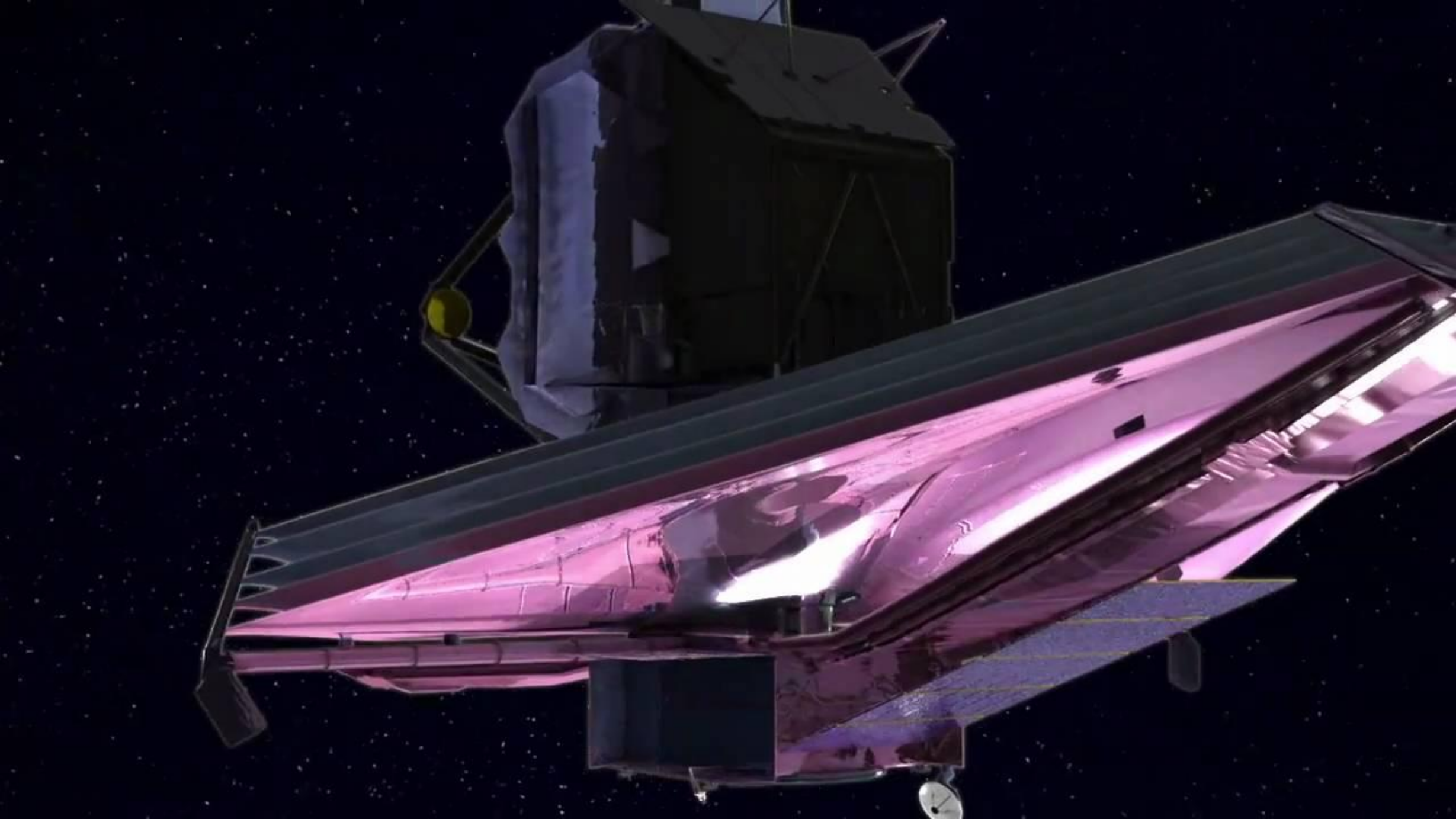

1
00:00:08,090 --> 00:00:04,040
sound effects

2
00:00:12,150 --> 00:00:16,160
The deeper we look into SPACE,
the farther back we see

3
00:00:16,180 --> 00:00:20,180
in TIME. Light travels

4
00:00:20,200 --> 00:00:24,200
670 million miles an hour. But
even at this speed, light

5
00:00:24,220 --> 00:00:28,220
light from even the closest big
galaxies takes millions of
years to reach us.

6
00:00:28,240 --> 00:00:32,230
Looking deep is looking back

7
00:00:32,250 --> 00:00:36,270
back to when the universe was
younger. Right now,

8
00:00:36,290 --> 00:00:40,320
our best tool for viewing the
young universe is NASA's Hubble
Space Telescope.

9
00:00:40,340 --> 00:00:44,400
This is Hubble's

10
00:00:44,420 --> 00:00:48,450
deepest view into space, known
as the Hubble Ultra Deep Field.

11
00:00:48,470 --> 00:00:52,500

Here, astronomers have found galaxies so far

12
00:00:52,520 --> 00:00:56,550
away that their light began its journey to us more than

13
00:00:56,570 --> 00:01:00,680
13 billion years ago. We're seeing these galaxies as they were

14
00:01:00,700 --> 00:01:04,710
when the universe was just 600 million years old.

15
00:01:04,730 --> 00:01:08,720
In human terms, this discovery is comparable to a teenager

16
00:01:08,740 --> 00:01:12,720
looking at a 6-month-old baby.But for these galaxies,

17
00:01:12,740 --> 00:01:16,770
the universe was no nursery. It was more like a brutal

18
00:01:16,790 --> 00:01:20,810
football game.

19
00:01:20,830 --> 00:01:24,850
The earliest galaxies were small dwarfs — smaller even than the ones

20
00:01:24,870 --> 00:01:28,930
Hubble has seen. They grew by colliding and merging with other small galaxies,

21
00:01:28,950 --> 00:01:32,970
as shown in this simulation.
Over billions

22
00:01:32,990 --> 00:01:37,000
of years, these mergers built
up the giant galaxies we see

23
00:01:37,020 --> 00:01:41,020
today. Mergers triggered pulses
of star formation

24
00:01:41,040 --> 00:01:45,050
that created the elements
necessary for planets ... and
ultimately,

25
00:01:45,070 --> 00:01:49,070
life. But to see beyond Hubble,

26
00:01:49,090 --> 00:01:53,140
to witness the origin and
development of galaxies,

27
00:01:53,160 --> 00:01:57,260
astronomers need a new tool.

28
00:01:57,280 --> 00:02:01,310
This is Hubble's successor, the
James Webb Space Telescope,
which is

29
00:02:01,330 --> 00:02:05,350
now being built. Its mirror —
2.75 the size

30
00:02:05,370 --> 00:02:09,400
of Hubble's — and instruments
are optimized for a part

31
00:02:09,420 --> 00:02:13,420
of the spectrum where the most
distant galaxies shine — the
infrared.

32
00:02:13,440 --> 00:02:17,460
Hubble sees

33
00:02:17,480 --> 00:02:21,540
infant galaxies. The James Webb

34
00:02:21,560 --> 00:02:25,610
Space Telescope will see
newborns.