1
00:00:04,070 --> 00:00:01,670
[Music]

2
00:00:05,990 --> 00:00:04,080
nasa's fermi gamma-ray space telescope

3
00:00:08,950 --> 00:00:06,000
has spotted the shortest burst of gamma

4
00:00:10,709 --> 00:00:08,960
rays ever seen from a collapsing star

5
00:00:13,430 --> 00:00:10,719
it challenges the traditional

6
00:00:14,910 --> 00:00:13,440
classification of gamma-ray bursts also

7
00:00:18,230 --> 00:00:14,920
called

8
00:00:20,230 --> 00:00:18,240
grbs grbs those lasting less than two

9
00:00:22,470 --> 00:00:20,240
seconds are thought to occur when

10
00:00:25,509 --> 00:00:22,480
orbiting objects like neutron stars

11
00:00:27,990 --> 00:00:25,519
spiral together and merge

12
00:00:30,390 --> 00:00:28,000
longer bursts come from massive stars at

13
00:00:32,150 --> 00:00:30,400

the ends of their lives a black hole

14
00:00:35,110 --> 00:00:32,160
forms at the center of the collapsing

15
00:00:37,270 --> 00:00:35,120
star it drives long-lasting jets that

16
00:00:39,430 --> 00:00:37,280
drill through the star producing gamma

17
00:00:41,350 --> 00:00:39,440
rays when they emerge

18
00:00:43,270 --> 00:00:41,360
the star then transforms into a

19
00:00:47,110 --> 00:00:43,280
supernova

20
00:00:49,830 --> 00:00:47,120
on august 26 2020 fermi detected a grb

21
00:00:51,830 --> 00:00:49,840
lasting about one second

22
00:00:54,150 --> 00:00:51,840
instruments on other spacecraft saw it

23
00:00:56,069 --> 00:00:54,160
too including nasa's wind and mars

24
00:00:58,150 --> 00:00:56,079
odyssey missions

25
00:01:00,229 --> 00:00:58,160
they helped narrow down the location to

26
00:01:02,069 --> 00:01:00,239
a patch of sky in the constellation

27
00:01:03,990 --> 00:01:02,079
andromeda

28
00:01:06,070 --> 00:01:04,000
less than a day after the grb

29
00:01:08,230 --> 00:01:06,080
astronomers identified a fading source

30
00:01:10,070 --> 00:01:08,240
of visible light using the zwicky

31
00:01:11,670 --> 00:01:10,080
transient facility at palomar

32
00:01:14,230 --> 00:01:11,680
observatory

33
00:01:16,390 --> 00:01:14,240
this was the bursts afterglow

34
00:01:18,390 --> 00:01:16,400
nasa's swift satellite soon recorded

35
00:01:20,630 --> 00:01:18,400
x-rays from it and within days

36
00:01:22,230 --> 00:01:20,640
ground-based radio telescopes observed

37
00:01:24,310 --> 00:01:22,240
it too

38
00:01:26,550 --> 00:01:24,320

after a few weeks when the afterglow had

39
00:01:28,469 --> 00:01:26,560
decayed ground-based observatories

40
00:01:29,749 --> 00:01:28,479
confirmed the presence of a brightening

41
00:01:31,990 --> 00:01:29,759
supernova

42
00:01:35,910 --> 00:01:32,000
this means the grb must have come from a

43
00:01:38,550 --> 00:01:35,920
massive collapsing star not a merger

44
00:01:41,830 --> 00:01:38,560
astronomers think this burst called grb

45
00:01:43,190 --> 00:01:41,840
2008 2008-26a was on the verge of not

46
00:01:46,310 --> 00:01:43,200
occurring at all

47
00:01:48,870 --> 00:01:46,320
about 6.6 billion years ago a massive

48
00:01:50,149 --> 00:01:48,880
star in a distant galaxy reached the end

49
00:01:52,149 --> 00:01:50,159
of its life

50
00:01:54,469 --> 00:01:52,159
its core collapsed and formed a black

51
00:01:57,350 --> 00:01:54,479
hole which launched near-light speed

52
00:01:59,350 --> 00:01:57,360
particle jets through the star

53
00:02:02,149 --> 00:01:59,360
just as they breached the surface the

54
00:02:04,789 --> 00:02:02,159
jets shut down producing a surprisingly

55
00:02:07,109 --> 00:02:04,799
brief grb

56
00:02:09,749 --> 00:02:07,119
astronomers think it's likely some short

57
00:02:11,910 --> 00:02:09,759
grbs they've detected are misclassified

58
00:02:14,470 --> 00:02:11,920
as mergers when instead they're really

59
00:02:17,670 --> 00:02:14,480
bursts from jets that nearly failed to

60
00:02:20,229 --> 00:02:17,680
drill through collapsing stars

61
00:02:21,670 --> 00:02:20,239
we only detect grbs when the jets aim in

62
00:02:23,430 --> 00:02:21,680
our direction

63
00:02:26,229 --> 00:02:23,440

even accounting for this

64
00:02:28,550 --> 00:02:26,239
long grbs still occur at a lower rate

65
00:02:29,589 --> 00:02:28,560
than the supernova type associated with

66
00:02:32,229 --> 00:02:29,599
them

67
00:02:35,670 --> 00:02:32,239
this means most collapsing massive stars

68
00:02:36,710 --> 00:02:35,680
likely fail to produce long-lived jets

69
00:02:39,190 --> 00:02:36,720
dying

70
00:02:40,630 --> 00:02:39,200
at least from the gamma-ray perspective

71
00:02:44,050 --> 00:02:40,640
with a whimper