



1
00:00:07,829 --> 00:00:05,190
psyche

2
00:00:10,709 --> 00:00:07,839
is a unique object in the solar system

3
00:00:13,030 --> 00:00:10,719
to us psyche is this really unusual body

4
00:00:15,030 --> 00:00:13,040
giving off really unusual gamma-ray

5
00:00:17,670 --> 00:00:15,040
neutron signatures technically it's an

6
00:00:24,470 --> 00:00:17,680
m-class asteroid out between

7
00:00:28,150 --> 00:00:25,910
one of the first things you want to know

8
00:00:31,189 --> 00:00:28,160
is what's it made of

9
00:00:32,790 --> 00:00:31,199
so the psyche payload consists of three

10
00:00:35,110 --> 00:00:32,800
science instruments

11
00:00:38,229 --> 00:00:35,120
one of them is what's called a gamma ray

12
00:00:40,790 --> 00:00:38,239
neutron spectrometer it's actually two

13
00:00:42,389 --> 00:00:40,800

separate pieces of hardware one is the

14
00:00:44,470 --> 00:00:42,399
gamma ray spectrometer and the other one

15
00:00:48,069 --> 00:00:44,480
is the neutron spectrometer both

16
00:00:49,910 --> 00:00:48,079
combined study the elemental composition

17
00:00:51,830 --> 00:00:49,920
of psyche if you know the surface

18
00:00:53,830 --> 00:00:51,840
composition what it's made of in terms

19
00:00:56,069 --> 00:00:53,840
of iron and nickel and silicon and

20
00:00:58,310 --> 00:00:56,079
oxygen you can then start to say

21
00:01:01,349 --> 00:00:58,320
something about its history and how it

22
00:01:03,349 --> 00:01:01,359
formed and how it evolved by using gamma

23
00:01:05,270 --> 00:01:03,359
ray spectroscopy we can

24
00:01:07,350 --> 00:01:05,280
measure those elements

25
00:01:09,270 --> 00:01:07,360
remotely we don't have to touch the

26

00:01:11,350 --> 00:01:09,280

surface we don't have to dig into the

27

00:01:13,190 --> 00:01:11,360

surface

28

00:01:15,109 --> 00:01:13,200

for psyche we're building kind of what

29

00:01:17,670 --> 00:01:15,119

we call the cadillac it's a very high

30

00:01:19,350 --> 00:01:17,680

precision high sensitivity instrument

31

00:01:21,270 --> 00:01:19,360

it's very similar to the messenger

32

00:01:23,749 --> 00:01:21,280

instrument that technology that we

33

00:01:26,310 --> 00:01:23,759

developed for the messenger spacecraft

34

00:01:28,469 --> 00:01:26,320

gave us a huge head start going to

35

00:01:30,390 --> 00:01:28,479

psyche for our types of instruments we

36

00:01:31,990 --> 00:01:30,400

don't get to fly them very often so when

37

00:01:34,469 --> 00:01:32,000

we actually get selected for something

38

00:01:35,910 --> 00:01:34,479

that's a big deal for us where we can

39

00:01:38,069 --> 00:01:35,920

you know take what we learned from the

40

00:01:41,830 --> 00:01:38,079

prior missions and implement it now and

41

00:01:45,749 --> 00:01:41,840

make an even better instrument

42

00:01:48,310 --> 00:01:45,759

our instrument is kind of like a camera

43

00:01:49,910 --> 00:01:48,320

without a telephoto lens in order to get

44

00:01:52,550 --> 00:01:49,920

our best measurements we need to be

45

00:01:55,350 --> 00:01:52,560

relatively close uh altitude above the

46

00:01:58,789 --> 00:01:55,360

surface that's what we call orbit d

47

00:02:01,510 --> 00:01:58,799

so we can form maps global maps of the

48

00:02:04,630 --> 00:02:01,520

elemental composition of psyche just by

49

00:02:07,270 --> 00:02:04,640

flying around externally

50

00:02:10,949 --> 00:02:07,280

you have galactic cosmic rays that's a

51
00:02:13,830 --> 00:02:10,959
fancy word for very fast protons they

52
00:02:16,229 --> 00:02:13,840
come in they smack a planetary surface

53
00:02:18,550 --> 00:02:16,239
they bust apart the atoms in that

54
00:02:21,270 --> 00:02:18,560
surface all the neutrons rattle around

55
00:02:23,430 --> 00:02:21,280
and as they rattle around they

56
00:02:24,949 --> 00:02:23,440
end up producing gamma rays and neutrons

57
00:02:26,949 --> 00:02:24,959
that come out

58
00:02:28,949 --> 00:02:26,959
and the gamma rays have energies and

59
00:02:30,470 --> 00:02:28,959
they're like a fingerprint so if you get

60
00:02:32,790 --> 00:02:30,480
the fingerprint of different energies

61
00:02:35,030 --> 00:02:32,800
that says there's iron there is nickel

62
00:02:36,550 --> 00:02:35,040
there or silicon and then how many of

63
00:02:39,430 --> 00:02:36,560

those gamma rays tells you how much of

64

00:02:41,190 --> 00:02:39,440

that element is there

65

00:02:43,509 --> 00:02:41,200

the first thing it takes to do a mission

66

00:02:45,750 --> 00:02:43,519

like this is a tremendous amount of

67

00:02:47,430 --> 00:02:45,760

institutional knowledge of all the

68

00:02:49,589 --> 00:02:47,440

different aspects not just how do you

69

00:02:51,589 --> 00:02:49,599

build something how do you

70

00:02:53,190 --> 00:02:51,599

aim something how do you guide something

71

00:02:56,150 --> 00:02:53,200

how do you get data from something those

72

00:02:57,670 --> 00:02:56,160

technical aspects i feel like it's super

73

00:02:58,790 --> 00:02:57,680

important to have a team that you can

74

00:03:00,710 --> 00:02:58,800

trust

75

00:03:01,990 --> 00:03:00,720

because you can guarantee that at some

76

00:03:03,990 --> 00:03:02,000

point something's going to go wrong

77

00:03:06,390 --> 00:03:04,000

probably many things over the many years

78

00:03:08,710 --> 00:03:06,400

of a project so already it's happened

79

00:03:11,350 --> 00:03:08,720

that in my process of learning about the

80

00:03:13,509 --> 00:03:11,360

science i've made small changes to the

81

00:03:16,309 --> 00:03:13,519

design to help optimize and help meet

82

00:03:18,149 --> 00:03:16,319

the science goals we're kind of the last

83

00:03:19,990 --> 00:03:18,159

instrument to get its measurements and

84

00:03:21,750 --> 00:03:20,000

so there is a sense where you're on pins

85

00:03:23,350 --> 00:03:21,760

and needles until you get that data back

86

00:03:25,350 --> 00:03:23,360

and then there's a big relief the big

87

00:03:27,270 --> 00:03:25,360

excitement and then you get to work and

88

00:03:29,990 --> 00:03:27,280

trying to say what does all this mean so

89

00:03:32,620 --> 00:03:30,000

we'll deliver some excellent science uh

90

00:03:36,650 --> 00:03:32,630

at the end