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Interactive Visualization of Relativistic Phenomena

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The introduction of Special Relativity inevitably leads to phenomena that contradict everyday experience. Immersive virtual environments provide a laboratory where relativistic effects can be investigated directly and thus, a higher level of understanding for these unfamiliar concepts is achievable.

Using the method of ray tracing, computer graphics applications are able to generate photo-realistic images. We generalized this concept to represent relativistic physics and to create interactive simulations of a relativistic world. Due to this framework, we are able to interactively render accelerated and uniformly moving objects. On top of that, the user is able to perform relativistic motion. Hence, the consequences of changing the point of view can be explored.

With the help of example scenes, we demonstrate the operation of the relativistic flight simulation and present a corresponding teaching strategy.

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