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00:00:12,349 --> 00:00:17,800
Opening the door to let the light in is a lot like how NIRSPEC does its job.

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00:00:17,800 --> 00:00:23,880
Let's go inside the ASTRIUM clean room in Ottobrunn, Germany to find out how.

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00:00:23,879 --> 00:00:27,189
So, Ralf, does NIRSPEC involve the opening of doors?

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00:00:27,189 --> 00:00:32,349
Ralf Ehrenwinkler/NIRSPEC I&T Manager: That's correct. But our doors are very small. If you have a look here, you see

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00:00:32,348 --> 00:00:37,919
thousands of doors in this array. And it's called micro shutters and if the doors are

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00:00:37,920 --> 00:00:42,600
open, you can have a look to the universe. Is there any way we can actually see the

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00:00:42,600 --> 00:00:48,600
micro shutter array in NIRSPEC? Yes for that we have to go into the cleanroom.

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00:00:48,600 --> 00:00:55,859
Our arrays on NIRSPEC... we have four of them. They're here, within this black arc. Ok, so there's four of them.

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00:00:55,859 --> 00:01:01,109
So you see two by two. Is that the spectrometer that it's in? This is the entrance of

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00:01:01,109 --> 00:01:05,019
the spectrometer. My eyesight's pretty good but it's not good enough to see

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00:01:05,019 --> 00:01:09,049
thousands of little doors or thousands of little micro shutters. How can I get a better look?

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00:01:09,049 --> 00:01:15,100

If you really want to know how to know how these doors are working, you should have to go to

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00:01:15,099 --> 00:01:22,379

NASA Goddard Space Flight Center at Maryland. Sounds good. Thank you so much for showing us the micro shutters in NIRSPEC. You're welcome.

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00:01:22,379 --> 00:01:26,670

So Harvey, Ralf from Astrium just sent us from across the pond to

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00:01:26,670 --> 00:01:31,399

find out more about how micro shutters work, but first I have a question. Why do we

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00:01:31,399 --> 00:01:35,780

need micro shutters on NIRSPEC? Harvey Moseley/Astrophysicist, NASA Goddard: Well, in order to tell you about that I need to

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00:01:35,780 --> 00:01:41,349

remind you the James Webb is supposed to study the universe at a time when the

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00:01:41,349 --> 00:01:46,259

first galaxies were forming. In order to really tell if they are citizens of this

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00:01:46,259 --> 00:01:51,368

very early phase of the universe we need to do a spectroscopic study of those

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00:01:51,368 --> 00:01:56,679

galaxies. They'll be very very faint so it's going to take us a very long time

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00:01:56,679 --> 00:02:01,450

to do those measurements... and after looking at the picture of the sky, we

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00:02:01,450 --> 00:02:05,700

identify where these objects are and we just open the shutters on each of these

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00:02:05,700 --> 00:02:12,490

locations. So basically, it isolates parts of the universe for you right? Exactly.

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00:02:12,490 --> 00:02:17,860

It let's observe say a hundred objects at one time rather than just one at a time,

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00:02:18,419 --> 00:02:24,699

so it makes JWST a hundred times as effective to explore the early universe.

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00:02:25,199 --> 00:02:26,639

Can I take a look?

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00:02:26,639 --> 00:02:36,708

Sure. Okay. So you're seeing the micro shutters there. The array has two hundred and

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00:02:36,709 --> 00:02:42,229

fifty thousand shutters in it. You're seeing only a tiny fraction of what's on there.

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00:02:43,000 --> 00:02:47,848

Now we can move in and see a single door in greater detail the height

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00:02:47,848 --> 00:02:54,018

of that door is only about twice the diameter of a hair. What are the smaller

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00:02:54,019 --> 00:03:00,099

rectangles on the shutter? These are stripes of magnetic material to allow

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00:03:00,099 --> 00:03:05,780

the magnet to open the shutter. Come on in, Mary. In here, we have a micro shutter array

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00:03:05,900 --> 00:03:12,330

set up where we can open it with a magnet so you can see how the little

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00:03:12,330 --> 00:03:18,140

shutters work. As we slide the magnet across here it's open and you can see

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00:03:18,139 --> 00:03:23,958

the NASA logo behind it and pull it back
and it's closed. When we combine that

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00:03:23,959 --> 00:03:25,810

with our electronics

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00:03:25,810 --> 00:03:31,289

we can actually open any single shutter
in the entire array. Well, Harvey, thank you so much

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00:03:31,289 --> 00:03:35,500

for helping us understand how micro shutters work on NIRSPEC. Well thank you

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00:03:35,500 --> 00:03:40,909

very much opportunity to show them off.
While this new technology was developed

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00:03:40,909 --> 00:03:45,199

specifically for Webb, the use of
micro shutters is being planned for

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00:03:45,199 --> 00:03:49,479

other telescopes. Thanks for joining us
for this edition of Behind the Webb.