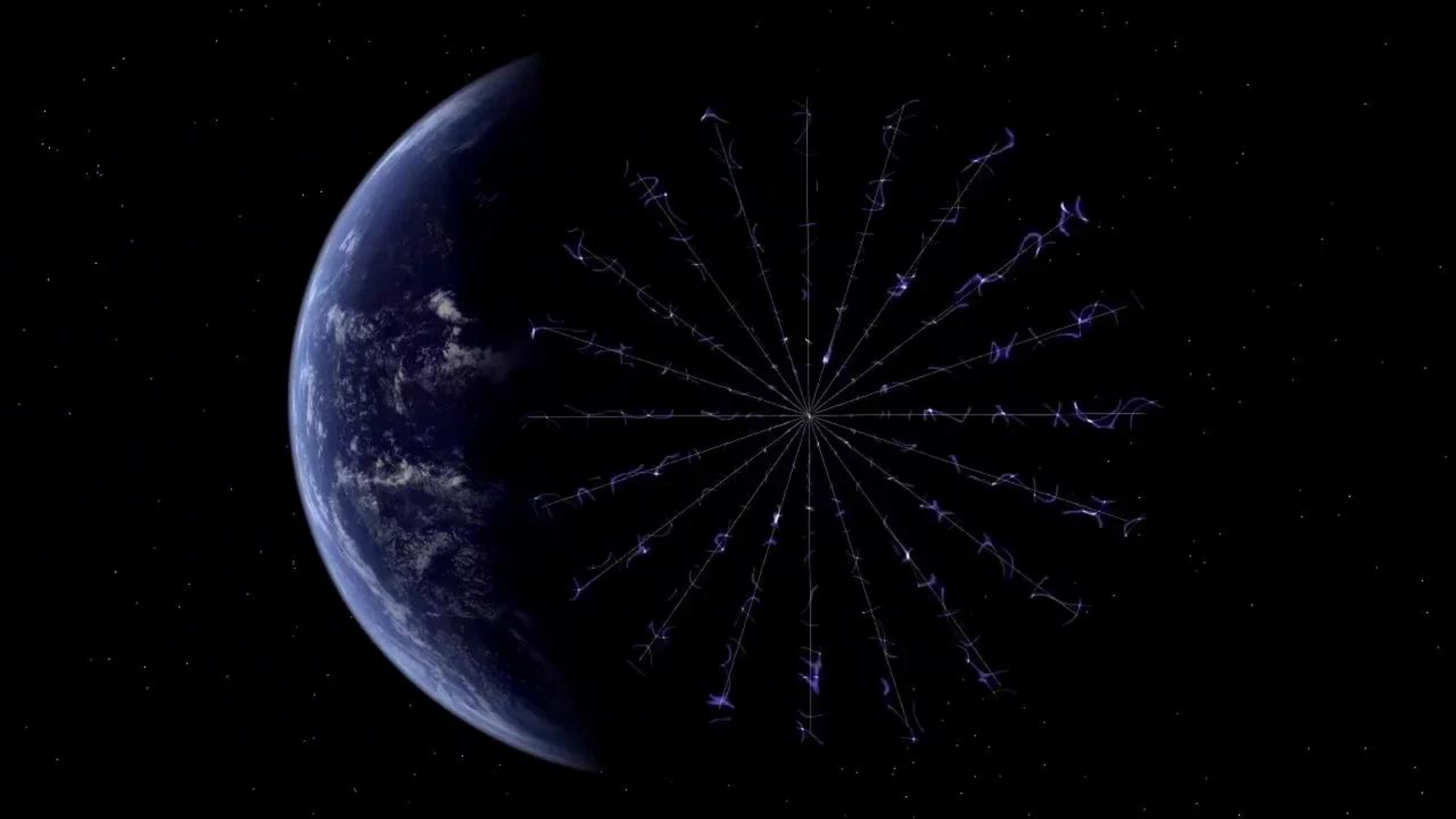

1
00:00:00,000 --> 00:00:07,533
The HERTS electric sail, or E-Sail,

2
00:00:07,568 --> 00:00:09,547
could send spacecraft to the edge

3
00:00:09,582 --> 00:00:11,396
of the solar system, known as the

4
00:00:11,431 --> 00:00:13,459
Heliopause, approximately 100

5
00:00:13,494 --> 00:00:15,651
astronomical units from Earth, in

6
00:00:15,686 --> 00:00:18,282
less than 10 years. Much faster than

7
00:00:18,317 --> 00:00:20,220
any current propulsion system.

8
00:00:20,255 --> 00:00:21,682
For example, it took the Voyager

9
00:00:21,717 --> 00:00:23,899
spacecraft 35 years to reach

10
00:00:23,934 --> 00:00:25,443
the edge of the solar system.

11
00:00:25,478 --> 00:00:27,523
The sun continually releases

12
00:00:27,558 --> 00:00:29,594
protons and electrons into the

13
00:00:29,629 --> 00:00:31,858

solar wind. A spacecraft can

14
00:00:31,893 --> 00:00:33,522
achieve high speeds by riding

15
00:00:33,557 --> 00:00:35,730
the solar wind. The spacecraft

16
00:00:35,765 --> 00:00:37,618
would spin up and deploy ten to

17
00:00:37,653 --> 00:00:39,795
twenty, multi-strand tethers.

18
00:00:39,830 --> 00:00:41,395
Each would be positively charged

19
00:00:41,430 --> 00:00:44,138
and about twenty kilometers long.

20
00:00:44,173 --> 00:00:45,794
Propulsion results from the

21
00:00:45,829 --> 00:00:47,394
momentum exchanges of the solar

22
00:00:47,429 --> 00:00:49,450
wind’s fast moving protons,

23
00:00:49,485 --> 00:00:52,370
shown here in blue. Thrust is

24
00:00:52,405 --> 00:00:53,722
created when the positively

25
00:00:53,757 --> 00:00:56,011
charged tethers electrostatically

26
00:00:56,046 --> 00:00:57,947
repell the protons.

27
00:00:57,982 --> 00:00:59,602
The spacecraft's electron gun

28
00:00:59,637 --> 00:01:02,082
discharges electrons. This

29
00:01:02,117 --> 00:01:03,562
maintains the correct positive

30
00:01:03,597 --> 00:01:06,275
bias on the charged wires. The

31
00:01:06,310 --> 00:01:07,593
team at NASA’s Marshall Space

32
00:01:07,628 --> 00:01:08,962
Flight Center in Huntsville,

33
00:01:08,997 --> 00:01:10,746
Alabama is currently creating

34
00:01:10,781 --> 00:01:12,811
models and simulations and