

# On the meaning of Lorentz covariance

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## Abstract

In classical mechanics, the Galilean covariance and the principle of relativity are completely equivalent and hold for all possible dynamical processes. In relativistic physics, on the contrary, the situation is much more complex: It will be shown that Lorentz covariance and the principle of relativity are not equivalent. The reason is that the principle of relativity actually holds only for the equilibrium quantities characterizing the equilibrium state of dissipative systems. In the light of this fact it will be argued that Lorentz covariance should not be regarded as a fundamental symmetry of the laws of physics.

**Keywords:** special relativity, space-time, Lorentz covariance, special relativity principle

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