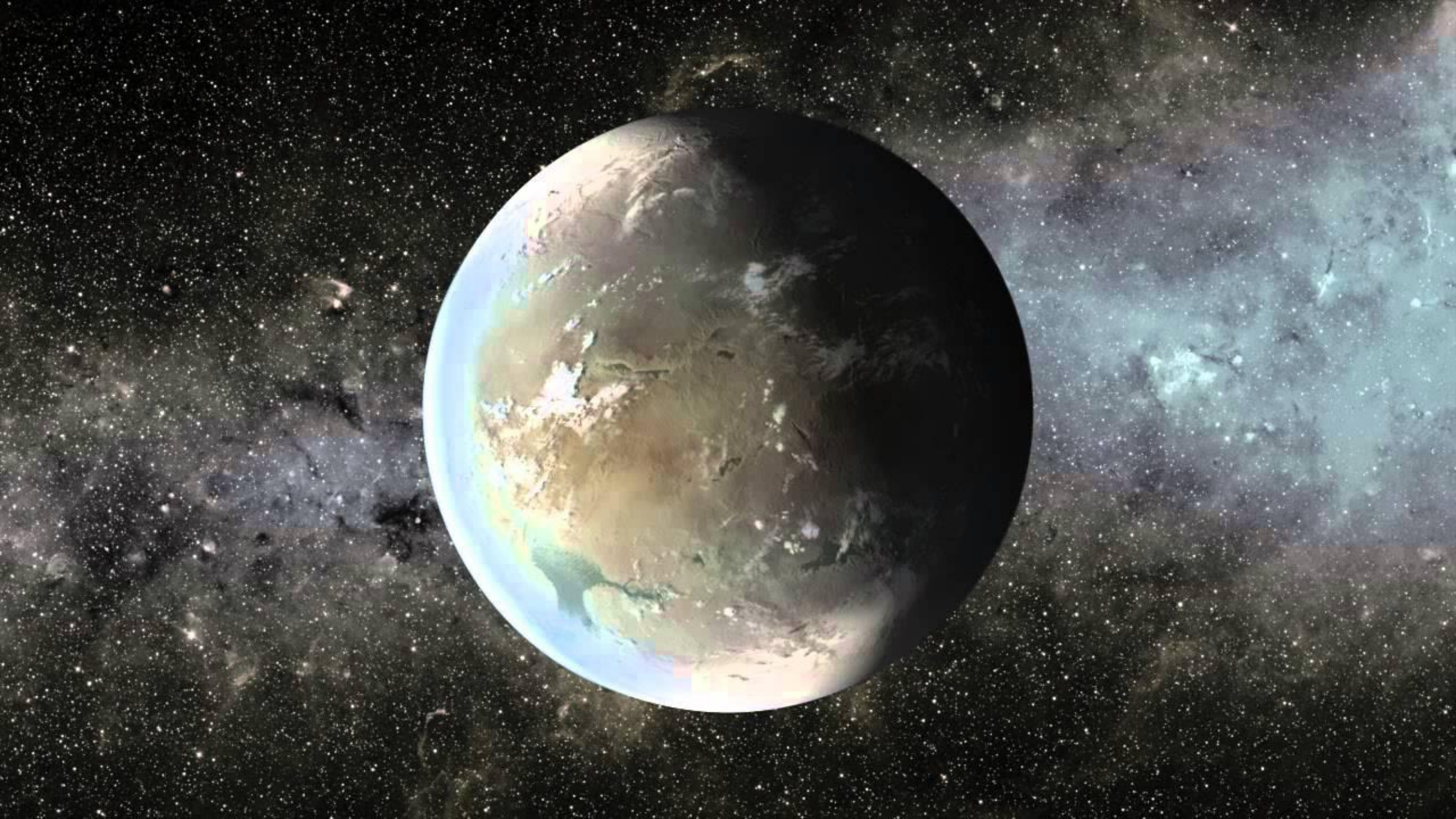

1
00:00:03,210 --> 00:00:03,590
NARRATOR:

2
00:00:03,590 --> 00:00:07,890
Hey everybody, and welcome to Exoplanet Q
& Alien. Today we're going to be talking about

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00:00:07,890 --> 00:00:10,900
something really cool called direct imaging.

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00:00:10,900 --> 00:00:15,330
Direct imaging is a fairly new method of finding
exoplanets. It hasn't been until recently

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00:00:15,330 --> 00:00:18,660
that telescope technology has advanced to
the point where it's possible.

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00:00:18,660 --> 00:00:21,130
From a basic perspective, direct imaging is

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00:00:21,130 --> 00:00:25,329
essentially taking pictures of exoplanets,
but it's a lot more complicated than that.

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00:00:25,329 --> 00:00:27,390
You see, Earth's atmosphere is constantly

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00:00:27,390 --> 00:00:31,820
moving around and distorting the light that
comes from objects in space. It's the reason

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00:00:31,820 --> 00:00:34,229
that stars seem to twinkle in the night sky.

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00:00:34,229 --> 00:00:35,969
In order to get around this, scientists use

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00:00:35,969 --> 00:00:40,510
a system called "adaptive optics", which uses
a segmented mirror that can change its shape

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00:00:40,510 --> 00:00:42,350
hundreds of times per second.

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00:00:42,350 --> 00:00:46,269
The atmosphere is only part of the problem
though, planets are millions of times dimmer

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00:00:46,269 --> 00:00:51,109
than the bright stars they orbit, and they're
very far away. Seeing an exoplanet is kind

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00:00:51,109 --> 00:00:55,320
of like spotting a firefly flying around a
spotlight from the other side of the country.\

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00:00:55,320 --> 00:00:57,809
To solve this problem, scientists use an instrument

18
00:00:57,809 --> 00:01:01,909
that blocks the light of a faraway star in
the same way that the moon blocks the light

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00:01:01,909 --> 00:01:04,059
of the sun during a solar eclipse.\

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00:01:04,059 --> 00:01:08,360
Right now, scientists and engineers at NASA
are working on two different methods for doing

21
00:01:08,360 --> 00:01:09,020
this.

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00:01:09,020 --> 00:01:13,590
Coronagraphs, which are already being used
in ground-based observatories, block starlight

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00:01:13,590 --> 00:01:15,460
after it enters a telescope.

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00:01:15,460 --> 00:01:19,329
An external starshade, on the other hand,
would be a separate spacecraft that blocks

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00:01:19,329 --> 00:01:21,659
starlight before it even enters the telescope.

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00:01:21,659 --> 00:01:25,540
Either way, these instruments have the same
goal: blocking the light of a faraway star

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00:01:25,540 --> 00:01:27,650
in order to see the planets that are orbiting
it.

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00:01:27,650 --> 00:01:29,540
Right now, the best pictures we can take of

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00:01:29,540 --> 00:01:33,329
exoplanets still look pretty blurry and blobby,
but we're just getting started.

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00:01:33,329 --> 00:01:35,680
Future space telescopes might be so powerful

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00:01:35,680 --> 00:01:40,380
that they can see stuff on other planets,
like continents and oceans and vegetation.