



1  
00:00:00,010 --> 00:00:04,060

Narrator: Every

2  
00:00:04,060 --> 00:00:08,090

5.4 years, comet 41P swings around the Sun

3  
00:00:08,090 --> 00:00:12,120

and puts on a show for observers on Earth.

4  
00:00:12,120 --> 00:00:16,180

Between March and April 2017, as the comet made its closest approach

5  
00:00:16,180 --> 00:00:20,210

to Earth, astronomers caught it doing something never before seen.

6  
00:00:20,210 --> 00:00:24,260

41P is an icy body from the Kuiper Belt,

7  
00:00:24,260 --> 00:00:28,340

the cold storage zone beyond Neptune.

8  
00:00:28,340 --> 00:00:32,460

Neptune's gravity first sent it hurtling toward the sun, and Jupiter trapped

9  
00:00:32,460 --> 00:00:36,660

it in its current orbit. As it nears the Sun,

10  
00:00:36,660 --> 00:00:40,870

the comet's icy areas warm up and turn to gas.

11  
00:00:40,870 --> 00:00:45,080

This forms jets that blast gas and dust into space.

12  
00:00:45,080 --> 00:00:49,240

This material becomes an extended atmosphere around the comet and makes up its

13  
00:00:49,240 --> 00:00:53,300

tail. To better understand how comets work,

14

00:00:53,300 --> 00:00:57,400

astronomers study how these jets change as a comet approaches and

15

00:00:57,400 --> 00:01:01,500

departs the inner solar system. From this, astronomers can measure

16

00:01:01,500 --> 00:01:05,590

how fast the comet rotates.

17

00:01:05,590 --> 00:01:09,680

When 41P approached, in March 2017, astronomers found

18

00:01:09,680 --> 00:01:13,750

it to be rotating about once every 20 hours. But when

19

00:01:13,750 --> 00:01:17,930

NASA's Swift studied the comet in May, 41P's rotation

20

00:01:17,930 --> 00:01:22,010

period had more than doubled. This is the largest, most

21

00:01:22,010 --> 00:01:26,180

abrupt rotational change ever seen on a comet.

22

00:01:26,180 --> 00:01:30,210

Comet 41P is a small object, smaller than most of the

23

00:01:30,210 --> 00:01:34,440

so-called Jupiter Family Comets, and very active.

24

00:01:34,440 --> 00:01:38,650

Astronomers think a particularly strong active area produced jets that

25

00:01:38,650 --> 00:01:42,730

lined up in just the right way to suddenly put the brakes on the comet's spin.

26  
00:01:42,730 --> 00:01:46,840  
Extrapolating from the Swift measurements,

27  
00:01:46,840 --> 00:01:50,980  
41P could have continued to slow in the following months,

28  
00:01:50,980 --> 00:01:55,000  
spinning less than once every four days by summer.

29  
00:01:55,000 --> 00:01:59,060  
This spin is too slow to keep the comet stable, so even

30  
00:01:59,060 --> 00:02:03,140  
small jets can set it wobbling like a top, or tumbling,

31  
00:02:03,140 --> 00:02:07,340  
and ultimately rotating around a different axis.

32  
00:02:07,340 --> 00:02:11,540  
Such changes affect which parts of the comet are exposed to sunlight.

33  
00:02:11,540 --> 00:02:15,710  
Perhaps, this will drive new levels of activity that will further change

34  
00:02:15,710 --> 00:02:19,880  
the comet's spin. Scientists have never before

35  
00:02:19,880 --> 00:02:24,070  
observed this phase of comet evolution, and they look forward to

36  
00:02:24,070 --> 00:02:28,260  
41P's next visit in 2022.