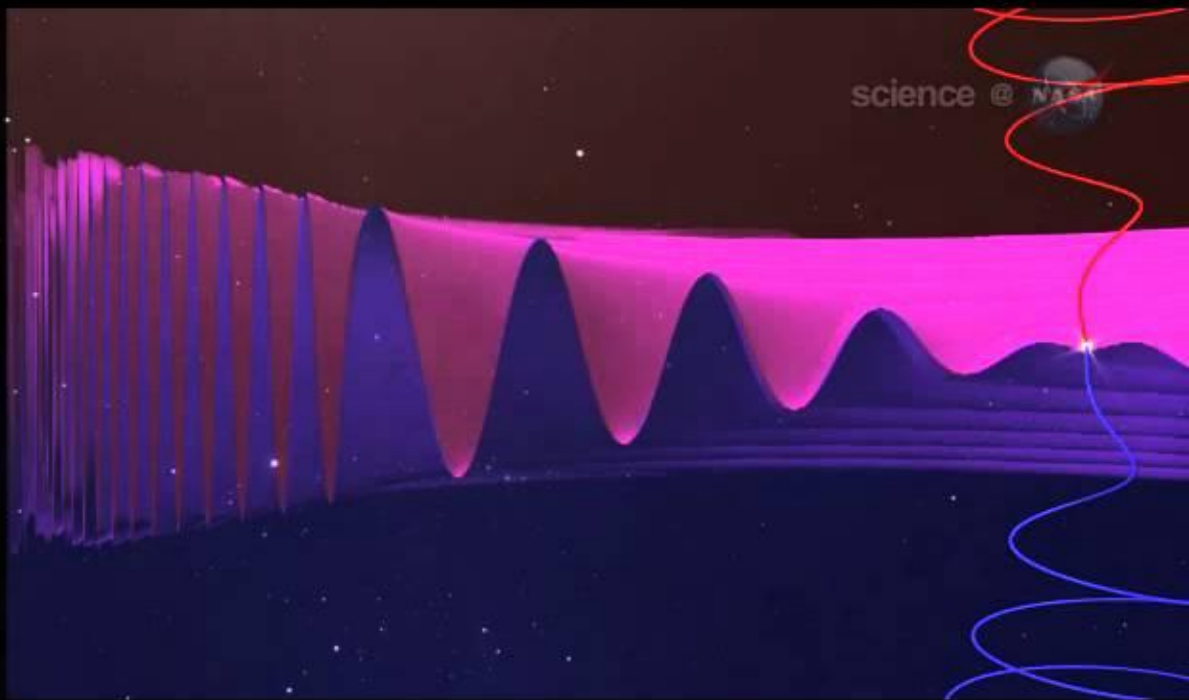


science @ NASA



1
00:00:09,190 --> 00:00:06,630
a big surprise from the edge of the

2
00:00:10,470 --> 00:00:09,200
solar system presented by science at

3
00:00:15,509 --> 00:00:10,480
nasa

4
00:00:18,070 --> 00:00:15,519
where no one has gone before gliding

5
00:00:20,390 --> 00:00:18,080
silently toward the stars nine billion

6
00:00:22,790 --> 00:00:20,400
miles from earth they are beaming back

7
00:00:24,870 --> 00:00:22,800
news from the most distant unexplored

8
00:00:26,790 --> 00:00:24,880
reaches of the solar system

9
00:00:30,150 --> 00:00:26,800
mission scientists say the probes have

10
00:00:32,630 --> 00:00:30,160
just sent back some very big news indeed

11
00:00:34,389 --> 00:00:32,640
it's bubbly out there

12
00:00:37,110 --> 00:00:34,399
the voyager probes have entered a

13
00:00:39,990 --> 00:00:37,120

strange realm of frothy magnetic bubbles

14

00:00:42,150 --> 00:00:40,000

says marav offer of boston university

15

00:00:44,709 --> 00:00:42,160

this is very surprising

16

00:00:47,590 --> 00:00:44,719

the bubbles are large about 100 million

17

00:00:50,310 --> 00:00:47,600

miles wide so it takes the speedy probes

18

00:00:54,229 --> 00:00:50,320

a whole year just across a few of them

19

00:00:56,310 --> 00:00:54,239

voyager 1 entered the foam zone in 2007

20

00:00:57,350 --> 00:00:56,320

and voyager 2 followed about a year

21

00:00:58,549 --> 00:00:57,360

later

22

00:01:00,229 --> 00:00:58,559

at first

23

00:01:02,630 --> 00:01:00,239

researchers didn't understand what the

24

00:01:04,789 --> 00:01:02,640

voyagers were sensing but now they have

25

00:01:07,510 --> 00:01:04,799

a good idea

26
00:01:09,350 --> 00:01:07,520
the sun's magnetic field extends all the

27
00:01:10,950 --> 00:01:09,360
way to the edge of the solar system

28
00:01:13,670 --> 00:01:10,960
explains offer

29
00:01:15,830 --> 00:01:13,680
because the sun spins its magnetic field

30
00:01:18,230 --> 00:01:15,840
becomes twisted and wrinkled

31
00:01:20,070 --> 00:01:18,240
a bit like a ballerina skirt

32
00:01:22,789 --> 00:01:20,080
far far away from the sun where the

33
00:01:24,149 --> 00:01:22,799
voyagers are now the folds of the skirt

34
00:01:26,149 --> 00:01:24,159
bunch up

35
00:01:28,710 --> 00:01:26,159
when a magnetic field gets severely

36
00:01:29,830 --> 00:01:28,720
folded like this interesting things can

37
00:01:32,230 --> 00:01:29,840
happen

38
00:01:33,429 --> 00:01:32,240

lines of magnetic force crisscross and

39

00:01:34,950 --> 00:01:33,439

reconnect

40

00:01:37,030 --> 00:01:34,960

the crowded folds of the skirt

41

00:01:41,270 --> 00:01:37,040

reorganize themselves sometimes

42

00:01:43,429 --> 00:01:41,280

explosively into foamy magnetic bubbles

43

00:01:45,350 --> 00:01:43,439

we never expected to find such a foam at

44

00:01:47,830 --> 00:01:45,360

the edge of the solar system but there

45

00:01:50,710 --> 00:01:47,840

it is says offers colleague astronomer

46

00:01:52,550 --> 00:01:50,720

jim drake of the university of maryland

47

00:01:54,310 --> 00:01:52,560

drake says they are still trying to wrap

48

00:01:55,670 --> 00:01:54,320

their minds around the implications of

49

00:01:58,310 --> 00:01:55,680

the finding

50

00:01:59,590 --> 00:01:58,320

one consequence has to do with cosmic

51

00:02:04,950 --> 00:01:59,600

rays

52

00:02:06,950 --> 00:02:04,960

accelerated to nearly light speed by

53

00:02:09,350 --> 00:02:06,960

distant black holes and supernova

54

00:02:11,029 --> 00:02:09,360

explosions when these microscopic

55

00:02:12,949 --> 00:02:11,039

cannonballs try to enter the solar

56

00:02:15,030 --> 00:02:12,959

system they have to fight through the

57

00:02:16,229 --> 00:02:15,040

sun's magnetic field to reach the inner

58

00:02:18,390 --> 00:02:16,239

planets

59

00:02:20,550 --> 00:02:18,400

the magnetic bubbles turn out to be our

60

00:02:23,430 --> 00:02:20,560

first line of defense against cosmic

61

00:02:25,670 --> 00:02:23,440

rays points out over we haven't figured

62

00:02:26,790 --> 00:02:25,680

out yet whether this is a good thing or

63

00:02:29,030 --> 00:02:26,800

not

64

00:02:31,589 --> 00:02:29,040

on one hand the bubbles would seem to be

65

00:02:33,830 --> 00:02:31,599

a very porous shield allowing many

66

00:02:35,910 --> 00:02:33,840

cosmic rays through the gaps

67

00:02:37,990 --> 00:02:35,920

on the other hand cosmic rays could get

68

00:02:41,190 --> 00:02:38,000

trapped inside the bubbles which would

69

00:02:43,110 --> 00:02:41,200

make them a very good shield indeed

70

00:02:45,110 --> 00:02:43,120

we'll probably discover which is correct

71

00:02:47,350 --> 00:02:45,120

as the voyagers proceed deeper into the

72

00:02:49,509 --> 00:02:47,360

froth says offer this is just the

73

00:02:50,710 --> 00:02:49,519

beginning and i predict more surprises

74

00:02:52,869 --> 00:02:50,720

ahead

75

00:02:55,190 --> 00:02:52,879

for more information about places no one

