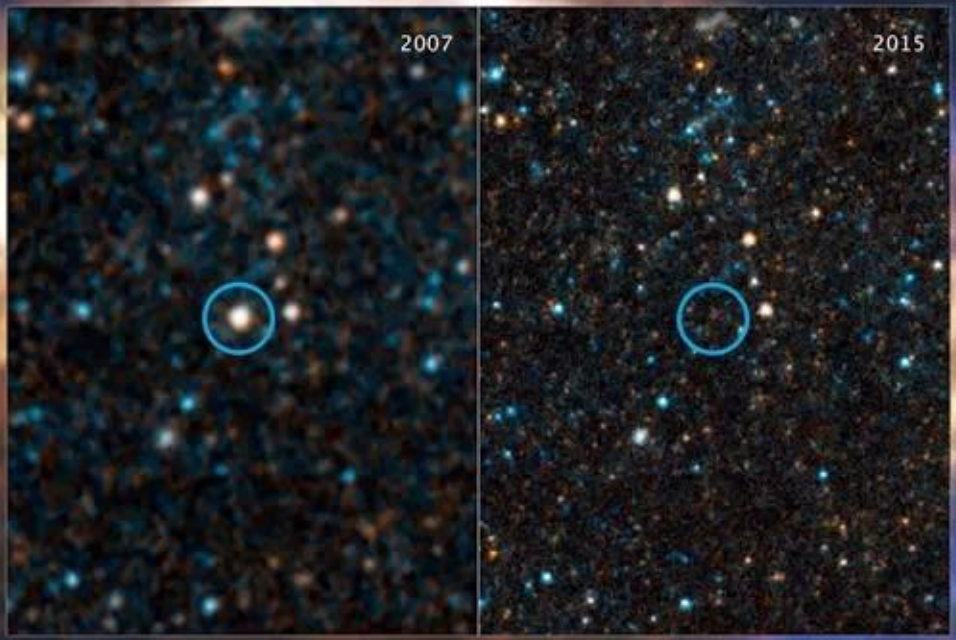
2007
2015

1
00:00:00,634 --> 00:00:03,470
For the first time ever,
astronomers might have witnessed

2
00:00:03,470 --> 00:00:07,908
a star actually become a black
hole right before our eyes... or

3
00:00:07,908 --> 00:00:11,078
telescopes. In this visible
light image from the Hubble

4
00:00:11,078 --> 00:00:14,882
Space Telescope, we can see a
large star about 25 times the

5
00:00:14,882 --> 00:00:18,151
mass of our Sun around 22
million light years away in the

6
00:00:18,151 --> 00:00:24,424
galaxy NGC 6946. This was in
2007. But in a Hubble image from

7
00:00:24,424 --> 00:00:27,961
2015, looking with the same
filters at the same wavelengths,

8
00:00:27,961 --> 00:00:33,233
the star appears to be gone. One
possible explanation - the star

9
00:00:33,233 --> 00:00:38,071
died and became a black hole.
But it gets weirder. The most

10
00:00:38,071 --> 00:00:40,540
prevalent theory for how a black
hole forms is through a

11
00:00:40,540 --> 00:00:44,278
supernova - if a star is big
enough, at the end of its life

12
00:00:44,278 --> 00:00:47,381
it will eject its outer layers
at high velocity in a massive

13
00:00:47,381 --> 00:00:50,851
explosion while the inner core
collapses into a very tiny

14
00:00:50,851 --> 00:00:54,454
space, creating a gravity well
so great that light can’t

15
00:00:54,454 --> 00:00:58,992
escape. Literally, a black hole.
So did we see this star go

16
00:00:58,992 --> 00:01:02,996
supernova? No, not really. A
team of astronomers was

17
00:01:02,996 --> 00:01:05,499
monitoring this star with the
Large Binocular Telescope in

18
00:01:05,499 --> 00:01:10,037
Arizona and saw the star get
brighter in 2009, but not nearly

19
00:01:10,037 --> 00:01:14,574
as bright as a supernova. They
call it a failed supernova. The

20
00:01:14,574 --> 00:01:18,245
star does expel its outer-most
layer, but relatively gently and

21
00:01:18,245 --> 00:01:22,115
not in a big explosion. Ok, so
this star got brighter in

22
00:01:22,115 --> 00:01:26,420
visible light in 2009, and then
disappeared in visible light.

23
00:01:26,420 --> 00:01:29,022
How do we know it’s not just
hidden behind a cloud of dust or

24
00:01:29,022 --> 00:01:32,859
something? The team checked for
that; they looked at infrared

25
00:01:32,859 --> 00:01:35,862
observations from the Spitzer
Space Telescope, which would be

26
00:01:35,862 --> 00:01:39,733
able to see the heat of dust
warmed by the star. What we see

27
00:01:39,733 --> 00:01:42,869
with Spitzer is there is some
emission in the mid-infrared,

28
00:01:42,869 --> 00:01:46,540
but it’s fading and fainter than
what you’d expect to see with a

29
00:01:46,540 --> 00:01:49,476
hidden star. The team thinks
instead that this infrared light

30
00:01:49,476 --> 00:01:52,813
is from the heat of gas falling
back onto the newly formed black

31
00:01:52,813 --> 00:01:56,850
hole. To help confirm that this
star is now a black hole, the

32
00:01:56,850 --> 00:01:59,519
team plans to analyze
observations taken with the

33
00:01:59,519 --> 00:02:03,390
Chandra X-Ray Observatory, which
would be able to reveal X-rays

34
00:02:03,390 --> 00:02:06,860
being emitted by the gas falling
into the black hole. The team

35
00:02:06,860 --> 00:02:09,529
also wants to continue
monitoring the star's location

36
00:02:09,529 --> 00:02:13,667
in visible light with Hubble,
in case the star is still
there and re-appears, and

37
00:02:13,667 --> 00:02:15,936
they'll want to look at the
location with the upcoming James

38
00:02:15,936 --> 00:02:19,006
Webb Space Telescope to check if
there's a surviving star hidden

39
00:02:19,006 --> 00:02:22,576
by cooler dust than can be
observed with Spitzer. So if

40
00:02:22,576 --> 00:02:25,645
this really is a black hole
birth, what does that mean for

41
00:02:25,645 --> 00:02:29,416
astronomy? First of all, this
would show that a star doesn’t

42
00:02:29,416 --> 00:02:33,353
need to go supernova to form a
black hole. Astronomers actually

43
00:02:33,353 --> 00:02:36,390
haven’t seen as many supernovas
occur with the largest stars as

44
00:02:36,390 --> 00:02:39,559
they would expect to see, and
they’ve been wondering why this

45
00:02:39,559 --> 00:02:44,264
is. Perhaps 10 to 30 percent of
massive stars don’t go supernova

46
00:02:44,264 --> 00:02:47,801
and are still able to simply
form a black hole. If future

47
00:02:47,801 --> 00:02:50,937
observations confirm this team’s
findings, this would be the

48
00:02:50,937 --> 00:02:54,441
first birth of a black hole ever
witnessed and the first failed

49
00:02:54,441 --> 00:02:57,344
supernova ever discovered, both
of which would usher in an

50
00:02:57,344 --> 00:03:00,814
exciting era of astronomy
research.