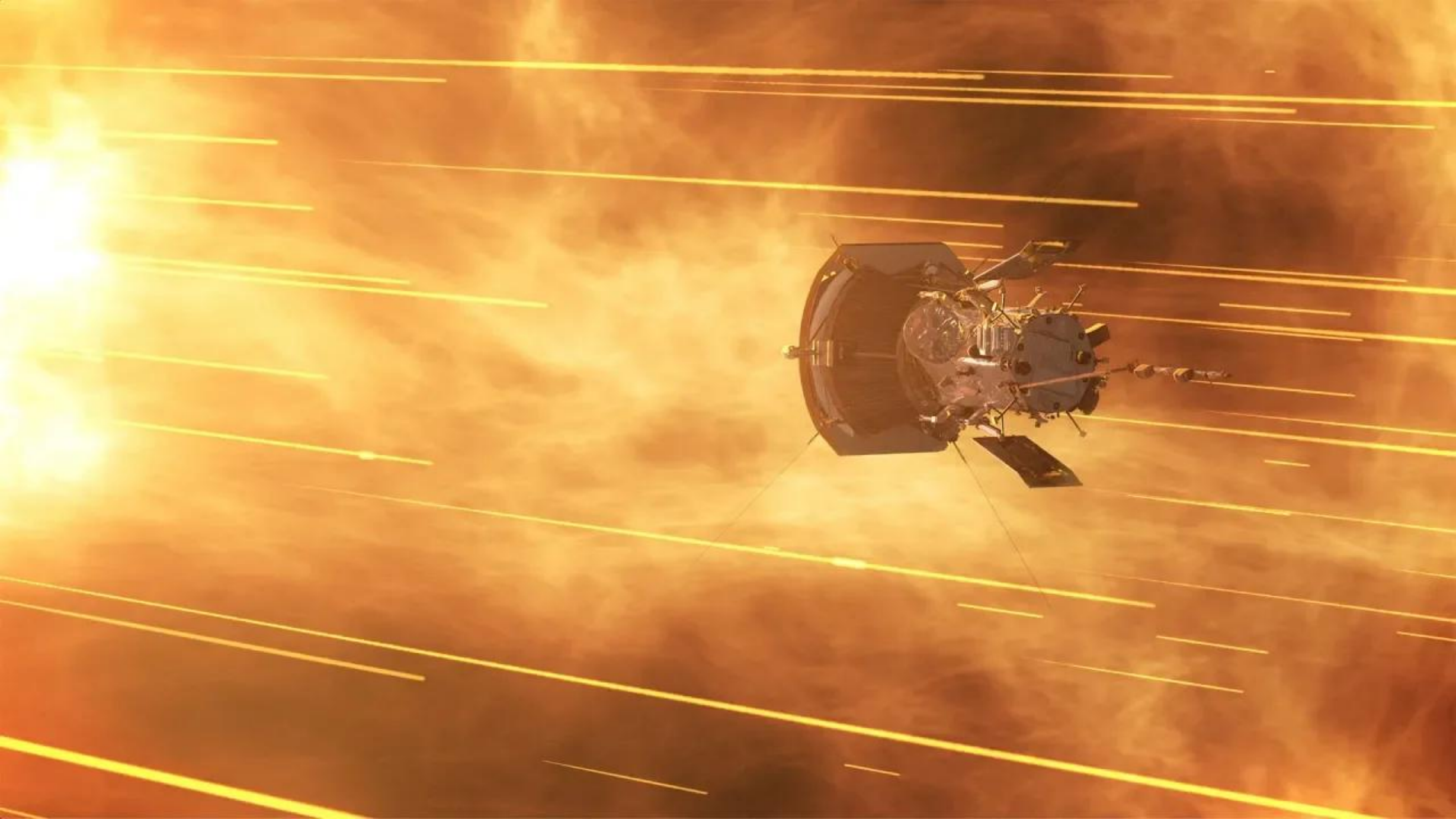

1
00:00:00,000 --> 00:00:04,000
<music throughout> Narrator: It’s tough out there for a spacecraft.

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00:00:04,000 --> 00:00:08,000
Hardware in space must brave an ocean of dangerous radiated

3
00:00:08,000 --> 00:00:12,000
particles. These particles can slowly wear on a spacecraft over time,

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00:00:12,000 --> 00:00:16,000
hit once and cause a temporary problem, or short the system in a

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00:00:16,000 --> 00:00:20,000
single blow. Whether a spacecraft is headed to the Moon – like the Artemis mission

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00:00:20,000 --> 00:00:24,000
– or facing off with the Sun – like Parker Solar Probe,

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00:00:24,000 --> 00:00:26,960
everything onboard must be checked for reliability before launch

8
00:00:26,960 --> 00:00:32,000
Megan Casey: Every part has to be tested, and that’s where our group comes in. We take the models and we

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00:00:32,000 --> 00:00:36,000
figure out what the radiation environment looks like, and then we test based on that environment.

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00:00:36,000 --> 00:00:40,000
and figure out whether the part will survive or not.

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00:00:40,000 --> 00:00:44,000
Narrator: To improve our spacecraft and protect our hardware as it travels through space,

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00:00:44,000 --> 00:00:48,000
NASA has the Space Environment Testbed mission or SET.

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00:00:48,000 --> 00:00:52,000

Megan Casey: This is a mission where the whole point is radiation.

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00:00:52,000 --> 00:00:56,000
Narrator: SET helps researchers to better understand and design for the potential radiation

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00:00:56,000 --> 00:01:00,000
effects that await spacecraft. Mike Xapsos: It’s actually doing measurements of the radiation environment

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00:01:00,000 --> 00:01:04,000
some measurements are actually counting individual particles as they come

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00:01:04,000 --> 00:01:08,000
in and other measurements are actually taking account of

18
00:01:08,000 --> 00:01:12,000
what the cumulative effect of all these particles are.

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00:01:12,000 --> 00:01:16,000
Narrator: All of space is a radiation environment, but the exact conditions will vary by destination.

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00:01:16,000 --> 00:01:20,000
The Sun fires protons.

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00:01:20,000 --> 00:01:24,000
Earth harbors swarms of protons and electrons.

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00:01:24,000 --> 00:01:28,000
Jupiter does the same, but in greater concentration and at higher energy.

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00:01:28,000 --> 00:01:32,000
And everywhere you go, there are heavier ions from galactic

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00:01:32,000 --> 00:01:36,000
cosmic rays. No spacecraft passes

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00:01:36,000 --> 00:01:40,000
through unaffected. More knowledge from SET means more efficient

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00:01:40,000 --> 00:01:44,000
spacecraft designs. For example, less shielding may be necessary.

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00:01:44,000 --> 00:01:48,000
Megan Casey: Right now we assume that all missions are going to have a shielding thickness

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00:01:48,000 --> 00:01:52,000
- by shielding thickness, we mean how thick are the walls of the spacecraft

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00:01:52,000 --> 00:01:56,000
or the instrument - and we assume they are going to be about a tenth of an inch.

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00:01:56,000 --> 00:02:00,000
If we can get better models and we can more tightly refine what

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00:02:00,000 --> 00:02:04,000
the radiation environment looks like, we can maybe thin those walls out.

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00:02:04,000 --> 00:02:08,000
Narrator: Lighter, thinner spacecraft can create savings in cost and room on board.

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00:02:08,000 --> 00:02:12,000
Mike Xapsos: We always need to improve our design of spacecraft because

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00:02:12,000 --> 00:02:16,000
it will help us improve our instrumentation, make

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00:02:16,000 --> 00:02:20,000
them less expensive to design, and give us more accurate measurements.

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00:02:20,000 --> 00:02:24,000
Narrator: We expect there to be applications to help protect

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00:02:24,000 --> 00:02:27,060
the hardware that will bring people to the Moon and beyond.

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00:02:27,060 --> 00:02:32,000

Megan Casey: We will be able to ensure that humans and electronics and spacecraft

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00:02:32,000 --> 00:02:34,440
and instruments – anything we are actually sending into space – will survive in the environment

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00:02:34,440 --> 00:02:38,920
we are putting it in. Narrator: With SET, NASA can get ready

41
00:02:38,920 --> 00:02:40,940
to go farther.