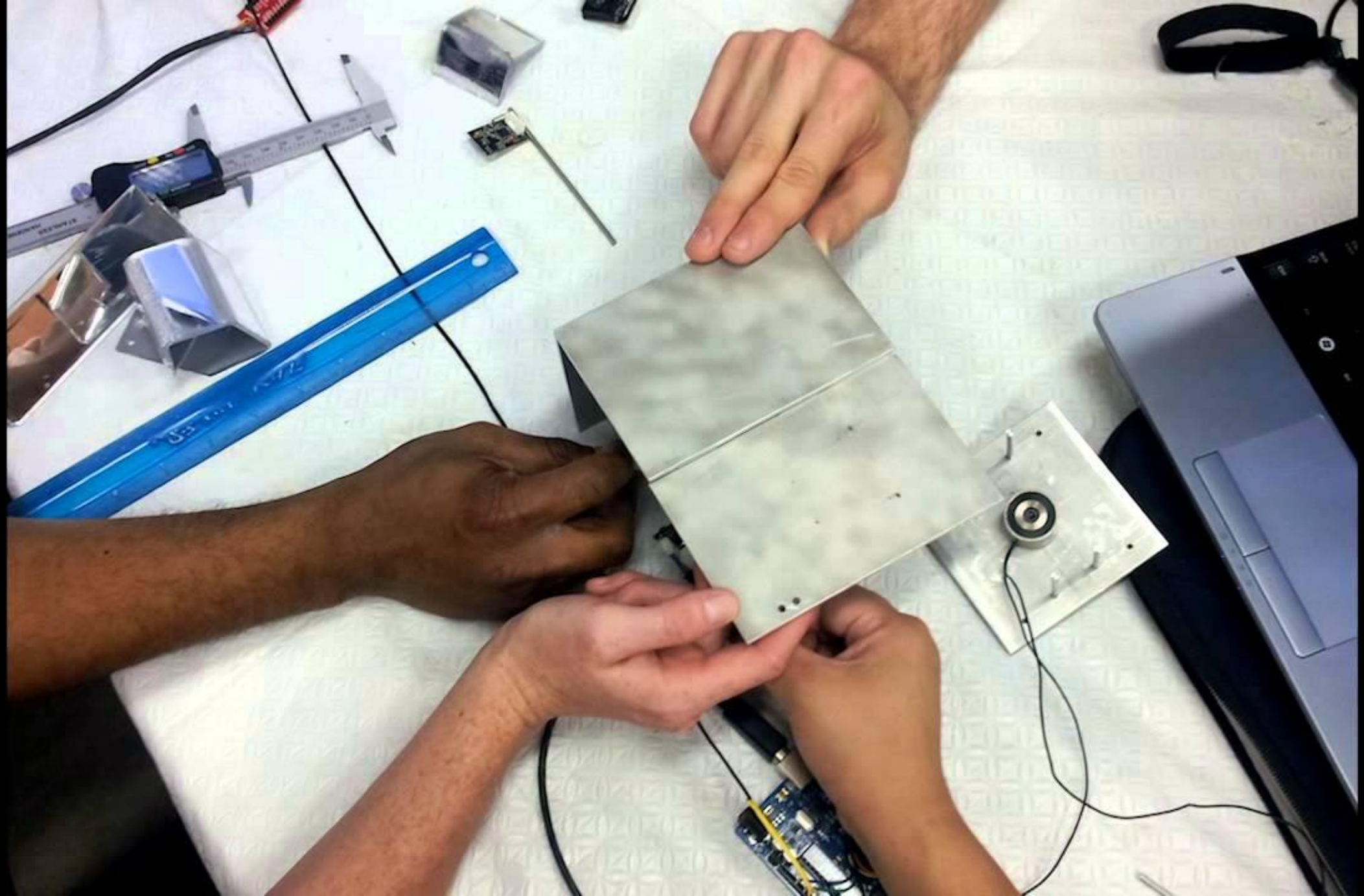

1
00:00:05,510 --> 00:00:03,590
research i do is in uh the field of

2
00:00:07,030 --> 00:00:05,520
planetary science has two components

3
00:00:08,790 --> 00:00:07,040
that are relevant for studies in

4
00:00:11,190 --> 00:00:08,800
microgravity research

5
00:00:12,470 --> 00:00:11,200
one is the early stages of the formation

6
00:00:14,310 --> 00:00:12,480
of the planets

7
00:00:15,190 --> 00:00:14,320
the very beginning of the solar system

8
00:00:17,029 --> 00:00:15,200
you had

9
00:00:18,790 --> 00:00:17,039
dust and gas and those dust particles

10
00:00:20,390 --> 00:00:18,800
stick together and gradually grow larger

11
00:00:21,830 --> 00:00:20,400
and larger objects

12
00:00:23,429 --> 00:00:21,840
once they're very large the gravity

13
00:00:24,390 --> 00:00:23,439

between those objects helps them stick

14
00:00:26,310 --> 00:00:24,400
together

15
00:00:28,150 --> 00:00:26,320
but getting them to that size has proved

16
00:00:30,710 --> 00:00:28,160
a theoretical challenge in order to

17
00:00:32,630 --> 00:00:30,720
study those collisions between small

18
00:00:34,549 --> 00:00:32,640
particles to see under what conditions

19
00:00:37,110 --> 00:00:34,559
they stick to each other and when they

20
00:00:39,190 --> 00:00:37,120
break apart to do that experimentally we

21
00:00:40,709 --> 00:00:39,200
need the long duration microgravity

22
00:00:42,630 --> 00:00:40,719
environment provided by the

23
00:00:44,310 --> 00:00:42,640
international space station

24
00:00:46,869 --> 00:00:44,320
the same types of collisions are

25
00:00:48,950 --> 00:00:46,879
actually also relevant in saturn's rings

26
00:00:50,869 --> 00:00:48,960
and other planetary ring systems where

27
00:00:52,310 --> 00:00:50,879
the collision velocities are very slow

28
00:00:54,790 --> 00:00:52,320
and the particles are very small and

29
00:00:55,830 --> 00:00:54,800
have a negligible gravity so we're also

30
00:00:57,350 --> 00:00:55,840
studying

31
00:00:59,029 --> 00:00:57,360
the evolution of saturn's rings

32
00:01:02,069 --> 00:00:59,039
experimentally by doing collision

33
00:01:04,310 --> 00:01:02,079
experiments in microgravity well our

34
00:01:06,149 --> 00:01:04,320
initial experiment is a small experiment

35
00:01:07,670 --> 00:01:06,159
that's designed to look at collisions

36
00:01:09,910 --> 00:01:07,680
between different kinds of particles at

37
00:01:11,910 --> 00:01:09,920
very low speeds to look at how much

38
00:01:13,510 --> 00:01:11,920

energy is lost in those collisions so

39
00:01:16,469 --> 00:01:13,520
we're just going to be using

40
00:01:18,390 --> 00:01:16,479
a small video camera to track the

41
00:01:20,070 --> 00:01:18,400
particles during

42
00:01:21,350 --> 00:01:20,080
their collisions and see how fast

43
00:01:23,510 --> 00:01:21,360
they're moving after the collisions

44
00:01:25,190 --> 00:01:23,520
we've got a chamber with a number of

45
00:01:28,310 --> 00:01:25,200
different sorts of particle samples in

46
00:01:30,310 --> 00:01:28,320
it once it's in orbit we'll agitate that

47
00:01:32,149 --> 00:01:30,320
chamber to get the particles bumping

48
00:01:33,270 --> 00:01:32,159
into each other gently and then we'll

49
00:01:35,429 --> 00:01:33,280
just

50
00:01:37,910 --> 00:01:35,439
collect video data and see the those

51
00:01:39,590 --> 00:01:37,920
collisions gently damp out over time

52
00:01:41,270 --> 00:01:39,600
we're using different sorts of particles

53
00:01:43,190 --> 00:01:41,280
with different densities some of them

54
00:01:44,950 --> 00:01:43,200
with powder coatings to try to

55
00:01:46,870 --> 00:01:44,960
understand how those different

56
00:01:48,789 --> 00:01:46,880
parameters affect how much energy is

57
00:01:50,950 --> 00:01:48,799
dissipated in the collisions

58
00:01:52,710 --> 00:01:50,960
is this a unique experiment

59
00:01:54,870 --> 00:01:52,720
uh

60
00:01:56,389 --> 00:01:54,880
to my knowledge this particular

61
00:01:58,870 --> 00:01:56,399
experiment hasn't been done on space

62
00:02:01,270 --> 00:01:58,880
station things experimental studies like

63
00:02:03,030 --> 00:02:01,280

this have been done before

64
00:02:04,789 --> 00:02:03,040
i think we're going to be able to get to

65
00:02:07,510 --> 00:02:04,799
a lower

66
00:02:08,949 --> 00:02:07,520
collision velocity regime and explore

67
00:02:11,350 --> 00:02:08,959
some different kinds of particles that

68
00:02:13,030 --> 00:02:11,360
have been explored before but this is a

69
00:02:15,030 --> 00:02:13,040
prototype experiment for us and we'd

70
00:02:16,390 --> 00:02:15,040
like to develop it into a larger

71
00:02:19,270 --> 00:02:16,400
experiment where we can do longer

72
00:02:23,510 --> 00:02:19,280
studies of bigger particles this

73
00:02:28,309 --> 00:02:26,309
got a ride up to space that's funded by

74
00:02:29,990 --> 00:02:28,319
nanoracks in space florida but the

75
00:02:32,229 --> 00:02:30,000
experiment itself is developed at the

76
00:02:35,430 --> 00:02:32,239
center for microgravity research which

77
00:02:37,270 --> 00:02:35,440
is at university of central florida and

78
00:02:40,229 --> 00:02:37,280
the experiment was designed and built

79
00:02:41,830 --> 00:02:40,239
primarily by undergraduate students

80
00:02:44,949 --> 00:02:41,840
at the university so they work in the

81
00:02:47,190 --> 00:02:44,959
lab uh they're getting real hands-on

82
00:02:49,430 --> 00:02:47,200
experience in building real space

83
00:02:51,350 --> 00:02:49,440
hardware learning how to work through

84
00:02:53,350 --> 00:02:51,360
the inevitable problems that you run

85
00:02:55,830 --> 00:02:53,360
into and trying to get things to fit in

86
00:02:57,750 --> 00:02:55,840
within your mass and power constraints

87
00:02:58,869 --> 00:02:57,760
and that sort of thing what do we learn

88
00:03:00,390 --> 00:02:58,879

from this

89
00:03:02,470 --> 00:03:00,400
well we're learning

90
00:03:06,390 --> 00:03:02,480
how to planets form where did the earth

91
00:03:08,229 --> 00:03:06,400
come from how odd is it that we've got a

92
00:03:10,149 --> 00:03:08,239
planetary system with planets like we

93
00:03:12,470 --> 00:03:10,159
have today under what conditions do

94
00:03:14,309 --> 00:03:12,480
planets form how frequently might they

95
00:03:16,710 --> 00:03:14,319
be forming around other stars what are

96
00:03:19,110 --> 00:03:16,720
the conditions necessary for that so

97
00:03:21,110 --> 00:03:19,120
it's about the history and the origin of