The Special Theory of Relativity: A Mathematical Exposition (Universitext)

By Anadijiban Das

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Based on courses taught at the University of Dublin, Carnegie Mellon University, and mostly at Simon Fraser University, this book presents the special theory of relativity from a mathematical point of view. It begins with the axioms of the Minkowski vector space and the flat spacetime manifold. Then it discusses the kinematics of special relativity in terms of Lorentz tranformations, and treats the group structure of Lorentz transformations. Extending the discussion to spinors, the author shows how a unimodular mapping of spinor (vector) space can induce a proper, orthochronous Lorentz mapping on the Minkowski vector space. The second part begins with a discussion of relativistic particle mechanics from both the Lagrangian and Hamiltonian points of view. The book then turns to the relativistic (classical) field theory, including a proof of Noether's theorem and discussions of the Klein-Gordon, electromagnetic, Dirac, and non-abelian gauge fields. The final chapter deals with recent work on classical fields in an eight-dimensional covariant phase space.

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The Special Theory of Relativity: A Mathematical Exposition (Universitext) By Anadijiban Das Bibliography

- Sales Rank: #1247000 in Books
- Published on: 1993
- Ingredients: Example Ingredients
- Original language: English
- Number of items: 1
- Dimensions: 9.25" h x .53" w x 6.10" l, .74 pounds
- Binding: Paperback
- 214 pages

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