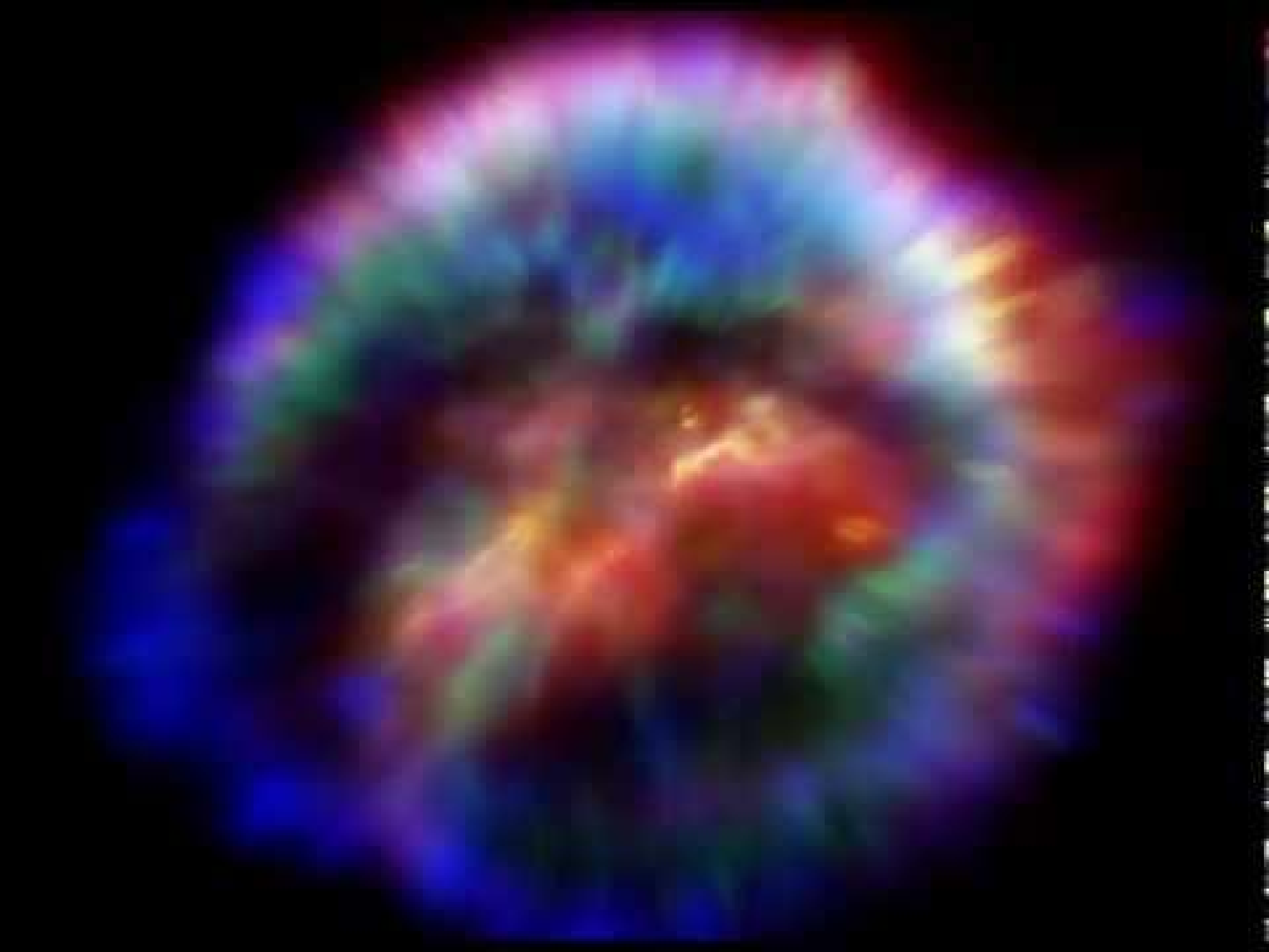

1
00:00:00,960 --> 00:00:07,550
\h The Chandra X-ray Observatory orbits high above the Earth, peering into the blackest reaches of space

2
00:00:07,550 --> 00:00:13,700
\h Exploring the most menacing and magnificent features of the cosmos, this remarkable telescope is reve

3
00:00:13,700 --> 00:00:31,290
\h our eyes can't, taking us beyond visible light.

4
00:00:31,290 --> 00:00:38,350
\h The bad boys of astronomy, black holes inspire well-deserved wariness and strange fascination.

5
00:00:38,350 --> 00:00:41,710
\h But what exactly are they?

6
00:00:41,710 --> 00:00:47,140
\h Scientists harnessing the incredible power of Chandra have discovered that black holes
play a

7
00:00:47,140 --> 00:00:53,700
\h critical role in both the development and demise of stars and galaxies.

8
00:00:53,700 --> 00:00:59,290
\h While astronomers have long known that
black holes existed, it wasn't until Chandra
was launched in

9
00:00:59,290 --> 00:01:04,760
\h 1999 that some of their elusive secrets were revealed.

10
00:01:04,760 --> 00:01:12,250
\h With its insightful perspective, Chandra has shed a revealing light on the dark mysteries of black holes.

11
00:01:12,250 --> 00:01:19,750
\h Focusing on the deepest depths of space, Chandra has witnessed the gluttonous eating habits of some

12
00:01:19,750 --> 00:01:24,200
\h HARVEY TANANBAUM: And in those

regions where the X-rays are deficient,

13
00:01:24,200 --> 00:01:28,750
\h where the gas voids exist, is the same regions where you see the radio lobes,

14
00:01:28,750 --> 00:01:31,300
\h these jets and lobes that are formed from the radios.

15
00:01:31,300 --> 00:01:36,480
\h So you know that energetic particles are being shot away from the black hole by some kind of mysteriou

16
00:01:36,480 --> 00:01:38,430
\h and they're clearing the gas away.

17
00:01:38,430 --> 00:01:40,350
\h They're pushing the gas aside.

18
00:01:40,350 --> 00:01:44,900
\h Because the gas has a density and a temperature, properties that we measure in the X-rays,

19
00:01:44,900 --> 00:01:49,630
\h it's very easy to calculate the amount of work that's needed to clear these voids.

20
00:01:49,630 --> 00:01:54,980
\h So you can actually measure the energy that's carried out by these jets of particles.

21
00:01:54,980 --> 00:02:01,240
\h However, not all black holes mean certain doom for their neighbors.

22
00:02:01,240 --> 00:02:10,430
\h Consider for example, one known as Sagittarius A Star, a black hole churning at the center of our own M

23
00:02:10,430 --> 00:02:17,710
\h Unlike its more malicious siblings, this black hole appears to be protecting a flock of young stars instead

24
00:02:17,710 --> 00:02:22,010
\h TANANBAUM: With Chandra, we're able to
measure the density and temperature of the

gas just outside

25
00:02:22,010 --> 00:02:24,980
\h the black hole at the center of the Milky Way galaxy,

26
00:02:24,980 --> 00:02:28,940
\h and there's plenty of gas there and it's hot!

27
00:02:28,940 --> 00:02:38,210
\h And we should see, even with conservative theories, instead of 100 billion times the amount of radiation

28
00:02:38,210 --> 00:02:46,890
\h we should see a billion times or some 100 million times; it doesn't matter, it's a large factor greater than

29
00:02:46,890 --> 00:02:55,320
\h Equal parts stellar destroyers and cosmic creators, Chandra's black holes exhibit dual nature.