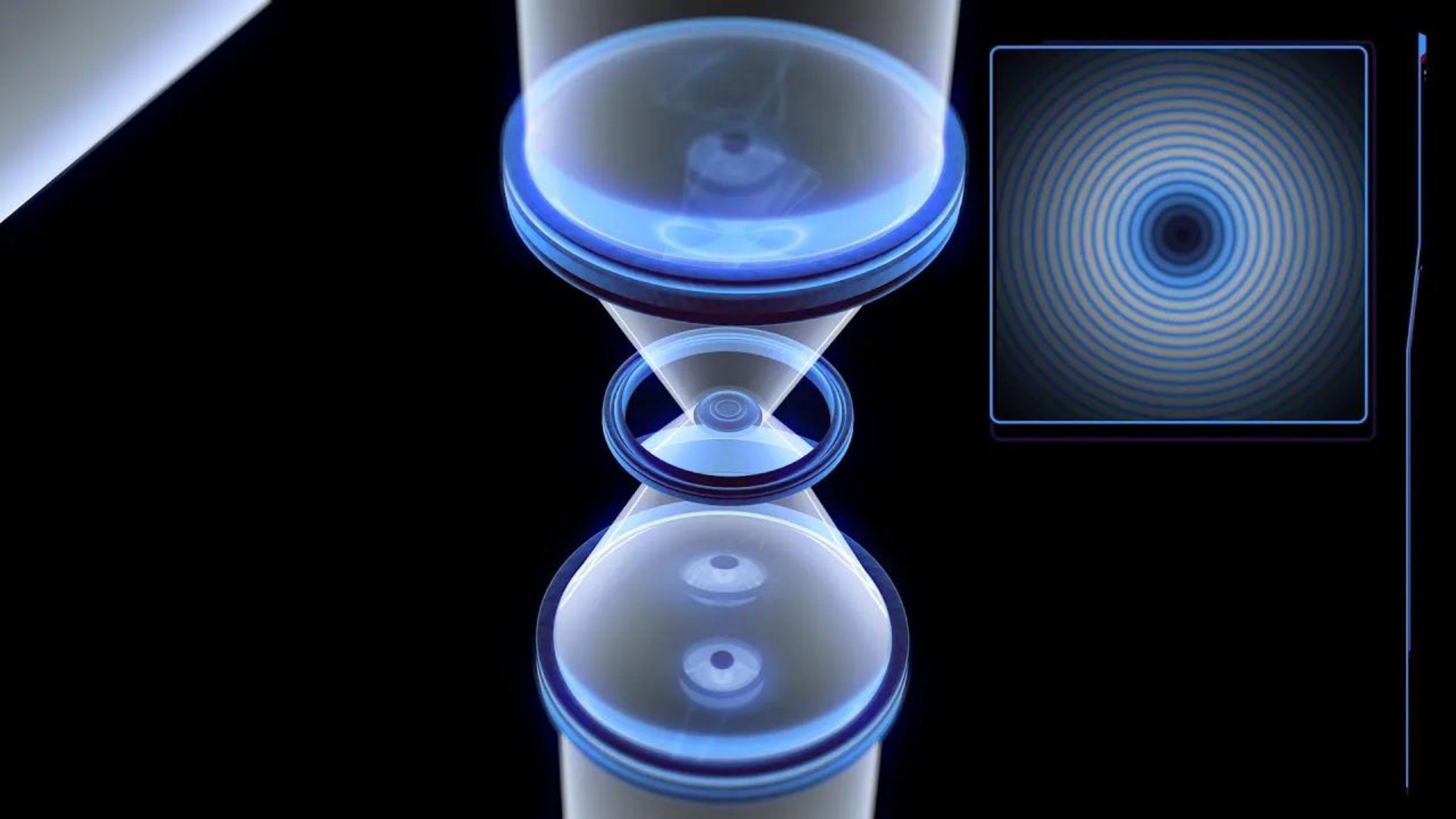

1
00:00:01,050 --> 00:00:05,030
[Music throughout] A coronagraph is

2
00:00:05,050 --> 00:00:09,030
a way to see distant planets hidden by the glare of the star they orbit.

3
00:00:09,050 --> 00:00:13,030
The coronagraph reduces the light coming directly from the star to separate it from

4
00:00:13,050 --> 00:00:17,030
the light reflected by the planet. WFIRST

5
00:00:17,050 --> 00:00:21,030
doesn’t block the star’s light with an opaque disk as a simple coronagraph might.

6
00:00:21,050 --> 00:00:25,030
Instead, it uses a combination of disks with complex

7
00:00:25,050 --> 00:00:28,980
patterns and light-blocking stops to create destructive interference

8
00:00:29,000 --> 00:00:33,030
with the star’s light, effectively making it disappear,

9
00:00:33,050 --> 00:00:37,030
while allowing the light from planets to pass through.

10
00:00:37,050 --> 00:00:41,030
A complicating factor is that the light picks up small distortions as it reflects off the

11
00:00:41,050 --> 00:00:45,030
telescope’s series of mirrors, and these distortions can reduce the effectiveness

12
00:00:45,050 --> 00:00:49,030
of the destructive interference. Collecting more light

13
00:00:49,050 --> 00:00:53,030

increases the image signal, but the planets are still hidden under blobs of leftover

14
00:00:53,050 --> 00:00:57,030
distorted starlight. To remove these blobs, the

15
00:00:57,050 --> 00:01:01,030
coronagraph has special deformable mirrors that can change shape by using

16
00:01:01,050 --> 00:01:05,030
hundreds of tiny pistons. This corrects distortions in the light beam.

17
00:01:05,050 --> 00:01:09,030
As the mirrors deform, the blobs of light slowly begin to

18
00:01:09,050 --> 00:01:12,980
disappear, revealing brighter planets. Further adjustment

19
00:01:13,000 --> 00:01:16,980
brings fainter planets into view. Advanced software

20
00:01:17,000 --> 00:01:21,030
processes this data, further improving the contrast and clarity of the

21
00:01:21,050 --> 00:01:24,980
image. This processing makes objects more than a billion times

22
00:01:25,000 --> 00:01:28,980
fainter than the star visible. As a result,

23
00:01:29,000 --> 00:01:32,980
WFIRST will provide the first look at individual planets in star systems

24
00:01:33,000 --> 00:01:36,980
that might be similar to our own.