The Physics of Neutrino Interactions

This advanced text discusses the fundamental concepts of neutrinos, their properties and interactions with matter, presenting a theoretical framework for describing relativistic particles. It provides a pedagogical description of the field theory of neutrinos, necessary to understand the standard model (SM) of electroweak interactions, and neutrino scattering from leptons and nucleons. Applications of neutrino scattering processes from the nucleons and nuclei are discussed in detail. Nuclear-medium effects in quasielastic scattering, and inelastic and deep inelastic scattering are also covered in depth. A separate chapter on neutrinos in astrophysics highlights the applications of various neutrino processes in the understanding of the universe and its evolution. The text introduces the subject of neutrino oscillations and highlights the need for beyond the standard model (BSM) physics. This topical book will stimulate new ideas and avenues for research, and will form a valuable resource for advanced graduate students and academic researchers in the fields of particle physics and nuclear physics.

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