



1
00:00:00,990 --> 00:00:07,620

\h The Chandra X-ray Observatory orbits high above the Earth, peering into the blackest reaches of space

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00:00:07,620 --> 00:00:13,200

\h Exploring the most menacing and magnificent features of the cosmos, this remarkable telescope is

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00:00:13,200 --> 00:00:30,880

\h revealing what our eyes can't, taking us beyond visible light.

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00:00:30,880 --> 00:00:38,260

\h NARRATOR: The cosmic ocean twinkles and transforms with the birth of stars and their explosive dem

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00:00:38,260 --> 00:00:45,490

\h Brilliantly bright and wrought with destructive power, supernovas and their gaseous remnants are a frequ

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00:00:45,490 --> 00:00:53,540

\h Chandra X-ray Observatory because of the clues they give us about their earlier lives as stars.

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00:00:53,540 --> 00:01:00,330

\h Equipped with X-ray detectors to cut through the clutter and glare that blind optical telescopes,

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00:01:00,330 --> 00:01:07,320

\h Chandra's revealed details about supernovas that help to shown them for the stars that they once were.

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00:01:07,320 --> 00:01:13,820

\h DR. PAT SLANE: You see the effects of the swept-up interstellar medium lighting up a ring of X-ray emi

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00:01:13,820 --> 00:01:20,800

\h You see the effects of the back pressure from that, pushing back toward the inside of the explosion whe

11
00:01:20,800 --> 00:01:27,160

\h the stuff that was formed in the explosion in the interior of the star, flying out.

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00:01:27,160 --> 00:01:31,510

\h That's being compressed and heated to X-ray temperatures, as well.

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00:01:31,510 --> 00:01:36,270

\h NARRATOR: Stars can burn anywhere from millions to billions of years.

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00:01:36,270 --> 00:01:43,030

\h Exactly how long they thrive for depends on the amount of gas they have to feed their nuclear furnaces.

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00:01:43,030 --> 00:01:48,340

\h Eventually though, their fuel is exhausted and the fire goes out.

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00:01:48,340 --> 00:01:54,520

\h Like a baby's first glimpse into the outside world, the Chandra X-ray Observatory's first sight

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00:01:54,520 --> 00:02:01,890

\h in deep space was a bright supernova remnant called Cassiopeia A.

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00:02:01,890 --> 00:02:04,400

\h DR. CLAUDE CANIZARES: In that very first image, we made a discovery.

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00:02:04,400 --> 00:02:11,790

\h There was a little point source at the center, which is probably the collapsed core of the star that exploded.

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00:02:11,790 --> 00:02:15,430

\h supernova went off. It's either a neutron star or black hole,

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00:02:15,430 --> 00:02:23,230

\h we're still not sure which, but people are still studying it and no one had ever seen it before.

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00:02:23,230 --> 00:02:29,490

\h NARRATOR: Ultimately, the death of stars may spawn the formation of other new planets and stars in the

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00:02:29,490 --> 00:02:34,810

\h Such objects are made up of elements like carbon, hydrogen and iron.

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00:02:34,810 --> 00:02:42,050

\h These elements are forged deep in the hot interior of stars and need a self-destructive explosion to un-

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00:02:42,050 --> 00:02:46,710

\h CANIZARES: What we're doing is studying essentially a star that's turned itself inside out,

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00:02:46,710 --> 00:02:53,210

\h very conveniently, and shown us what it's made of and what atomic elements might have been generated

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00:02:53,210 --> 00:02:59,030

\h synthesized in the star and are being returned to the interstellar medium where they're going to eventually

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00:02:59,030 --> 00:03:05,300

\h other material and form new stars, new planets and maybe life somewhere

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00:03:05,300 --> 00:03:08,920

\h if there's enough of the right material and the right conditions.