathematics gets a

272

00:13:43,250 --> 00:13:40,769

lot more complicated oh dear okay so

273

00:13:46,610 --> 00:13:43,260

when you solve these Maxwell's equations

274

00:13:50,720 --> 00:13:46,620

you get different kinds of solutions you

275

00:13:54,710 --> 00:13:50,730

get new that I don't really have time to

276

00:13:57,050 --> 00:13:54,720

go into but they allow and and they

277

00:13:59,120 --> 00:13:57,060

generate different kinds of waves these

278

00:14:01,940 --> 00:13:59,130

waves have been called all kinds of

279

00:14:05,990 --> 00:14:01,950

things and longitudinal waves and scalar

280

00:14:07,579 --> 00:14:06,000

waves waves where the electric vector

281

00:14:09,590 --> 00:14:07,589

and the magnetic vector are not

282

00:14:12,699 --> 00:14:09,600

perpendicular but they're parallel and

283

00:14:17,090 --> 00:14:12,709

vortex fields here's a picture of a

284

00:14:18,139 --> 00:14:17,100

Beltrami field anyway the point and and

285

00:14:21,560 --> 00:14:18,149

they have all kinds of different

286

00:14:23,510 --> 00:14:21,570

properties where these fields are not

287

00:14:25,850 --> 00:14:23,520

classical the properties are not

288

00:14:28,699 --> 00:14:25,860

classical so what we're talking about

289

00:14:31,160 --> 00:14:28,709

here is different different experimental

290

00:14:34,100 --> 00:14:31,170

methods of actually generating these

291

00:14:41,150 --> 00:14:34,110

fields you can generate these fields by

292

00:14:43,970 --> 00:14:41,160

different kinds of electronic coils and

293

00:14:46,130 --> 00:14:43,980

here's the toroid which is the classic

294

00:14:47,540 --> 00:14:46,140

example because the electric classical

295

00:14:52,579 --> 00:14:47,550

electromagnetic fields are trapped

296

00:14:54,800 --> 00:14:52,589

inside but potential fields are known to

297

00:14:57,170 --> 00:14:54,810

exist on the outside and theoretically

298

00:14:58,730 --> 00:14:57,180

this has been known for a long time but

299

00:15:02,060 --> 00:14:58,740

it turns out there are lots of different

300

00:15:05,840 --> 00:15:02,070

kinds of geometries and different kinds

301
00:15:07,550 --> 00:15:05,850
of coils that have been used even in the

302
00:15:11,510 --> 00:15:07,560
electronics industry for various

303
00:15:14,689 --> 00:15:11,520
applications but most of this has been

304
00:15:18,019 --> 00:15:14,699
rather theoretical and this particular

305
00:15:20,329 --> 00:15:18,029
paper was a is a theoretical paper

306
00:15:23,240 --> 00:15:20,339
describing the nature of the fields that

307
00:15:28,530 --> 00:15:23,250
are generated from a toroid for example

308
00:15:33,150 --> 00:15:28,540
and in this particular case the the

309
00:15:35,910 --> 00:15:33,160
the fields are are mapped in terms of

310
00:15:37,860 --> 00:15:35,920
the eighth to a fields which interact

311
00:15:40,050 --> 00:15:37,870
with each other which makes us a little

312
00:15:42,450 --> 00:15:40,060
more complicated and here's the the

313
00:15:45,960 --> 00:15:42,460

shapes of the fields and this particular

314

00:15:49,440 --> 00:15:45,970

paper describes the nature of these

315

00:15:53,310 --> 00:15:49,450

fields as not being you one symmetry but

316

00:15:55,680 --> 00:15:53,320

being you to gauge symmetry and the

317

00:15:57,570 --> 00:15:55,690

properties of these fields are that they

318

00:16:00,420 --> 00:15:57,580

are complex they're called self-dual

319

00:16:02,430 --> 00:16:00,430

they have some unusual properties they

320

00:16:04,740 --> 00:16:02,440

don't involve photons they involve

321

00:16:08,220 --> 00:16:04,750

instant tongs and you know this is the

322

00:16:11,660 --> 00:16:08,230

physic the theoretical physics recently

323

00:16:14,220 --> 00:16:11,670

as in last year some experimental

324

00:16:16,530 --> 00:16:14,230

studies were finally done and published

325

00:16:19,290 --> 00:16:16,540

in the physics journal using these kind

326

00:16:22,890 --> 00:16:19,300

of fields where they actually measured

327

00:16:26,280 --> 00:16:22,900

the magnetic component of the fields on

328

00:16:29,600 --> 00:16:26,290

the outside you cannot measure μ^2

329

00:16:32,790 --> 00:16:29,610

symmetry fields using ordinary

330

00:16:35,640 --> 00:16:32,800

electromagnetic detectors so all they

331

00:16:38,850 --> 00:16:35,650

could do is measure the U_1 field that

332

00:16:42,120 --> 00:16:38,860

is the ordinary field that is emitted by

333

00:16:45,000 --> 00:16:42,130

these kind of coils and they conclude

334

00:16:50,030 --> 00:16:45,010

that the magnetic field patterns first

335

00:16:52,800 --> 00:16:50,040

of all they don't fall off like ordinary

336

00:16:54,900 --> 00:16:52,810

electromagnetic fields as in

337

00:16:57,830 --> 00:16:54,910

proportional to one over R^2

338

00:17:02,130 --> 00:16:57,840

their pattern of distribution is

339

00:17:07,260 --> 00:17:02,140

inconsistent with u 1 fields and they

340

00:17:12,140 --> 00:17:07,270

they have unusual behavior even in this

341

00:17:14,730 --> 00:17:12,150

case where you're only measuring the u 1

342

00:17:16,319 --> 00:17:14,740

classical component so there's something

343

00:17:20,520 --> 00:17:16,329

strange going on when you generate

344

00:17:23,730 --> 00:17:20,530

fields I don't have time for this what

345

00:17:25,800 --> 00:17:23,740

we're using a toroid or a caduceus coil

346

00:17:28,950 --> 00:17:25,810

kind of configuration so the experiment

347

00:17:30,990 --> 00:17:28,960

that i did was using yet and yet another

348

00:17:35,340 --> 00:17:31,000

kind of configuration where the current

349

00:17:37,500 --> 00:17:35,350

in this kind of a coil a flat coil it

350

00:17:40,350 --> 00:17:37,510

comes in at one end as you can see in

351

00:17:42,010 --> 00:17:40,360

the far right corner it turns around and

352

00:17:44,530 --> 00:17:42,020

it goes back out and the other dress

353

00:17:48,610 --> 00:17:44,540

so that the current is opposing the

354

00:17:51,760 --> 00:17:48,620

current cancels the magnetic force field

355

00:17:55,840 --> 00:17:51,770

the vectors cancel and you generate some

356

00:17:58,090 --> 00:17:55,850

kind of a potential field like described

357

00:18:01,090 --> 00:17:58,100

in the two papers I just described so

358

00:18:05,440 --> 00:18:01,100

you have some kind of an su two field

359

00:18:09,880 --> 00:18:05,450

non classical field generated the

360

00:18:14,110 --> 00:18:09,890

experiment involved a complex square

361

00:18:17,380 --> 00:18:14,120

wave that was put into the coil in the

362

00:18:20,050 --> 00:18:17,390

form of a modulated square wave or

363

00:18:22,150 --> 00:18:20,060

writing on top of a sine wave and then

364

00:18:24,520 --> 00:18:22,160

we actually measured there there was a

365

00:18:27,630 --> 00:18:24,530

residual magnetic field component that

366

00:18:30,540 --> 00:18:27,640

you could measure a u1 component but

367

00:18:34,000 --> 00:18:30,550

what the actual experiment was is it a

368

00:18:38,080 --> 00:18:34,010

biological experiment where I used human

369

00:18:41,350 --> 00:18:38,090

lymphocytes which are immune cells T

370

00:18:44,020 --> 00:18:41,360

lymphocytes it's kind of a standard si

371

00:18:47,080 --> 00:18:44,030

they're grown in tissue culture and then

372

00:18:49,660 --> 00:18:47,090

you well so now I'm sorry they're

373

00:18:51,820 --> 00:18:49,670

isolated from human blood you isolate

374

00:18:53,980 --> 00:18:51,830

the T lymphocytes from the other blood

375

00:18:56,350 --> 00:18:53,990

cells and then you put them in a tissue

376

00:18:59,140 --> 00:18:56,360

culture dish you treat them with

377

00:19:01,840 --> 00:18:59,150

radioactive thymidine which which it

378

00:19:03,970 --> 00:19:01,850

gets incorporated into the DNA it's a

379

00:19:07,960 --> 00:19:03,980

standard method for measuring cell

380

00:19:10,480 --> 00:19:07,970

growth you actually measure the

381

00:19:12,960 --> 00:19:10,490

radioactivity incorporated into the

382

00:19:17,020 --> 00:19:12,970

nucleus and then you calculate the

383

00:19:21,100 --> 00:19:17,030

radioactive counts by the total amount

384

00:19:24,550 --> 00:19:21,110

of protein and then what you get is this

385

00:19:27,250 --> 00:19:24,560

so in the control situation there is a

386

00:19:29,410 --> 00:19:27,260

very small amount of growth but in the

387

00:19:31,360 --> 00:19:29,420

presence of the non classical

388

00:19:34,360 --> 00:19:31,370

electromagnetic field generated from

389

00:19:37,300 --> 00:19:34,370

this kind of self canceling non

390

00:19:41,620 --> 00:19:37,310

inductive coil you get a relatively

391

00:19:45,070 --> 00:19:41,630

large stimulation in growth when you use

392

00:19:46,510 --> 00:19:45,080

a standard chemical mitogen call it I'll

393

00:19:49,450 --> 00:19:46,520

be finished in a second yeah I call

394

00:19:51,880 --> 00:19:49,460

interleukin 2 you get a similar kind of

395

00:19:54,790 --> 00:19:51,890

growth and then when you combine the two

396

00:19:56,890 --> 00:19:54,800

which is the there is no enhancement

397

00:20:00,340 --> 00:19:56,900

is the same effect that dr. Gupta got

398

00:20:05,320 --> 00:20:00,350

when combining energy and chemicals so

399

00:20:09,730 --> 00:20:05,330

in conclusion the the fields that are

400

00:20:12,310 --> 00:20:09,740

generated the non-classical gauge fields

401
00:20:15,430 --> 00:20:12,320
of su 2 symmetry generated by this kind

402
00:20:17,740 --> 00:20:15,440
of a coil does in fact stimulate human

403
00:20:20,860 --> 00:20:17,750
lymphocytes the magnitude of the effect

404
00:20:24,190 --> 00:20:20,870
is is very large it's in the order of 20

405
00:20:26,560 --> 00:20:24,200
fold in fact there are more than one

406
00:20:28,800 --> 00:20:26,570
signal and some signals work much better

407
00:20:31,480 --> 00:20:28,810
than other signal to was less effective

408
00:20:32,830 --> 00:20:31,490
there was there was no additive 'ti

409
00:20:34,360 --> 00:20:32,840
between the chemical and an

410
00:20:36,880 --> 00:20:34,370
electromagnetic field which suggests

411
00:20:42,700 --> 00:20:36,890
that they work via the same mechanism of

412
00:20:44,950 --> 00:20:42,710
action and the the large stimulation is

413
00:20:47,530 --> 00:20:44,960

anomalous because in the literature

414

00:20:50,320 --> 00:20:47,540

elect standard classical electromagnetic

415

00:20:53,020 --> 00:20:50,330

field do are known to stimulate

416

00:20:55,540 --> 00:20:53,030

lymphocytes but not on the order of 20

417

00:20:58,870 --> 00:20:55,550

fold that typically it's on the order of

418

00:21:03,310 --> 00:20:58,880

50 80 percent so that's where the

419

00:21:08,230 --> 00:21:03,320

anomaly is and that's my conclusions and

420

00:21:12,370 --> 00:21:08,240

thank you very much that there's my

421

00:21:24,180 --> 00:21:12,380

information did it okay that 20 minutes

422

00:21:28,750 --> 00:21:24,190

is yes my name is John Reid Glen your

423

00:21:30,370 --> 00:21:28,760

research is very fascinating because it

424

00:21:32,680 --> 00:21:30,380

appears that this has great

425

00:21:34,480 --> 00:21:32,690

applicability for enhancing the immune

426

00:21:37,510 --> 00:21:34,490
system and and that's one of the

427

00:21:39,100 --> 00:21:37,520
directions I think that medicine is

428

00:21:43,420 --> 00:21:39,110
going the 21st century like we were

429

00:21:46,360 --> 00:21:43,430
discussing last night and have you did

430

00:21:49,390 --> 00:21:46,370
you'd were the were they specific

431

00:21:51,340 --> 00:21:49,400
t-cells with 84 or t8 or what what

432

00:21:53,620 --> 00:21:51,350
t-cells were they because this has

433

00:21:56,950 --> 00:21:53,630
potentially great applicability to

434

00:21:59,380 --> 00:21:56,960
perhaps treatment of aid since right you

435

00:22:01,510 --> 00:21:59,390
know it's the decline in the T

436

00:22:02,010 --> 00:22:01,520
lymphocytes that exactly results in the

437

00:22:04,350 --> 00:22:02,020
right

438

00:22:07,080 --> 00:22:04,360

problem and and the panel we were

439

00:22:09,060 --> 00:22:07,090

talking about helper cells and

440

00:22:12,110 --> 00:22:09,070

suppressor cells which are the two types

441

00:22:15,810 --> 00:22:12,120

of T lymphocytes in this particular

442

00:22:17,490 --> 00:22:15,820

preparation I did not separate the

443

00:22:21,150 --> 00:22:17,500

helper and the suppressor cells so this

444

00:22:23,810 --> 00:22:21,160

was a combined preparation that contain

445

00:22:26,490 --> 00:22:23,820

both helper cells and suppressor cells

446

00:22:29,340 --> 00:22:26,500

but both of those are called T

447

00:22:31,320 --> 00:22:29,350

lymphocytes so I did not separate the

448

00:22:35,580 --> 00:22:31,330

two different types of lymphocytes that

449

00:22:38,910 --> 00:22:35,590

would be great for future research hi my

450

00:22:45,170 --> 00:22:38,920

name is Shawn Lakshman and I have a

451
00:22:48,510 --> 00:22:45,180
question on the the Maxwell's equation

452
00:22:51,660 --> 00:22:48,520
so you were talking about the scalar

453
00:22:57,110 --> 00:22:51,670
potential basically for the magnetic

454
00:23:00,650 --> 00:22:57,120
field there is no charge and therefore

455
00:23:02,910 --> 00:23:00,660
Maxwell included the scalar potential

456
00:23:06,120 --> 00:23:02,920
equivalent to that of a charge so you

457
00:23:08,430 --> 00:23:06,130
put an artificial kind of a potential

458
00:23:14,070 --> 00:23:08,440
that appear so how do you correlate that

459
00:23:17,850 --> 00:23:14,080
with these you know your su-22 fit into

460
00:23:20,130 --> 00:23:17,860
that equation so you're telling it is if

461
00:23:23,510 --> 00:23:20,140
it is a non classical you should

462
00:23:28,620 --> 00:23:23,520
generate by itself you need not have to

463
00:23:30,540 --> 00:23:28,630

introduce a electric unit to cancel

464

00:23:33,300 --> 00:23:30,550

itself and do any other thing so it

465

00:23:35,910 --> 00:23:33,310

should you know it without any

466

00:23:40,290 --> 00:23:35,920

electrical information interference you

467

00:23:43,620 --> 00:23:40,300

should have a output yeah well in the

468

00:23:47,940 --> 00:23:43,630

previous study by Barrett and the

469

00:23:51,870 --> 00:23:47,950

follow-up study by Froning they compared

470

00:23:53,610 --> 00:23:51,880

a the cancel mode and the non cancel

471

00:23:56,790 --> 00:23:53,620

mode where the currents running parallel

472

00:23:58,650 --> 00:23:56,800

versus anti parallel and I didn't have

473

00:24:01,320 --> 00:23:58,660

time to go into that in much detail and

474

00:24:04,200 --> 00:24:01,330

I'm sorry for URI didn't get a chance to

475

00:24:08,670 --> 00:24:04,210

add probably a very good question but

476

00:24:11,760 --> 00:24:08,680

we'll talk later URIs and you're right

477

00:24:14,430 --> 00:24:11,770

in in both the cancel and the non cancel

478

00:24:17,909 --> 00:24:14,440

modes you do generate the su

479

00:24:20,430 --> 00:24:17,919

to non-classical forms of the field but

480

00:24:23,789 --> 00:24:20,440

the point that they made there is that

481

00:24:27,029 --> 00:24:23,799

the the behavior of the fields that are

482

00:24:29,549 --> 00:24:27,039

generated outside of the toroid or or a

483

00:24:31,680 --> 00:24:29,559

caduceus coil or whatever is different

484

00:24:34,350 --> 00:24:31,690

in the cancel mode in the non cancel

485

00:24:36,539 --> 00:24:34,360

mode so the conclusion was that you

486

00:24:39,779 --> 00:24:36,549

generate su two fields in both

487

00:24:42,720 --> 00:24:39,789

situations not be necessarily because of

488

00:24:45,180 --> 00:24:42,730

the cancellation but because in the case

489

00:24:47,009 --> 00:24:45,190

of a toroid the fields are trapped the

490

00:24:50,580 --> 00:24:47,019

classical fields are trapped in the

491

00:24:52,619 --> 00:24:50,590

center the $u(1)$ symmetry fields are

492

00:24:56,999 --> 00:24:52,629

trapped in the center of the toroid but

493

00:24:59,220 --> 00:24:57,009

the $su(2)$ fields are lib are free to be

494

00:25:02,549 --> 00:24:59,230

generated on the outside of the toroid

495

00:25:03,690 --> 00:25:02,559

but I didn't use a trapping kind of

496

00:25:10,830 --> 00:25:03,700

geometry

497

00:25:14,129 --> 00:25:10,840

to generate the $su(2)$ fields so it's a

498

00:25:15,389 --> 00:25:14,139

little complex but conceptually that I