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Nota di contenuto	1. Lorentz group and its representations -- 1.1. Generators of the Lorentz group -- 1.2. Two-by-two representation of the Lorentz group -- 1.3. Conformal representation of the Lorentz group -- 1.4. Representations of the Poincare group -- 1.5. Representations of the Lorentz group based on harmonic oscillators -- 1.6. Wigner functions for the Lorentz group 2. Wigner's little groups for internal space-time symmetries -- 2.1. Euler decomposition of Wigner's little group -- 2.2. O(3)-like little group for massive particles -- 2.3. E(2)-like little group for massless particles -- 2.4. O(2, 1)-like little group for imaginary-mass particles -- 2.5. Further properties of Wigner's little groups -- 2.6. Little groups in the light-cone coordinate system 3. Group contractions -- 3.1. Contraction with squeeze transformations -- 3.2. Contractions of the O(3) rotation group -- 3.3. Contraction of the O(2, 1) Lorentz group -- 3.4. Contraction of the Lorentz group -- 3.5. Tangential spheres 4. Two-by-two representations of Wigner's little groups -- 4.1. Transformation properties of the energy-momentum four-vector --

Sommario/riassunto

This book explains the Lorentz group in a language familiar to physicists, namely in terms of two-by-two matrices. While the three-dimensional rotation group is one of the standard mathematical tools in physics, the Lorentz group applicable to the four-dimensional Minkowski space is still very strange to most physicists. However, it

plays an essential role in a wide swathe of physics and is becoming the essential language for modern and rapidly developing fields. The first edition was primarily based on applications in high-energy physics developed during the latter half of the 20th Century, and the application of the same set of mathematical tools to optical sciences. In this new edition, the authors have added five new chapters to deal with emerging new problems in physics, such as quantum optics, information theory, and fundamental issues in physics including the question of whether quantum mechanics and special relativity are consistent with each other, or whether these two disciplines can be derived from the same set of equations.