



Artist concept

1
00:00:09,669 --> 00:00:08,230
weird planets presented by science at

2
00:00:12,549 --> 00:00:09,679
nasa

3
00:00:14,150 --> 00:00:12,559
news flash the milky way galaxy just got

4
00:00:17,029 --> 00:00:14,160
a little weirder

5
00:00:19,670 --> 00:00:17,039
back in 2011 astronomers were amazed

6
00:00:22,630 --> 00:00:19,680
when nasa's kepler spacecraft discovered

7
00:00:24,870 --> 00:00:22,640
a planet orbiting a double star system

8
00:00:27,830 --> 00:00:24,880
such a world they realized would have

9
00:00:29,669 --> 00:00:27,840
double sunsets and sunrises just like

10
00:00:31,349 --> 00:00:29,679
the fictional planet tatooine in the

11
00:00:34,150 --> 00:00:31,359
movie star wars

12
00:00:36,709 --> 00:00:34,160
yet this planet was real

13
00:00:39,670 --> 00:00:36,719

now kepler has discovered a whole system

14

00:00:42,630 --> 00:00:39,680

of planets orbiting a double star

15

00:00:45,670 --> 00:00:42,640

the star system known as kepler-47

16

00:00:48,069 --> 00:00:45,680

is located 4 900 light years from earth

17

00:00:49,990 --> 00:00:48,079

in the constellation cygnus

18

00:00:51,750 --> 00:00:50,000

two stars orbit one another at the

19

00:00:54,549 --> 00:00:51,760

center of the system

20

00:00:56,709 --> 00:00:54,559

one is similar to the sun in size but

21

00:00:59,110 --> 00:00:56,719

only 84 percent is bright

22

00:01:01,510 --> 00:00:59,120

the second star is smaller only one

23

00:01:03,270 --> 00:01:01,520

third the size of the sun and less than

24

00:01:05,910 --> 00:01:03,280

one percent as bright

25

00:01:07,990 --> 00:01:05,920

kepler found two planets orbiting this

26

00:01:10,310 --> 00:01:08,000

mismatched pair

27

00:01:13,590 --> 00:01:10,320

the presence of a full-fledged planetary

28

00:01:16,149 --> 00:01:13,600

system orbiting kepler-47 is an amazing

29

00:01:18,390 --> 00:01:16,159

discovery says greg laughlin professor

30

00:01:20,550 --> 00:01:18,400

of astrophysics and planetary science at

31

00:01:21,910 --> 00:01:20,560

the university of california in santa

32

00:01:23,910 --> 00:01:21,920

cruz

33

00:01:26,469 --> 00:01:23,920

this is going to change the way we think

34

00:01:29,350 --> 00:01:26,479

about the formation of planets

35

00:01:31,590 --> 00:01:29,360

the inner planet kepler-47b

36

00:01:33,990 --> 00:01:31,600

closely circles the pair of stars

37

00:01:35,030 --> 00:01:34,000

completing each orbit in less than 50

38

00:01:36,950 --> 00:01:35,040

days

39

00:01:38,870 --> 00:01:36,960

astronomers think it is a sweltering

40

00:01:41,270 --> 00:01:38,880

world where the destruction of methane

41

00:01:43,749 --> 00:01:41,280

in its superheated atmosphere might lead

42

00:01:45,429 --> 00:01:43,759

to a thick global haze

43

00:01:48,469 --> 00:01:45,439

kepler-47b

44

00:01:51,510 --> 00:01:48,479

is about three times the size of earth

45

00:01:54,950 --> 00:01:51,520

the outer planet kepler-47c

46

00:01:57,590 --> 00:01:54,960

orbits every 303 days this puts it in

47

00:01:59,990 --> 00:01:57,600

the system's habitable zone a band of

48

00:02:01,830 --> 00:02:00,000

orbits that are just right for liquid

49

00:02:03,270 --> 00:02:01,840

water to exist on the surface of a

50

00:02:08,630 --> 00:02:03,280

planet

51
00:02:12,390 --> 00:02:08,640
possibly not the astronomers think it is

52
00:02:14,550 --> 00:02:12,400
a gas giant slightly larger than neptune

53
00:02:17,030 --> 00:02:14,560
the discovery of planets orbiting double

54
00:02:19,430 --> 00:02:17,040
stars means that planetary systems are

55
00:02:21,270 --> 00:02:19,440
even weirder and more abundant than

56
00:02:23,270 --> 00:02:21,280
previously thought

57
00:02:25,589 --> 00:02:23,280
many stars are part of multiple star

58
00:02:28,630 --> 00:02:25,599
systems where two or more stars orbit

59
00:02:30,550 --> 00:02:28,640
one another the question always has been

60
00:02:33,030 --> 00:02:30,560
do they have planets and planetary

61
00:02:35,509 --> 00:02:33,040
systems says william beruki

62
00:02:38,710 --> 00:02:35,519
kepler mission principal investigator at

63
00:02:41,670 --> 00:02:38,720

nasa's ames research center this kepler

64

00:02:44,550 --> 00:02:41,680

discovery proves that they do

65

00:02:46,710 --> 00:02:44,560

our own sun is a single isolated star

66

00:02:48,710 --> 00:02:46,720

with a relatively simple gravitational

67

00:02:50,390 --> 00:02:48,720

field that rules the motions of the

68

00:02:53,270 --> 00:02:50,400

planets orbiting it

69

00:02:55,589 --> 00:02:53,280

but as baruchi points out not all stars

70

00:02:57,110 --> 00:02:55,599

are single astronomers estimate that

71

00:03:00,070 --> 00:02:57,120

more than half of the stars in the

72

00:03:03,350 --> 00:03:00,080

galaxy have companions there are double

73

00:03:05,430 --> 00:03:03,360

triple and even quadruple star systems

74

00:03:07,670 --> 00:03:05,440

any planets in such systems would have

75

00:03:10,229 --> 00:03:07,680

to navigate a complex gravitational

76

00:03:11,750 --> 00:03:10,239

field tugged in multiple directions by

77

00:03:14,149 --> 00:03:11,760

multiple stars

78

00:03:16,149 --> 00:03:14,159

in fact for many years astronomers

79

00:03:19,509 --> 00:03:16,159

doubted that planets could even form in

80

00:03:22,630 --> 00:03:19,519

such an environment kepler-47 erases

81

00:03:24,949 --> 00:03:22,640

those doubts and poses a conundrum

82

00:03:26,949 --> 00:03:24,959

these planets are very difficult to form

83

00:03:29,830 --> 00:03:26,959

using the currently accepted paradigm

84

00:03:31,589 --> 00:03:29,840

says laughlin i believe that theorists

85

00:03:33,990 --> 00:03:31,599

myself included will be going back to

86

00:03:35,589 --> 00:03:34,000

the drawing board to try to improve our

87

00:03:38,149 --> 00:03:35,599

understanding of how planets are

88

00:03:41,110 --> 00:03:38,159

assembled in the dusty gaseous disks

89

00:03:43,430 --> 00:03:41,120

that surround many young stars

90

00:03:45,430 --> 00:03:43,440

the kepler spacecraft is on a mission to

91

00:03:47,110 --> 00:03:45,440

find earth-like planets that might

92

00:03:50,070 --> 00:03:47,120

support life

93

00:03:52,229 --> 00:03:50,080

says beruki in our search for habitable

94

00:03:55,670 --> 00:03:52,239

worlds we have just found more

95

00:03:58,309 --> 00:03:55,680

opportunities for life to exist

96

00:04:00,789 --> 00:03:58,319

for more news about weird planets in the