

T H A T

# UFO

P O D C A S T

AVI LOEB

CLIPS



1  
00:00:03,830 --> 00:00:01,990  
many people would claim that the craft

2  
00:00:06,150 --> 00:00:03,840  
or uaps are potentially using

3  
00:00:07,749 --> 00:00:06,160  
anti-gravity technology that's something

4  
00:00:09,350 --> 00:00:07,759  
that's quite common would it be

5  
00:00:11,350 --> 00:00:09,360  
pertinent for people like yourself in

6  
00:00:14,070 --> 00:00:11,360  
the galileo project to look for

7  
00:00:15,990 --> 00:00:14,080  
signatures like gravitational waves and

8  
00:00:18,950 --> 00:00:16,000  
could you potentially track these using

9  
00:00:21,429 --> 00:00:18,960  
ligo or other laser interferometers

10  
00:00:22,310 --> 00:00:21,439  
okay so let me first say what is known

11  
00:00:24,630 --> 00:00:22,320  
uh

12  
00:00:25,670 --> 00:00:24,640  
in terms of the current science that we

13  
00:00:27,349 --> 00:00:25,680

know about

14

00:00:28,870 --> 00:00:27,359

first of all

15

00:00:31,830 --> 00:00:28,880

according to einstein's theory of

16

00:00:33,830 --> 00:00:31,840

gravity you can get

17

00:00:35,830 --> 00:00:33,840

repulsive gravity

18

00:00:38,310 --> 00:00:35,840

and in fact

19

00:00:39,990 --> 00:00:38,320

you get it when the vacuum

20

00:00:43,030 --> 00:00:40,000

you know the vacuum is what what you

21

00:00:45,750 --> 00:00:43,040

have when you remove all the matter so

22

00:00:47,990 --> 00:00:45,760

when the vacuum itself has some mass

23

00:00:49,430 --> 00:00:48,000

density mass per unit volume or energy

24

00:00:51,750 --> 00:00:49,440

per unit volume

25

00:00:53,830 --> 00:00:51,760

it you can show that that in in the

26

00:00:54,709 --> 00:00:53,840

context of einstein's theory of gravity

27

00:00:58,150 --> 00:00:54,719

that

28

00:00:59,750 --> 00:00:58,160

gives you a repulsive force and actually

29

00:01:02,150 --> 00:00:59,760

we observe it

30

00:01:03,990 --> 00:01:02,160

so einstein thought well it's a mistake

31

00:01:05,670 --> 00:01:04,000

of my theory that

32

00:01:07,830 --> 00:01:05,680

you know it gives this

33

00:01:09,429 --> 00:01:07,840

so-called cosmological constant you know

34

00:01:10,630 --> 00:01:09,439

that has to do with the energy of the

35

00:01:12,710 --> 00:01:10,640

vacuum

36

00:01:14,789 --> 00:01:12,720

he thought oh i should get rid of it

37

00:01:16,630 --> 00:01:14,799

because otherwise you know

38

00:01:18,710 --> 00:01:16,640

you know he was thinking about it just

39

00:01:20,070 --> 00:01:18,720

to balance the expansion of the universe

40

00:01:22,230 --> 00:01:20,080

at the time he thought the universe

41

00:01:23,910 --> 00:01:22,240

doesn't expand so he thought having a

42

00:01:26,230 --> 00:01:23,920

repulsive force

43

00:01:29,429 --> 00:01:26,240

of gravity balancing the attractive

44

00:01:30,870 --> 00:01:29,439

force of matter would make the universe

45

00:01:32,550 --> 00:01:30,880

static

46

00:01:34,630 --> 00:01:32,560

not expanding if you have a perfect

47

00:01:36,230 --> 00:01:34,640

balance between the two forces

48

00:01:38,789 --> 00:01:36,240

but then he realized he was wrong

49

00:01:41,670 --> 00:01:38,799

because edwin hubble

50

00:01:43,990 --> 00:01:41,680

argued the universe is expanding and and

51  
00:01:45,510 --> 00:01:44,000  
einstein said oh that was a mistake i i

52  
00:01:47,670 --> 00:01:45,520  
shouldn't have thought about this

53  
00:01:49,510 --> 00:01:47,680  
repulsive gravity but it turns out that

54  
00:01:51,510 --> 00:01:49,520  
it exists and in fact even though the

55  
00:01:53,830 --> 00:01:51,520  
universe is expanding

56  
00:01:56,310 --> 00:01:53,840  
its expansion is accelerating

57  
00:01:59,190 --> 00:01:56,320  
recently and that means that there is

58  
00:02:01,670 --> 00:01:59,200  
something pushing galaxies apart

59  
00:02:02,310 --> 00:02:01,680  
uh a repulsive gravitational force which

60  
00:02:06,389 --> 00:02:02,320  
is

61  
00:02:09,669 --> 00:02:06,399  
cosmological constant the vacuum energy

62  
00:02:11,830 --> 00:02:09,679  
density and so it exists we know of that

63  
00:02:13,190 --> 00:02:11,840

uh what is the nature of the vacuum

64

00:02:15,030 --> 00:02:13,200

energy that is

65

00:02:17,110 --> 00:02:15,040

causing this expansion

66

00:02:18,949 --> 00:02:17,120

you know where does it come from from a

67

00:02:21,750 --> 00:02:18,959

fundamental physics point of view we

68

00:02:23,830 --> 00:02:21,760

don't really understand that okay but

69

00:02:26,790 --> 00:02:23,840

the existence of a repulsive gravity

70

00:02:28,790 --> 00:02:26,800

anti-gravity is known to to be real

71

00:02:30,150 --> 00:02:28,800

because that the nobel prize was awarded

72

00:02:32,150 --> 00:02:30,160

for that and

73

00:02:33,910 --> 00:02:32,160

for the discovery of the accelerated

74

00:02:35,670 --> 00:02:33,920

expansion of the universe

75

00:02:37,350 --> 00:02:35,680

uh so the universe is not only expanding

76

00:02:39,830 --> 00:02:37,360

it's expanding with a speed that is

77

00:02:42,229 --> 00:02:39,840

increasing over time as if something is

78

00:02:45,350 --> 00:02:42,239

pushing everything apart and that

79

00:02:48,150 --> 00:02:45,360

happens uh only in recent

80

00:02:50,070 --> 00:02:48,160

history uh if you go back in time at

81

00:02:52,229 --> 00:02:50,080

early on the density of metal was so

82

00:02:54,949 --> 00:02:52,239

large much larger than the density of

83

00:02:56,949 --> 00:02:54,959

the vacuum the matter the matter density

84

00:02:59,110 --> 00:02:56,959

dominated the the radiation density

85

00:03:01,110 --> 00:02:59,120

dominated and at that point gravity was

86

00:03:03,350 --> 00:03:01,120

attractive so it's only a recent

87

00:03:05,589 --> 00:03:03,360

phenomena over the past

88

00:03:08,149 --> 00:03:05,599

half of the age of the universe that

89

00:03:10,630 --> 00:03:08,159

matter and radiation were diluted enough

90

00:03:13,110 --> 00:03:10,640

for the vacuum to take over and dominate

91

00:03:15,910 --> 00:03:13,120

and and show this accelerated expansion

92

00:03:16,710 --> 00:03:15,920

before that it wasn't really important

93

00:03:18,470 --> 00:03:16,720

uh

94

00:03:19,509 --> 00:03:18,480

except maybe very early on in the

95

00:03:22,149 --> 00:03:19,519

universe

96

00:03:24,149 --> 00:03:22,159

okay so that's what we know now

97

00:03:27,910 --> 00:03:24,159

uh that doesn't mean that we can

98

00:03:30,869 --> 00:03:27,920

manipulate the vacuum and sort of uh

99

00:03:32,789 --> 00:03:30,879

engineer it to propel things

100

00:03:34,789 --> 00:03:32,799

uh based on what we know we don't know

101  
00:03:36,070 --> 00:03:34,799  
how to do that let's put it that way we

102  
00:03:39,589 --> 00:03:36,080  
don't know how to

103  
00:03:42,470 --> 00:03:39,599  
sort of excavate the vacuum and and and

104  
00:03:44,710 --> 00:03:42,480  
you know use it for propulsion uh but

105  
00:03:45,589 --> 00:03:44,720  
that doesn't mean that it cannot be done

106  
00:03:47,430 --> 00:03:45,599  
i mean

107  
00:03:49,430 --> 00:03:47,440  
perhaps

108  
00:03:51,910 --> 00:03:49,440  
a more advanced scientific civilization

109  
00:03:54,710 --> 00:03:51,920  
would be able to do that so i wouldn't

110  
00:03:57,589 --> 00:03:54,720  
rule it out it's just that we don't have

111  
00:03:59,589 --> 00:03:57,599  
any idea of how to do that how to

112  
00:04:02,070 --> 00:03:59,599  
you know propel something using the

113  
00:04:04,470 --> 00:04:02,080

vacuum we don't know how to do that

114

00:04:06,789 --> 00:04:04,480

um and then the other thing i would say

115

00:04:08,229 --> 00:04:06,799

is gravitational waves are really

116

00:04:09,509 --> 00:04:08,239

difficult to

117

00:04:16,150 --> 00:04:09,519

excite

118

00:04:18,710 --> 00:04:16,160

it's you know in order to produce a

119

00:04:21,189 --> 00:04:18,720

meaningful level of a gravitational wave

120

00:04:24,469 --> 00:04:21,199

so that we can detect it with a

121

00:04:26,790 --> 00:04:24,479

an observatory like ligo or or the

122

00:04:30,310 --> 00:04:26,800

future observatories that we will build

123

00:04:33,030 --> 00:04:30,320

um what you read is what you need is a

124

00:04:33,749 --> 00:04:33,040

a very high concentration of of mass

125

00:04:34,950 --> 00:04:33,759

like

126  
00:04:36,550 --> 00:04:34,960  
you get

127  
00:04:38,790 --> 00:04:36,560  
in a black hole

128  
00:04:41,670 --> 00:04:38,800  
but the point is if you have that

129  
00:04:43,110 --> 00:04:41,680  
concentration of mass just the newtonian

130  
00:04:45,110 --> 00:04:43,120  
effect forget about gravity

131  
00:04:47,350 --> 00:04:45,120  
gravitational waves just the fact that

132  
00:04:49,189 --> 00:04:47,360  
you have this mass that is

133  
00:04:51,670 --> 00:04:49,199  
you know a very large mass in order to

134  
00:04:52,710 --> 00:04:51,680  
generate strong waves that must by

135  
00:04:55,270 --> 00:04:52,720  
itself

136  
00:04:57,590 --> 00:04:55,280  
acts on anything on earth

137  
00:05:00,390 --> 00:04:57,600  
using you know based on newton's law of

138  
00:05:04,310 --> 00:05:00,400

gravity okay so just like the sun acts

139

00:05:05,670 --> 00:05:04,320

on us or jupiter acts on us so

140

00:05:07,350 --> 00:05:05,680

before you even worry about

141

00:05:09,430 --> 00:05:07,360

gravitational waves there would be this

142

00:05:11,189 --> 00:05:09,440

newtonian effect that would move things

143

00:05:14,950 --> 00:05:11,199

around and we would notice it because

144

00:05:16,710 --> 00:05:14,960

the oceans would show a tide and so

145

00:05:18,550 --> 00:05:16,720

don't think about gravitational waves as

146

00:05:21,029 --> 00:05:18,560

if that would be the only way we would

147

00:05:24,150 --> 00:05:21,039

learn about a massive compact object

148

00:05:26,310 --> 00:05:24,160

that you know because long before that

149

00:05:28,150 --> 00:05:26,320

uh there would be effects like on the

150

00:05:30,310 --> 00:05:28,160

oceans a tidal effect due to the

151  
00:05:32,870 --> 00:05:30,320  
newtonian gravity that would

152  
00:05:34,469 --> 00:05:32,880  
move the oceans around in a way that is

153  
00:05:35,830 --> 00:05:34,479  
noticeable so

154  
00:05:37,749 --> 00:05:35,840  
so i would

155  
00:05:39,350 --> 00:05:37,759  
suggest not to think about gravitational

156  
00:05:41,350 --> 00:05:39,360  
waves as a good

157  
00:05:43,749 --> 00:05:41,360  
way of detecting

158  
00:05:46,230 --> 00:05:43,759  
objects because there are much bigger

159  
00:05:48,070 --> 00:05:46,240  
effects that come into play before

160  
00:05:51,110 --> 00:05:48,080  
gravitation waves

161  
00:05:53,270 --> 00:05:51,120  
affect us or are measurable just based

162  
00:05:56,629 --> 00:05:53,280  
on gravity i'm saying

163  
00:05:58,070 --> 00:05:56,639

there are other effects based on gravity

164

00:06:01,749 --> 00:05:58,080

that are much stronger like the

165

00:06:02,870 --> 00:06:01,759

newtonian force uh of a passing object

166

00:06:04,550 --> 00:06:02,880

so

167

00:06:08,230 --> 00:06:04,560

it's very difficult to generate

168

00:06:10,469 --> 00:06:08,240

detectable gravitational waves without

169

00:06:11,990 --> 00:06:10,479

producing a strong newtonian force

170

00:06:14,550 --> 00:06:12,000

that's my point

171

00:06:15,990 --> 00:06:14,560

so i would argue

172

00:06:18,309 --> 00:06:16,000

let's not think about gravitational

173

00:06:20,390 --> 00:06:18,319

waves as a good way to detect things we

174

00:06:21,670 --> 00:06:20,400

can use newtonian

175

00:06:25,110 --> 00:06:21,680

gravity

176

00:06:26,469 --> 00:06:25,120

to detect them much more easily and on

177

00:06:29,110 --> 00:06:26,479

top of that there are other things that

178

00:06:31,270 --> 00:06:29,120

we can observe of course using um

179

00:06:33,029 --> 00:06:31,280

light you know radiation

180

00:06:35,270 --> 00:06:33,039

either reflected of the object or