



1
00:00:09,509 --> 00:00:06,150
a whiff of dark matter on the iss

2
00:00:11,430 --> 00:00:09,519
presented by science at nasa

3
00:00:13,509 --> 00:00:11,440
in science fiction movies finding

4
00:00:15,190 --> 00:00:13,519
antimatter on board your spaceship is

5
00:00:16,630 --> 00:00:15,200
not good news

6
00:00:18,550 --> 00:00:16,640
usually it means you're moments away

7
00:00:20,790 --> 00:00:18,560
from an explosion

8
00:00:23,509 --> 00:00:20,800
in real life though finding antimatter

9
00:00:25,750 --> 00:00:23,519
could lead to a nobel prize

10
00:00:28,230 --> 00:00:25,760
on april 3rd researchers led by nobel

11
00:00:30,310 --> 00:00:28,240
laureate samuel ting of mit announced

12
00:00:32,310 --> 00:00:30,320
that the alpha magnetic spectrometer a

13
00:00:35,110 --> 00:00:32,320

particle detector operating on board the

14

00:00:37,990 --> 00:00:35,120

international space station since 2011

15

00:00:40,869 --> 00:00:38,000

has counted more than 400 000 positrons

16

00:00:42,950 --> 00:00:40,879

the antimatter equivalent of electrons

17

00:00:44,950 --> 00:00:42,960

there's no danger of an explosion but

18

00:00:47,270 --> 00:00:44,960

the discovery is sending shock waves

19

00:00:49,350 --> 00:00:47,280

through the scientific community

20

00:00:51,350 --> 00:00:49,360

these data show the existence of a new

21

00:00:53,110 --> 00:00:51,360

physical phenomenon wrote ting and

22

00:00:55,110 --> 00:00:53,120

colleagues in an article published in

23

00:00:58,229 --> 00:00:55,120

the physical review letters

24

00:01:00,950 --> 00:00:58,239

it could be a sign of dark matter

25

00:01:03,270 --> 00:01:00,960

the alpha magnetic spectrometer ams for

26

00:01:05,030 --> 00:01:03,280

short was delivered to the iss by the

27

00:01:07,590 --> 00:01:05,040

space shuttle endeavour on its final

28

00:01:10,070 --> 00:01:07,600

flight in may 2011.

29

00:01:14,149 --> 00:01:10,080

in its first 18 months of operations

30

00:01:17,350 --> 00:01:14,159

from may 19 2011 to december 10 2012

31

00:01:18,630 --> 00:01:17,360

the ams analyzed 25 billion cosmic ray

32

00:01:21,030 --> 00:01:18,640

events

33

00:01:24,630 --> 00:01:21,040

of these an unprecedented number were

34

00:01:26,950 --> 00:01:24,640

unambiguously identified as positrons

35

00:01:29,429 --> 00:01:26,960

cosmic rays are subatomic particles such

36

00:01:31,350 --> 00:01:29,439

as protons and helium nuclei accelerated

37

00:01:33,270 --> 00:01:31,360

to near light speed by supernova

38

00:01:34,870 --> 00:01:33,280

explosions and other violent events in

39

00:01:36,310 --> 00:01:34,880

the cosmos

40

00:01:38,830 --> 00:01:36,320

researchers have long thought that

41

00:01:41,270 --> 00:01:38,840

cosmic rays contain a sprinkling of

42

00:01:44,389 --> 00:01:41,280

antimatter italy's pamelia satellite

43

00:01:46,550 --> 00:01:44,399

detected high-energy positrons in 2009

44

00:01:49,670 --> 00:01:46,560

and nasa's fermi gamma-ray observatory

45

00:01:52,310 --> 00:01:49,680

confirmed to the find two years later

46

00:01:54,389 --> 00:01:52,320

but where do the positrons come from

47

00:01:56,950 --> 00:01:54,399

the universe is almost completely devoid

48

00:01:59,429 --> 00:01:56,960

of antimatter so the positron fraction

49

00:02:02,230 --> 00:01:59,439

of cosmic ray electrons as much as 10

50

00:02:04,870 --> 00:02:02,240

percent is a little surprising

51

00:02:06,870 --> 00:02:04,880

one idea is dark matter

52

00:02:09,029 --> 00:02:06,880

astronomers know that the vast majority

53

00:02:11,110 --> 00:02:09,039

of the material universe is actually

54

00:02:12,229 --> 00:02:11,120

made of dark matter rather than ordinary

55

00:02:17,830 --> 00:02:12,239

matter

56

00:02:19,589 --> 00:02:17,840

it exerts gravity but emits no light

57

00:02:21,270 --> 00:02:19,599

which makes it devilishly difficult to

58

00:02:23,270 --> 00:02:21,280

study

59

00:02:24,790 --> 00:02:23,280

a leading theory holds that dark matter

60

00:02:26,390 --> 00:02:24,800

is made of a particle called the

61

00:02:30,150 --> 00:02:26,400

neutroleno

62

00:02:32,390 --> 00:02:30,160

produce a large number of high-energy

63

00:02:34,830 --> 00:02:32,400

positrons which the ams should be able

64

00:02:36,869 --> 00:02:34,840

to detect with unprecedented

65

00:02:38,869 --> 00:02:36,879

sensitivity the accuracy of our

66

00:02:40,790 --> 00:02:38,879

measurements is one percent which is

67

00:02:42,949 --> 00:02:40,800

excellent and we have statistics

68

00:02:44,550 --> 00:02:42,959

unmatched by any other spacecraft says

69

00:02:46,150 --> 00:02:44,560

ting

70

00:02:48,229 --> 00:02:46,160

so far the evidence supports the

71

00:02:50,309 --> 00:02:48,239

hypothesis of dark matter

72

00:02:51,830 --> 00:02:50,319

but he cautions it does not rule out

73

00:02:53,990 --> 00:02:51,840

another possibility

74

00:02:58,149 --> 00:02:54,000

pulsars

75

00:03:00,309 --> 00:02:58,159

stars formed in the aftermath of

76

00:03:02,229 --> 00:03:00,319

supernova explosions

77

00:03:04,630 --> 00:03:02,239

they can spin on their axis thousands of

78

00:03:06,630 --> 00:03:04,640

times a second flinging particles into

79

00:03:09,430 --> 00:03:06,640

space with fantastic energies that

80

00:03:11,190 --> 00:03:09,440

accelerators on earth can't match

81

00:03:13,910 --> 00:03:11,200

among these particles are pairs of

82

00:03:16,149 --> 00:03:13,920

electrons and positrons

83

00:03:18,790 --> 00:03:16,159

ams can distinguish between pulsars and

84

00:03:20,869 --> 00:03:18,800

dark matter but not yet

85

00:03:22,869 --> 00:03:20,879

we need more data at higher energies to

86

00:03:24,229 --> 00:03:22,879

decide which is the correct explanation

87

00:03:26,309 --> 00:03:24,239

says ting

88

00:03:28,869 --> 00:03:26,319

it is only a matter of time perhaps

89

00:03:31,030 --> 00:03:28,879

months or a few years

90

00:03:32,869 --> 00:03:31,040

built by scientists from 16 countries

91

00:03:35,190 --> 00:03:32,879

with support from the u.s department of

92

00:03:36,789 --> 00:03:35,200

energy the alpha magnetic spectrometer

93

00:03:38,710 --> 00:03:36,799

will continue operating for the rest of

94

00:03:40,710 --> 00:03:38,720

the life of the space station at least

95

00:03:42,869 --> 00:03:40,720

until 2020

96

00:03:45,910 --> 00:03:42,879

between now and then the mystery of dark

97

00:03:47,670 --> 00:03:45,920

matter could be solved once and for all