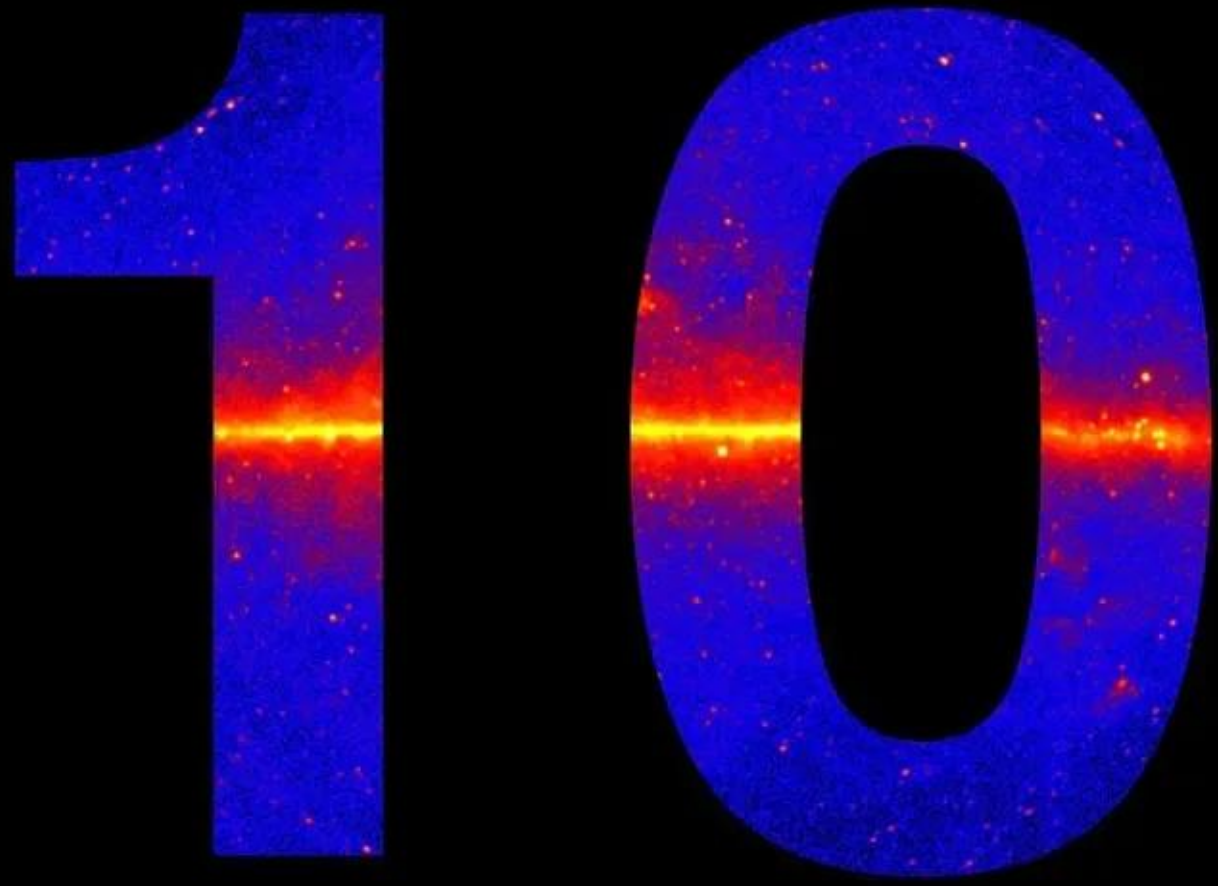
10

1
00:00:00,060 --> 00:00:04,090
[Music throughout](Announcer): Liftoff of the Delta rocket carrying a gamma-ray telescope

2
00:00:04,110 --> 00:00:08,240
searching for unseen....[fades out] (Narrator): I'm Julie Mcenery, Fermi project

3
00:00:08,260 --> 00:00:12,370
scientist. Since its launch in 2008, the Fermi Gamma-ray

4
00:00:12,390 --> 00:00:16,430
Space Telescope has revolutionized our understanding of the cosmos.

5
00:00:16,450 --> 00:00:20,520
Fermi has mapped the entire sky in gamma rays, the highest-energy form of light,

6
00:00:20,540 --> 00:00:24,220
and detected thousands of sources so far.

7
00:00:24,220 --> 00:00:28,520
In celebration of its 10th anniversary in space, here are five of its

8
00:00:28,520 --> 00:00:33,000
transformative discoveries. In 2017, Fermi saw

9
00:00:33,020 --> 00:00:37,110
a gamma-ray burst coming from the constellation Hydra. The burst

10
00:00:37,130 --> 00:00:41,290
was tied to ripples in space-time detected by the Laser Interferometer

11
00:00:41,310 --> 00:00:45,490
Gravitational Wave Observatory, operated by the National Science Foundation.

12
00:00:45,510 --> 00:00:49,660
This was the first time light and gravitational waves were detected from the same source.

13
00:00:49,680 --> 00:00:53,740

Scientists believe the event formed when two neutron stars merged. The merger

14
00:00:53,760 --> 00:00:57,870
created the gravitational signal and a jet of particles traveling at nearly the speed

15
00:00:57,890 --> 00:01:02,070
of light that gave off gamma rays. In 2009,

16
00:01:02,090 --> 00:01:06,280
Fermi used a short-duration gamma-ray burst to confirm that all light

17
00:01:06,300 --> 00:01:10,350
travels at the same speed, no matter its energy. This proved Einstein's theory

18
00:01:10,370 --> 00:01:14,540
that space-time is smooth and continuous.

19
00:01:14,560 --> 00:01:18,750
Early in Fermi's mission, scientists noted odd structures emerging from

20
00:01:18,770 --> 00:01:22,850
above and below the Milky Way. These bubbles, spanning

21
00:01:22,870 --> 00:01:26,980
50,000 light-years, were produced by our galaxy's supermassive black hole and are

22
00:01:27,000 --> 00:01:31,180
only a few million years old. In 2013,

23
00:01:31,200 --> 00:01:35,270
Fermi studied the remains of two supernovas to learn more about cosmic rays,

24
00:01:35,290 --> 00:01:39,370
particles traveling at nearly the speed of light. It was hard to find the source

25
00:01:39,390 --> 00:01:43,480
of cosmic rays because they veer off course as they travel and encounter magnetic fields.

26
00:01:43,500 --> 00:01:47,600
Fermi showed that gamma rays from these supernova remnants

27
00:01:47,620 --> 00:01:51,720
came from cosmic rays that were accelerated by the explosions' blast waves.

28
00:01:51,740 --> 00:01:55,910
Fermi has seen 5,000 terrestrial gamma-ray flashes

29
00:01:55,930 --> 00:02:00,100
in the last 10 years. These flashes are associated with lightning

30
00:02:00,120 --> 00:02:04,190
and thunderstorms in Earth's atmosphere.

31
00:02:04,210 --> 00:02:08,320
From Earth, to the farthest reaches of the cosmos, Fermi's first ten years

32
00:02:08,340 --> 00:02:12,500
have fundamentally altered how we look at the universe. Who knows what mysteries

33
00:02:12,520 --> 00:02:16,080
remain to be solved?