**MARKUS KLUTE:** Welcome back to 8.20 Special Relativity. In this short video, you're going to see how special relativity, here shown as SR, fits into the general landscape of physics theories. Very likely you have listened to 8.01 last semester or some previous time in your career at MIT. And once we enter the discussion of special relativity, it might seem to you that what you learned there was simply incorrect.

A better way to look at this is that each of those physics theories, they have a range of validity, a range in which the theory works and describes physical phenomena. And so here in this picture, I'd like to point out that even special relativity has its own range of validity. But let's start with classical mechanics.

So classical mechanics describes the motion of objects, a collision of objects, a rotation of objects. In 8.02, you are studying electrodynamics. But you do that typically at MIT in those courses at velocities which are modest-- small velocities, small velocities compared to the speed of light.

Once you accelerate, once you have velocities which are really, really large, then the description breaks. The validity of those theories breaks. And that's where special relativity comes in. And it's especially important when you discuss very fast moving bodies, fast moving reference frames, or behavior of light.

And so this is what special relativity does. The range of validity is basically fast-moving phenomena with high speed. But special relativity by itself doesn't help you to understand, for example, object of small scales.

In order to have a proper description here, you need to study quantum mechanics. If you have object of very mass large or with large accelerations, you need to enter a generalized view, general relativity. And if you, for example, combine high velocities and small scales, you have to study quantum field theories.

So the point of this slide is really to point out that special relativity has a specific use case. It's limited. It describes fast-moving objects. It doesn't describe large accelerations. So that is the generalization you get when you study general relativity.

So in summary, special relativity is a complete description of physical phenomena at high speed. It is consistent with 8.01 and 8.02. And you will later see that whenever we find integration of motion for object at high speed, if we use smaller velocities, we'll find the solutions of 8.01 and 8.02. When we combine special relativity with quantum mechanics, it describes quantum field theories. And as I was saying, the generalization of special relativity, SR, is general relativity, GR.