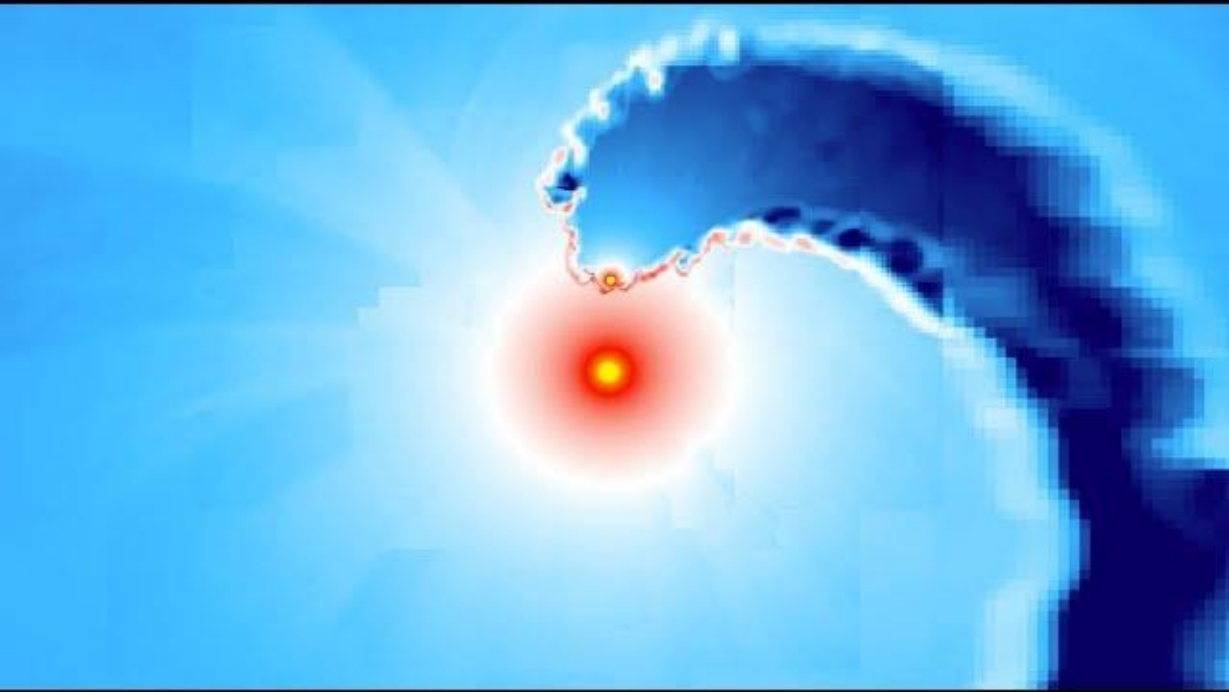

1
00:00:00,020 --> 00:00:10,030
Music

2
00:00:10,050 --> 00:00:14,070
NASA's Swift and ESA's XMM-Newton satellites

3
00:00:14,090 --> 00:00:18,100
have used their X-ray telescopes to watch the interaction between a pair of gigantic

4
00:00:18,120 --> 00:00:22,130
stars. This is a stellar grouping called Cygnus OB2,

5
00:00:22,150 --> 00:00:26,160
one of the richest collections of hot, massive O-type stars in the

6
00:00:26,180 --> 00:00:30,210
galaxy. Unfortunately for optical astronomers, this spectacular

7
00:00:30,230 --> 00:00:34,270
sight is mostly hidden by dust clouds. One of these stars

8
00:00:34,290 --> 00:00:38,330
is a radio source simply called Cygnus OB2 number 9.

9
00:00:38,350 --> 00:00:42,390
In 2008, astronomers concluded that the changes in radio emission only made

10
00:00:42,410 --> 00:00:46,400
sense if the star were actually a binary, with two massive stars in a tight

11
00:00:46,420 --> 00:00:50,430
orbit. Massive stars run so hot that they

12
00:00:50,450 --> 00:00:54,450
actually drive away some of their gas in powerful outflows called stellar winds.

13
00:00:54,470 --> 00:00:58,480

In binaries with two large young stars orbiting closely,

14
00:00:58,500 --> 00:01:02,480
these hot outflows collide and produce X-rays. Only a few

15
00:01:02,500 --> 00:01:06,510
of these colliding wind systems are known, and they aren't especially well behaved for

16
00:01:06,530 --> 00:01:10,530
astronomers. The collision may become turbulent, and X-rays may appear only

17
00:01:10,550 --> 00:01:14,550
at some times in the orbit. Which brings us back to Cygnus OB2 number

18
00:01:14,570 --> 00:01:18,570
nine. It should produce X-rays where the stars' winds collide, but there was

19
00:01:18,590 --> 00:01:22,600
no evidence for it. Perhaps it only occurred when the stars were closest in

20
00:01:22,620 --> 00:01:26,630
their 2.4-year orbit. The first opportunity to test this came

21
00:01:26,650 --> 00:01:30,650
during the close approach on June 28, 2011. So astronomers

22
00:01:30,670 --> 00:01:34,670
enlisted Swift and XMM-Newton, as well as ground-based observatories to monitor

23
00:01:34,690 --> 00:01:38,690
the system at intervals throughout the year. As the stars approach each other,

24
00:01:38,710 --> 00:01:42,730
their fierce winds crash together at several million miles an hour, reaching temperatures

25
00:01:42,750 --> 00:01:46,750
of millions of degrees and creating X-rays. As they separate,

26
00:01:46,770 --> 00:01:50,800
the collision strength decreases. Even so, these powerful winds

27
00:01:50,820 --> 00:01:54,820
will influence star formation in the binary's neighborhood.

28
00:01:54,840 --> 00:01:58,860
Cygnus OB2 number nine has turned out to be a

29
00:01:58,880 --> 00:02:02,880
model colliding wind binary, one of the most reliable and best behaved now known.

30
00:02:02,900 --> 00:02:06,930
It will be a key to better understanding how these systems

31
00:02:06,950 --> 00:02:10,970
help shape the galaxy. (Music)

32
00:02:10,990 --> 00:02:14,990
Music