Elective Course 13-E2-0018-vl Introduction to Special Relativity



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What was the outcome of the Michelson-Morley-Experiment and why was that so crucial for the development of the special theory of relativity? The term Lorentz transformations re transformations b inertial frames. Ar



Lorentz-Transformationen $x' = \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}}$ $y' = \frac{y - vt}{\sqrt{1 - \frac{v^2}{c^2}}}$ $x' = \frac{x' - vt}{\sqrt{1 - \frac{v^2}{c^2}}}$ $y' = \frac{y - vt}{\sqrt{1 - \frac{v^2}{c^2}}}$

If an object travels at the speed of light its length is measured to be shorter than its proper length, a phenomenon called length contraction. The term Lorentz transformations refers to transformations between inertial frames. An inertial frame of reference is a frame of reference in which objects exhibit inertia.

A spacetime diagram (Minkowski diagram) is a graphical illustration of locations in space at various times. What's its importance in the context of the special theory of relativity?







What is the phenomenon of time dilation?





Teaching Content:

vector analysis in three dimensional Euclidean space Newtonian mechanics, Maxwell equations in electrodynamics Galileian relaitivity principle Constancy of the speed of light, Lorentz transformation, light cone

Minkowski four dimensional spacetime

relativistic particle mechanics, relativistic hydromechanics, relativistic formulation of

Maxwell equations

For students of mechanics (B.Sc. and M.Sc.), computational engineering, mechanical engineering, civil and environmental engineering, materials and earth sciences, mathematics and physics. Course dates **SoSe 2025** 2SWS lecture | 3CP thursday, 17.10-18.50h in L501/32

This lecture is held by Dr.-Ing. Dimitrios Makridis, a former member of the institute for mechanics under the module ownership of Prof. Dr.-Ing. Ralf Müller, active professor of the institute for mechanics in the department of civil and environmental engineering, TU Darmstadt.

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