
M82
(SN 2014J)
X-ray
SN 2014J (pre-explosion)

1
00:00:17,020 --> 00:00:22,930
Earlier this year, astronomers discovered
one of the closest supernovas in decades.

2
00:00:22,930 --> 00:00:29,930
Now, new data from NASA's Chandra X-ray Observatory has provided information on the environment

3
00:00:30,630 --> 00:00:37,630
of the star before it exploded, and insight
into the possible cause of the explosion.

4
00:00:37,860 --> 00:00:44,860
On January 21, 2014, astronomers witnessed a supernova just days after it went off in

5
00:00:45,460 --> 00:00:52,460
the Messier 82, or M82, galaxy. Telescopes across the globe and in space turned their

6
00:00:54,640 --> 00:01:01,640
attention to study this newly exploded star.
Astronomers quickly determined this supernova,

7
00:01:01,910 --> 00:01:08,910
dubbed SN 2014J, belongs to a class of explosions called "Type Ia" supernovas. These supernovas

8
00:01:10,259 --> 00:01:16,259
are used as cosmic distance-markers and played a key role in the discovery of the Universe's

9
00:01:16,259 --> 00:01:22,830
accelerated expansion, which has been attributed to the effects of dark energy.

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00:01:22,830 --> 00:01:29,179
While astronomers agree that Type Ia supernovas occur when a white dwarf star explodes, they

11
00:01:29,179 --> 00:01:36,179
are not sure exactly how this happens. For
example, do these supernovas go off when the

12
00:01:36,240 --> 00:01:42,110

white dwarf pulls too much material from a
companion star like the Sun, or when two white

13
00:01:42,110 --> 00:01:49,110
dwarf stars merge? Researchers used Chandra to look for clues. They took observations

14
00:01:52,929 --> 00:01:59,929
with Chandra about three weeks after 2014J and compared it with Chandra data taken prior

15
00:02:00,060 --> 00:02:05,959
to the explosion. They found, well, nothing.

16
00:02:05,959 --> 00:02:11,810
Although it may sound counterintuitive, this non-detection of X-rays actually told astronomers

17
00:02:11,810 --> 00:02:18,280
quite a bit. Specifically, it showed that
the environment around the star was relatively

18
00:02:18,280 --> 00:02:25,000
free of material before it exploded. This
means that it's very unlikely that a messy

19
00:02:25,000 --> 00:02:32,000
transfer of material between the white dwarf and a companion star took place. Rather, whatever

20
00:02:32,340 --> 00:02:39,340
caused SN 2014J to explode cleared out the space around the star beforehand. This helps