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SPECIAL RELATIVITY

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Special Relativity

Elements in the Philosophy of Physics

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Abstract: This Element presents the philosophy of special relativity, from the foundations of the theory in Newtonian mechanics, through its birth out of the ashes of nineteenth-century ether theory, through the various conceptual paradoxes which the theory presents, and finally arriving at some of its connections with Einstein's later theory of general relativity. It illustrates concepts such as inertial frames, force-free motion, dynamical versus geometrical understandings of physics, the standard hierarchy of classical spacetimes, and symmetries of a physical theory; it also discusses specific topics in the foundations of special relativity such as Einstein's 1905 derivation of the Lorentz transformations, the conventionality of simultaneity, the status of frame-dependent effects, and the twin paradox.

Keywords: special relativity, spacetime, Einstein, geometry, dynamics

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