1
00:00:10,080 --> 00:00:20,150
congratulations

2
00:00:23,910 --> 00:00:22,470
hello to mark

3
00:00:25,910 --> 00:00:23,920
uh

4
00:00:26,790 --> 00:00:25,920
matiozo i'm not sure if i'm saying that

5
00:00:27,670 --> 00:00:26,800
right

6
00:00:30,870 --> 00:00:27,680
but

7
00:00:32,630 --> 00:00:30,880
he's 22 years old and from lausanne

8
00:00:34,630 --> 00:00:32,640
switzerland

9
00:00:35,670 --> 00:00:34,640
thanks for your question he says hello

10
00:00:37,430 --> 00:00:35,680
could you describe one of the

11
00:00:39,110 --> 00:00:37,440
experiments you performed on orbit and

12
00:00:40,389 --> 00:00:39,120
what were the results

13
00:00:41,990 --> 00:00:40,399

you know

14
00:00:43,350 --> 00:00:42,000
there's so many things

15
00:00:46,150 --> 00:00:43,360
going on up here and they're at

16
00:00:49,029 --> 00:00:46,160
different stages and um

17
00:00:49,990 --> 00:00:49,039
doing several fluids experiments um uh

18
00:00:52,709 --> 00:00:50,000
some

19
00:00:54,229 --> 00:00:52,719
medical experiments earth observation

20
00:00:56,310 --> 00:00:54,239
experiments there's some experiments

21
00:00:59,189 --> 00:00:56,320
running outside for

22
00:01:01,990 --> 00:00:59,199
solar observations and uh material

23
00:01:04,390 --> 00:01:02,000
exposure to radiation and vacuum

24
00:01:06,230 --> 00:01:04,400
um did actually a

25
00:01:08,789 --> 00:01:06,240
cognitive perception

26
00:01:11,109 --> 00:01:08,799
experiment see how our brain behaves in

27
00:01:12,550 --> 00:01:11,119
this zero gravity or something else

28
00:01:13,830 --> 00:01:12,560
that's looking at

29
00:01:15,990 --> 00:01:13,840
um

30
00:01:19,190 --> 00:01:16,000
sort of like a star trek tricorder

31
00:01:20,950 --> 00:01:19,200
really it's been able to analyze

32
00:01:23,510 --> 00:01:20,960
samples on the spot

33
00:01:26,149 --> 00:01:23,520
using a portable device rather than

34
00:01:28,550 --> 00:01:26,159
having to take some samples of surface

35
00:01:31,670 --> 00:01:28,560
samples or air samples or whatever and

36
00:01:34,230 --> 00:01:31,680
bring them down to earth to study later

37
00:01:36,230 --> 00:01:34,240
being able to analyze uh composition of

38
00:01:38,069 --> 00:01:36,240

something on the spot is going to be a

39
00:01:40,149 --> 00:01:38,079
really important capability for the

40
00:01:42,310 --> 00:01:40,159
future

41
00:01:43,910 --> 00:01:42,320
well though there's so many but let me

42
00:01:45,830 --> 00:01:43,920
pick one to tell you about that i'm

43
00:01:47,109 --> 00:01:45,840
working on now

44
00:01:49,830 --> 00:01:47,119
it's a fluids experiment and the

45
00:01:51,670 --> 00:01:49,840
japanese module will be the first

46
00:01:53,030 --> 00:01:51,680
main experiment there

47
00:01:54,389 --> 00:01:53,040
and

48
00:01:57,190 --> 00:01:54,399
it's called mace

49
00:01:59,670 --> 00:01:57,200
and what it is it's looking at

50
00:02:01,590 --> 00:01:59,680
what's called a fluid bridge

51
00:02:03,190 --> 00:02:01,600
so this is a fundamental fluid physics

52
00:02:04,469 --> 00:02:03,200
experiment but it also has amazing

53
00:02:07,429 --> 00:02:04,479
applications

54
00:02:08,869 --> 00:02:07,439
basically looking at a chunk of fluid

55
00:02:11,990 --> 00:02:08,879
and the fluid is going to sitting

56
00:02:13,670 --> 00:02:12,000
between two metal cylinders so it's a

57
00:02:16,150 --> 00:02:13,680
it's a cylinder shaped

58
00:02:17,510 --> 00:02:16,160
bit of fluid and it's pretty big so you

59
00:02:18,790 --> 00:02:17,520
know

60
00:02:21,030 --> 00:02:18,800
it's not something you could do on the

61
00:02:23,190 --> 00:02:21,040
ground because it would just collapse

62
00:02:26,470 --> 00:02:23,200
up here it can flow to the relatively

63
00:02:27,990 --> 00:02:26,480

large piece large segment of fluid

64
00:02:29,990 --> 00:02:28,000
and there's going to be heating between

65
00:02:32,390 --> 00:02:30,000
the two plates and

66
00:02:35,030 --> 00:02:32,400
up here the the surface tension

67
00:02:38,070 --> 00:02:35,040
is very dominant effect in the fluid so

68
00:02:40,790 --> 00:02:38,080
you know let's gravity is not a factor

69
00:02:43,190 --> 00:02:40,800
and with heating between these plates uh

70
00:02:44,390 --> 00:02:43,200
there's going to be a fluid flow that's

71
00:02:47,350 --> 00:02:44,400
also

72
00:02:49,509 --> 00:02:47,360
carried by the surface tension so it's a

73
00:02:51,030 --> 00:02:49,519
very fundamental physics experiment but

74
00:02:52,790 --> 00:02:51,040
it's looking at

75
00:02:55,990 --> 00:02:52,800
how fluid

76
00:02:59,910 --> 00:02:58,390
with the driving force and

77
00:03:01,670 --> 00:02:59,920
and with surface tension as the

78
00:03:04,550 --> 00:03:01,680
mechanism for a flow

79
00:03:05,350 --> 00:03:04,560
now why is this important um you know

80
00:03:08,229 --> 00:03:05,360
for

81
00:03:10,229 --> 00:03:08,239
fundamental physics uh reasons there's

82
00:03:12,309 --> 00:03:10,239
interesting things to understand there

83
00:03:13,750 --> 00:03:12,319
but um and i'm not the specialist in

84
00:03:15,670 --> 00:03:13,760
this area but one of the really neat

85
00:03:17,509 --> 00:03:15,680
things about this is that you know we

86
00:03:19,750 --> 00:03:17,519
have a lot of things on the ground and

87
00:03:21,830 --> 00:03:19,760
in space that depend on pumps and

88
00:03:23,110 --> 00:03:21,840

systems that have electronics and

89
00:03:25,030 --> 00:03:23,120
sensors and

90
00:03:26,789 --> 00:03:25,040
motors to make fluids move around for

91
00:03:27,589 --> 00:03:26,799
cooling

92
00:03:34,390 --> 00:03:27,599
for

93
00:03:36,229 --> 00:03:34,400
and you know pumps pumps can fail and

94
00:03:40,070 --> 00:03:36,239
things with parts can fail

95
00:03:41,990 --> 00:03:40,080
and um uh this is this um experiment has

96
00:03:44,949 --> 00:03:42,000
some possible applications for looking

97
00:03:46,229 --> 00:03:44,959
at how fluids can move or be forced to

98
00:03:47,190 --> 00:03:46,239
move just because of a temperature

99
00:03:48,149 --> 00:03:47,200
difference

100
00:03:49,350 --> 00:03:48,159
and

101
00:03:51,110 --> 00:03:49,360
so we have

102
00:03:52,390 --> 00:03:51,120
temperature differences up here very

103
00:03:54,149 --> 00:03:52,400
large temperature differences from

104
00:03:56,070 --> 00:03:54,159
inside outside from

105
00:03:58,470 --> 00:03:56,080
day to night shadow and

106
00:04:01,830 --> 00:03:58,480
sunlight huge temperature differences

107
00:04:03,830 --> 00:04:01,840
and it's possible to generate flows of

108
00:04:05,270 --> 00:04:03,840
fluids just because of these temperature

109
00:04:06,949 --> 00:04:05,280
differences

110
00:04:08,789 --> 00:04:06,959
you can imagine a cooling system that

111
00:04:11,110 --> 00:04:08,799
works on a space station for a mission

112
00:04:12,550 --> 00:04:11,120
to mars for example with no moving parts

113
00:04:16,550 --> 00:04:12,560

all it would have is

114
00:04:18,310 --> 00:04:16,560
tubes and by exposing these tubes to

115
00:04:20,550 --> 00:04:18,320
heating and cooling

116
00:04:22,710 --> 00:04:20,560
you would have the ability to generate a

117
00:04:24,310 --> 00:04:22,720
continuous flow without any power in any

118
00:04:26,469 --> 00:04:24,320
motor so anyway this is one of the

119
00:04:28,469 --> 00:04:26,479
possible applications for understanding

120
00:04:29,749 --> 00:04:28,479
these mechanisms better so that's a

121
00:04:32,150 --> 00:04:29,759
pretty neat experiment we're just

122
00:04:33,909 --> 00:04:32,160
getting started set up all the apparatus