PROFESSOR: Now, we are ready to look at Fraunhofer diffraction associated with circular apertures. The setup, again, is the same as before. But I just want to remind you of it. We have a helium-neon laser. Beam from the laser is reflected by this mirror and then reflected again by this mirror into this lens. And now we have the lens focusing the light onto a set of apertures. And then the diffraction light from the aperture then goes onto the screen.

Now, these apertures have different diameters. Actually, they're tiny pinholes. So the first one we have has a 100 micron diameter. So, now, if we look at the screen, we see the diffraction pattern associated with 100 micron diameter aperture. Again, let me give you some dimensions. The separation between the aperture and the screen is about 100 centimeters, the light is from the helium-neon laser at 6328 angstroms, and the scale on the screen from here to here, which is the diameter of the first dark ring, is about 1.6 centimeters.

So, now, you can check the diffraction pattern, given the information that I've just presented to you. At the moment, you see-- first of all, let me do some adjustment, make sure that I'm picked up. And what you see, you see a bright ring in the middle and then some faint rings around the central bright ring. There are actually many rings, but because they're so faint, you can't see them.

So what I'm going to do is pull away this screen and expose to you a more sensitive screen, as we can see. Now, you see that we're saturating in the middle, but we're beginning to see other rings. Now, if we open up the camera aperture some more, you can see even more rings. And, again, all these rings, and their intensities, and sizes, and what have you can be calculated from the information that I've given you.

So, now, this is then the Fraunhofer diffraction pattern associated with 100 micron aperture. Now, I would like to move to the next aperture, which is 50 microns. And then I'm going to do a little tweaking so I have it nicely picked up. Good. So, now, if we can look at it on the whole screen, this is then the diffraction pattern of a 50 micron aperture, and you can see that the size of the central fringe is bigger. And, again, from the information that I've given you, you should be able to calculate what it should be.

Again, if we open up the aperture in the camera, maybe we can start to see a few more rings. And, again, the light level is smaller than with the previous aperture, because, again, the aperture is only 50 microns this time. Now, we've seen the Fraunhofer diffraction pattern associated with a rectangular aperture. And then, just now, we saw the diffraction associated with a circular aperture.

In the next demonstration, we're going to show the Fraunhofer diffraction pattern associated with multiple slits-- with a two-dimensional array of multiple slits. So when we come back, we'll have the setup arranged so we can demonstrate that effect for you.