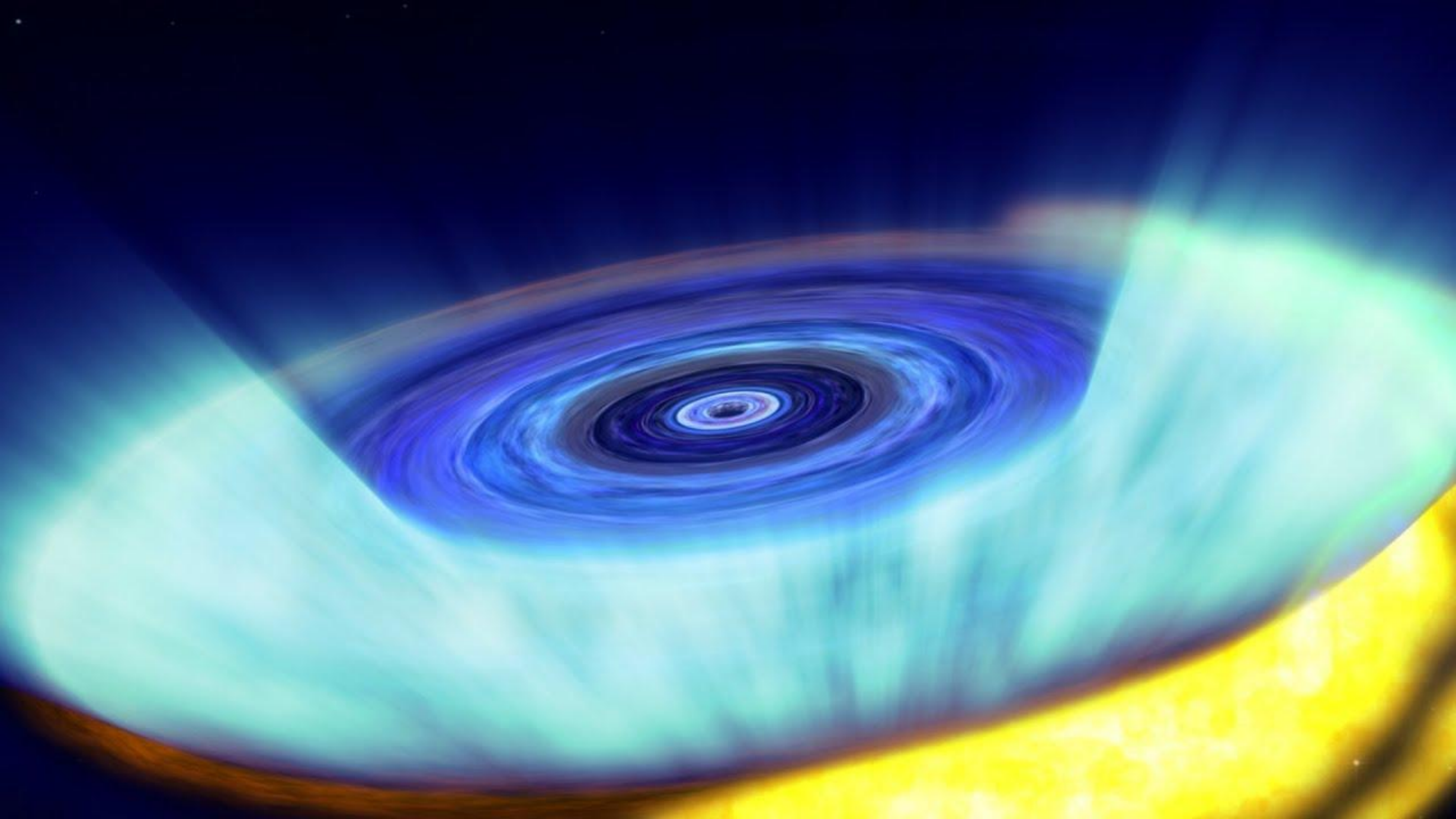

1
00:00:00,050 --> 00:00:09,060
Music

2
00:00:09,080 --> 00:00:13,160
The Milky Way is a diffuse glow that marks the central

3
00:00:13,180 --> 00:00:17,200
plane of our home galaxy. It's brightest whenever the constellations

4
00:00:17,220 --> 00:00:21,210
Sagittarius and Scorpius are in view. Between them, we're

5
00:00:21,230 --> 00:00:25,260
looking toward the very center of the Milky Way. Thick dust clouds block our

6
00:00:25,280 --> 00:00:29,290
view of the central region in visible light, but satellites like NASA's Swift,

7
00:00:29,310 --> 00:00:33,320
which detect X-rays, can see straight through them.

8
00:00:33,340 --> 00:00:37,350
On September 16, 2012, NASA's Swift noticed a new and

9
00:00:37,370 --> 00:00:41,390
rapidly brightening X-ray source a few degrees from the galactic center.

10
00:00:41,410 --> 00:00:45,420
Astronomers quickly realized that this was a bright X-ray nova,

11
00:00:45,440 --> 00:00:49,460
something so rare that it's the first one Swift has seen.

12
00:00:49,480 --> 00:00:53,560
The object, now identified as Swift J1745-26

13
00:00:53,580 --> 00:00:57,660

after its sky position reached peak brightness in

14
00:00:57,680 --> 00:01:01,680
high-energy X-rays in just over two days. At lower energies,

15
00:01:01,700 --> 00:01:05,680
such as those seen by Swift's X-ray telescope, it continued to brighten into

16
00:01:05,700 --> 00:01:09,710
October. Additional X-ray behavior told astronomers that

17
00:01:09,730 --> 00:01:13,740
the object at the center of this activity was a previously unknown black hole.

18
00:01:13,760 --> 00:01:17,750
The black hole is part of a binary system with a normal star like the

19
00:01:17,770 --> 00:01:21,860
sun. A stream of gas from the normal star flows into an accretion disk

20
00:01:21,880 --> 00:01:25,880
around the black hole. Usually in systems like these, the disk's

21
00:01:25,900 --> 00:01:29,930
gas spirals in toward the black hole, heats up greatly, and produces a steady

22
00:01:29,950 --> 00:01:33,950
X-ray glow. But with X-ray novae, there's a glitch in the disk.

23
00:01:33,970 --> 00:01:38,000
Gas builds up in the outer regions like water behind a dam.

24
00:01:38,020 --> 00:01:42,030
Once enough gas accumulates, which can take several decades, the dam

25
00:01:42,050 --> 00:01:46,060
breaks and a flood of gas surges toward the black hole, creating the X-ray nova

26
00:01:46,080 --> 00:01:50,090
outburst...and perhaps short-lived jets that blast particles outward at

27
00:01:50,110 --> 00:01:54,170
high-energy. Instabilities in gas disks regulate

28
00:01:54,190 --> 00:01:58,210
outbursts in a wide range of objects, highlighting the importance of understanding

29
00:01:58,230 --> 00:02:02,290
why some disks are more stable than others.