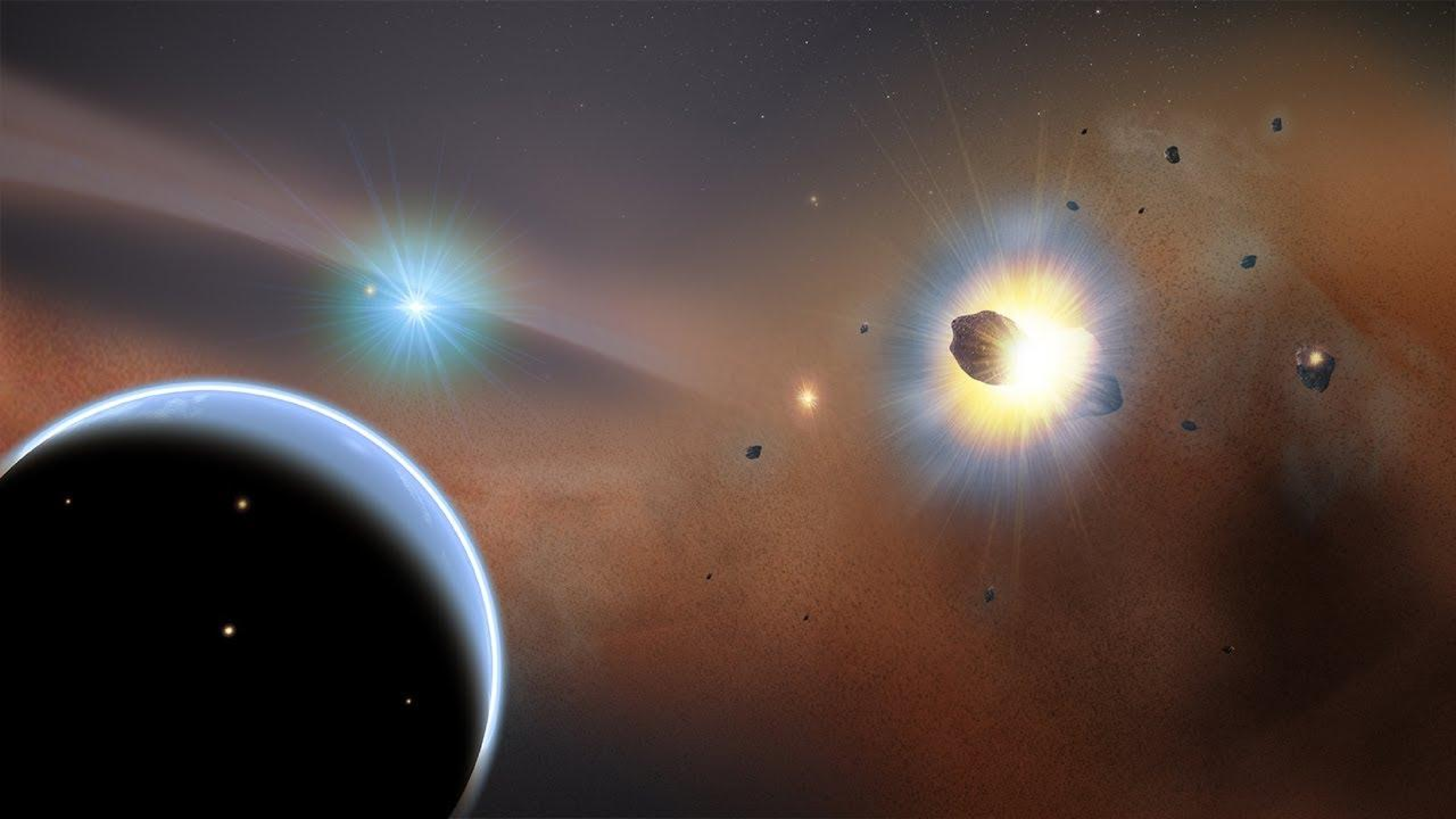

1
00:00:08,170 --> 00:00:04,060
[Music]

2
00:00:08,190 --> 00:00:12,210
I'm Aki Roberge,

3
00:00:12,230 --> 00:00:16,250
an astronomer at NASA's Goddard Space Flight Center. I've been studying

4
00:00:16,270 --> 00:00:20,340
a young nearby planetary system around the bright star Beta Pictoris.

5
00:00:20,360 --> 00:00:24,350
Located 63 light-years away, and only about

6
00:00:24,370 --> 00:00:28,380
20 million years old, the star is surrounded by a vast disk of

7
00:00:28,400 --> 00:00:32,450
gas, dust and comet-like bodies that we view edgewise.

8
00:00:32,470 --> 00:00:36,470
We know of one planet in there too, it's a giant planet tracking along

9
00:00:36,490 --> 00:00:40,520
an orbit nearly as large as Saturn's. I'm part of a team

10
00:00:40,540 --> 00:00:44,570
studying Beta Pic's disk using the ALMA observatory in Chile.

11
00:00:44,590 --> 00:00:48,640
We've found something odd: a belt of carbon monoxide

12
00:00:48,660 --> 00:00:52,660
gas centered about three times farther from the star than Neptune's

13
00:00:52,680 --> 00:00:56,690

distance from the sun. The total amount of gas is about

14
00:00:56,710 --> 00:01:00,710
one-sixth the mass of all the water in Earth's oceans. What's

15
00:01:00,730 --> 00:01:04,720
interesting is that incoming ultraviolet light should break up the carbon

16
00:01:04,740 --> 00:01:08,760
monoxide molecules in little more than a century, on average.

17
00:01:08,780 --> 00:01:12,820
This means that the carbon monoxide must be resupplied by the breakup of icy

18
00:01:12,840 --> 00:01:16,890
comets. To produce the amount of gas we detect, we're looking at the

19
00:01:16,910 --> 00:01:21,030
equivalent of the total destruction of a large comet every 5 minutes.

20
00:01:21,050 --> 00:01:25,090
From our data, we can tell that much of the carbon monoxide

21
00:01:25,110 --> 00:01:29,110
is in one or two massive clumps, which was very surprising.

22
00:01:29,130 --> 00:01:33,170
Because we're viewing the disk edge-on, we can't be sure if its one or

23
00:01:33,190 --> 00:01:37,200
two. Regardless, the comets suppling the gas must also

24
00:01:37,220 --> 00:01:41,220
be concentrated into clumps. How could this happen?

25
00:01:41,240 --> 00:01:45,290
If there is one clump, we think we're seeing the aftermath of collision

26
00:01:45,310 --> 00:01:49,310
between two icy planets about the mass of Mars.

27
00:01:49,330 --> 00:01:53,350
Such a collision would have occurred about half a million years ago, releasing large

28
00:01:53,370 --> 00:01:57,370
quantities of gas and small, comet-like fragments. The second

29
00:01:57,390 --> 00:02:01,430
--and we think more likely--scenario is that the carbon monoxide

30
00:02:01,450 --> 00:02:05,460
exists in two clumps and is continually replenished by by collisions in

31
00:02:05,480 --> 00:02:09,510
huge comet swarms. We believe the comets are shepherded together

32
00:02:09,530 --> 00:02:13,570
by an as-yet-undetected second planet whose gravity confines

33
00:02:13,590 --> 00:02:17,610
the comets into a small region so the frequently collide. A planet

34
00:02:17,630 --> 00:02:21,650
with roughly Saturn's mass could do the job. Other observations

35
00:02:21,670 --> 00:02:25,720
hint that the brightest clump is moving in a way that makes the two clump

36
00:02:25,740 --> 00:02:29,770
scenario more likely. Further observations will track it in better detail

37
00:02:29,790 --> 00:02:33,820
and help us confirm this dramatic picture.

38
00:02:33,840 --> 00:02:37,880

[Music][Beeping]