1
00:00:01,490 --> 00:00:04,580
>> Don Pettit: It's shooting
out sparks about that long.

2
00:00:09,570 --> 00:00:13,760
So I want to investigate
static electric forces

3
00:00:13,760 --> 00:00:17,060
in a weightless environment,
where you don't have to worry

4
00:00:17,060 --> 00:00:19,590
about gravitational forces.

5
00:00:19,590 --> 00:00:21,360
So how are we going to do this?

6
00:00:21,360 --> 00:00:25,600
We happen to have a number
of educational projects

7
00:00:25,600 --> 00:00:28,860
on station involving Legos.

8
00:00:28,860 --> 00:00:36,320
And we have the official
NASA Space Station Lego

9
00:00:36,320 --> 00:00:38,010
instruction booklet.

10
00:00:38,010 --> 00:00:40,520
And -- and these are
good educational projects

11
00:00:40,520 --> 00:00:44,570
in themselves, but the
whole concept of Legos

12
00:00:44,570 --> 00:00:48,280
to me is not following
the instructions.

13
00:00:48,280 --> 00:00:53,470
So I'm going to just give the
instruction booklet a push,

14
00:00:53,470 --> 00:00:59,140
and see what I can't
make with Legos, just --

15
00:00:59,140 --> 00:01:02,510
just on my own, not
following the instructions.

16
00:01:02,510 --> 00:01:04,700
And remember, I want
to do something

17
00:01:04,700 --> 00:01:07,340
with static electricity.

18
00:01:07,340 --> 00:01:11,000
And look what I made.

19
00:01:11,000 --> 00:01:13,810
I made this little
Lego structure,

20
00:01:13,810 --> 00:01:16,290
and I've got a big
rubber band here of --

21
00:01:16,290 --> 00:01:19,770
and I use some Lego
wheels as pulleys to go

22

00:01:19,770 --> 00:01:21,260
around the rubber band.

23
00:01:21,260 --> 00:01:26,390
And then if I turn the axle,
which is made out of a bowl,

24
00:01:26,390 --> 00:01:27,810
I can make the rubber
band go around

25
00:01:27,810 --> 00:01:30,650
and around on these pulleys.

26
00:01:30,650 --> 00:01:33,900
And then I've got a bit
of screen wire up here,

27
00:01:33,900 --> 00:01:37,440
and then I've got
some screen wire here.

28
00:01:37,440 --> 00:01:41,390
And I happen to know
that this is the basis

29
00:01:41,390 --> 00:01:44,070
for a Van der Graaff generator.

30
00:01:44,070 --> 00:01:47,370
I happen to have some aluminum
foil, and so I rolled it

31
00:01:47,370 --> 00:01:51,490
into this cylinder,
and look at that.

32
00:01:51,490 --> 00:01:58,350
Okay, it's not pretty,
it's not ideal,

33
00:01:59,690 --> 00:02:02,370
but I think it'll
be good enough.

34
00:02:02,370 --> 00:02:06,030
Let's see if it works.

35
00:02:06,030 --> 00:02:13,460
So I can just fasten the
drill driver onto the belt,

36
00:02:13,460 --> 00:02:18,390
and now I can do that.

37
00:02:18,390 --> 00:02:23,240
This is going to be the
positive terminal down here,

38
00:02:23,240 --> 00:02:26,030
and the collector --

39
00:02:26,030 --> 00:02:28,660
the cylindrical collector's
going to be negative.

40
00:02:28,660 --> 00:02:32,580
And let's see if I can
get any charge built up.

41
00:02:32,580 --> 00:02:39,510
Oh wow. It's shooting out
sparks about that long.

42
00:02:39,510 --> 00:02:50,330
[Silence]

43
00:02:50,330 --> 00:02:55,530
So here I -- I've

taken a plastic bag,

44
00:02:55,530 --> 00:02:59,510
and taped two pieces
of aluminum foil in it,

45
00:02:59,510 --> 00:03:02,240
and then have this little
piece of aluminum foil coming

46
00:03:02,240 --> 00:03:04,790
out with a nice little
curly q on the end.

47
00:03:04,790 --> 00:03:07,860
And this makes a laden jar,

48
00:03:07,860 --> 00:03:12,010
a means for storing
static electricity.

49
00:03:12,010 --> 00:03:15,510
So we can charge up our --
our laden jar just like this.

50
00:03:15,510 --> 00:03:20,320
[Silence]

51
00:03:20,320 --> 00:03:22,360
And then just to
see if it works,

52
00:03:22,360 --> 00:03:25,650
you can see if you
can shock yourself.

53
00:03:25,650 --> 00:03:30,330
It works. So the laden
jar's being charged up.

54
00:03:32,140 --> 00:03:34,000
This isn't little
kid stuff anymore.

55
00:03:34,000 --> 00:03:36,160
We've taken Legos,
which we typically think

56
00:03:36,160 --> 00:03:37,760
of as little kid stuff,

57
00:03:37,760 --> 00:03:40,750
turned it into something that's
a real science experiment,

58
00:03:40,750 --> 00:03:43,500
to the tune of about
30,000 volts,

59
00:03:43,500 --> 00:03:47,420
and it's static volts,
real low current.

60
00:03:47,420 --> 00:03:53,910
And let's see what happens
if I rub this block of foam

61
00:03:53,910 --> 00:03:56,700
on the foam, let's
see what happens here.

62
00:03:56,700 --> 00:04:01,070
Oh, it sticks to the cylinder.

63
00:04:01,070 --> 00:04:03,790
In fact, you can
get it to orb it

64
00:04:03,790 --> 00:04:06,400

around the cylinder,
like a satellite.

65
00:04:06,400 --> 00:04:10,030
Oh, isn't that cool?

66
00:04:10,030 --> 00:04:14,720
And it reached the escape
[phonetic] velocity.

67
00:04:14,720 --> 00:04:17,490
Now if I rub it on my skin,

68
00:04:18,680 --> 00:04:21,910
let's see if anything
different happens.

69
00:04:21,910 --> 00:04:24,630
Oh look at that, it's repelled.

70
00:04:29,300 --> 00:04:31,420
Wow. So what do you
think's happening?

71
00:04:31,420 --> 00:04:35,390
I rub it on my skin
and it's repelled.

72
00:04:35,390 --> 00:04:38,130
I rub it on another piece of
foam, and it's the same foam,

73
00:04:38,130 --> 00:04:43,330
in fact I cut it out of the
foam right there, and it sticks.

74
00:04:43,330 --> 00:04:48,890
So something interesting's
going on.

75
00:04:48,890 --> 00:04:51,170
And notice we have a
Van de Graaff generator,

76
00:04:51,170 --> 00:04:52,560
and a laden jar.

77
00:04:52,560 --> 00:04:59,280
All of these are of
Dutch name origin.

78
00:04:59,280 --> 00:05:02,850
We happen to have an ESA
astronaut, Andre Kuipers,

79
00:05:02,850 --> 00:05:05,270
who's from the Netherlands
on -- on board.

80
00:05:05,270 --> 00:05:07,090
And I'm going to need some help.

81
00:05:07,090 --> 00:05:09,550
Andre, see if you
can charge this up.