MARKUS KLUTE: Welcome back to special relativity. Bending of light is one of the spectacular consequences of general relativity, a prediction, if you want, [? of ?] [? general ?] relativity, which was experimentally confirmed. But let's analyze the situation first before we look at the actual evidence.

They use Alice and Bob again, where Alice is an elevator operator. She's stationary and operating this elevator. Bob is a passenger and riding within the elevator. So Alice is injecting a light beam and watching this light beam in the elevator from outside. And the light beam, as you would expect, is going in a straight line. We'll see pictures here show the elevator at three different times-- [? t1, ?] [? t2, ?] and t3.

For Bob, the very same situation looks completely different. He sees the light entering the elevator. And then after some time, the light pulse is maybe on the height of his head. And after some additional time, he sees the light at the end-- or at the bottom part of the elevator. So if you would draw a line on the back of the elevator where he was able to observe the light pulses, you could draw this line. So for Bob, who's stationary in this accelerating reference frame, light is bending.

As we discussed in the first section in this chapter, there's an equivalence between accelerating and the gravitational field causing an acceleration. And so you can use heavy objects, like the Sun, in order to bend light. And this led to the first observation of the rotational bending of light. And so in order to do this, we want to have a star very close, or starlight passing very close to the Sun. And because the Sun is very bright, you want to use solar-- a total solar eclipse in order to test this effect.

And this was first achieved in 1919 with a solar eclipse in Brazil, also at the West Coast of Africa, by Arthur Eddington. And so this then led to Einstein really becoming famous. I talk about this later. You might remember the last partial eclipse here in Massachusetts in 2017. I have a vivid memory of this, showing this to my kids up into the sky, obviously, with proper eye protection.

So the idea is, again, that you have a star, and light passes by the Sun. And because of the gravitational bending of the Sun, there's a bending effect. So there seems to be an offset of the actual start position due to the bending.

And this effect, again, was discovered-- or was measured in 1919 by Arthur Eddington, and let's-- maybe because of an article in *The New York Times* to the fame of Albert Einstein. So at the time, there was no science reporters for newspapers. So a former sports reporter reported on the scientific endeavor.

And the way he writes about it is rather interesting. You might want to read the entire article. But here's just the headlines. And it read like, "Lights All Askew in the Heavens," "Men of Science More or Less Agog Over Results Of Eclipse Observations," "Einstein's Theory Trumphs," Stars not Where They Seemed or Were Calculated to Be, But Nobody Need to Worry," "A Book for 12 Wise Men," "No more in all the world could comprehend it," said Einstein, when his daring publisher accepted it.

So, again, this populous writing made Einstein very popular. He was then later invited to come and visit to the United States and made a tour, which he also used for political reasons. But, really, it made him very, very famous-- made him a pop star of the time.