1
00:00:02,600 --> 00:00:03,560
The Sun.

2
00:00:03,560 --> 00:00:05,080
It’s the solar system’s engine,

3
00:00:05,080 --> 00:00:08,480
and the only star in the sky that gets our attention…

4
00:00:08,500 --> 00:00:10,480
every day.

5
00:00:10,500 --> 00:00:11,480
But up close,

6
00:00:11,500 --> 00:00:14,880
it’s unlike anything we can see from Earth.

7
00:00:14,900 --> 00:00:16,180
It’s ferocious—

8
00:00:16,200 --> 00:00:19,400
a writhing mass of nuclear chaos,

9
00:00:19,420 --> 00:00:21,180
tangled magnetic lines,

10
00:00:21,200 --> 00:00:24,980
and a constant wind with inconceivably high temperatures

11
00:00:25,000 --> 00:00:29,660
and speeds close to a million miles an hour.

12
00:00:32,200 --> 00:00:35,980
Over the years NASA has sent probes all over the solar system…

13
00:00:36,000 --> 00:00:37,580

...but never to the Sun.

14
00:00:37,600 --> 00:00:39,480
Check this out.

15
00:00:39,500 --> 00:00:41,180
This is the Parker Solar Probe…

16
00:00:41,200 --> 00:00:45,300
…and it’s going to be humanity’s first mission assigned to touch the Sun.

17
00:00:46,200 --> 00:00:49,980
It will fly to within 4 million miles of the Sun’s surface

18
00:00:49,990 --> 00:00:51,680
confronting brutal radiation

19
00:00:51,700 --> 00:00:56,580
and temperatures that can reach 1,000,000 degrees Fahrenheit.

20
00:00:56,600 --> 00:00:58,290
Parker Solar Probe has been prepped

21
00:00:58,310 --> 00:01:01,880
to fly right through that unforgiving atmosphere.

22
00:01:01,900 --> 00:01:05,180
It's a rough journey.

23
00:01:05,200 --> 00:01:07,780
Typically, if you want to head out into the solar system,

24
00:01:07,800 --> 00:01:10,280
you merge with orbital traffic.

25
00:01:10,300 --> 00:01:12,780
But if you want to head toward the center of the solar system,

26
00:01:12,800 --> 00:01:14,480
you've got to run the other way…

27
00:01:14,500 --> 00:01:17,080
and it takes a lot of energy.

28
00:01:17,100 --> 00:01:20,380
once it arrives, the spacecraft has got to take the heat.

29
00:01:20,400 --> 00:01:22,880
Bathed in radiation as it swoops in close,

30
00:01:22,900 --> 00:01:24,780
Parker Solar Probe will use an advanced

31
00:01:24,800 --> 00:01:26,780
carbon/carbon composite heat shield

32
00:01:26,800 --> 00:01:28,340
to protect its delicate instruments.

33
00:01:29,700 --> 00:01:32,280
And here’s a technical triumph:

34
00:01:32,300 --> 00:01:34,580
the spacecraft’s thermal regulation system

35
00:01:34,600 --> 00:01:37,180
will use just a single gallon of ordinary water

36
00:01:37,200 --> 00:01:38,880
H 2 O

37
00:01:38,900 --> 00:01:43,200
to collect and then dissipate heat…just like a car radiator.

38
00:01:44,800 --> 00:01:46,540

It will fly into the corona,

39
00:01:46,560 --> 00:01:50,340
the super hot region of gas and plasma surrounding the Sun.

40
00:01:50,360 --> 00:01:52,460
There’s hardly a there there,

41
00:01:52,480 --> 00:01:55,920
as high energy particles fly outward like streamers.

42
00:01:55,940 --> 00:01:58,860
But – and this is another weird thing about the sun-

43
00:01:58,880 --> 00:02:02,580
-the corona is hotter than the surface of the star itself.

44
00:02:02,600 --> 00:02:04,440
We have a few good theories about this–

45
00:02:04,460 --> 00:02:06,680
but we're really not sure why.

46
00:02:06,700 --> 00:02:09,570
There's some process in the atmosphere that keeps heating it up

47
00:02:09,590 --> 00:02:11,620
even as it gets further away from the core.

48
00:02:11,640 --> 00:02:15,330
Parker Solar Probe is going to try and figure it out.

49
00:02:15,350 --> 00:02:18,170
The corona also propels the solar wind out into space

50
00:02:18,190 --> 00:02:19,590
at incredible speeds

51
00:02:19,600 --> 00:02:21,640
way beyond the orbit of Pluto.

52
00:02:21,640 --> 00:02:26,120
No one knows for sure what accelerates it so far so fast.

53
00:02:27,520 --> 00:02:31,180
Parker Solar Probe is going to fly right through the origin of this wind,

54
00:02:31,180 --> 00:02:35,440
right where it starts, to figure out how the whole system works

55
00:02:35,960 --> 00:02:39,600
We can’t see those processes from Earth, or even from space.

56
00:02:41,380 --> 00:02:46,560
Parker Solar Probe is our first direct encounter with a star.

57
00:02:47,620 --> 00:02:50,860
Our Sun is the only star we can visit….

58
00:02:50,860 --> 00:02:52,680
…which means this mission will gather

59
00:02:52,700 --> 00:02:57,180
important information about how stars work…everywhere.

60
00:02:57,180 --> 00:03:01,520
That’s information we can only get by going straight to the source.

61
00:03:01,540 --> 00:03:04,280
Some journeys are harder than others.

62
00:03:04,300 --> 00:03:08,880
Some destinations are further, higher, hotter.

63
00:03:08,900 --> 00:03:12,490

But the only way to explore a new destination

64
00:03:12,510 --> 00:03:15,190
is to actually make the journey.

65
00:03:15,200 --> 00:03:16,740
Parker Solar Probe: