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6.3 Mixing of three Majorana neutrinos6.4 One-generation Dirac-Majorana mass term; 6.5 Three-generation Dirac-Majorana mixing; 6.6 Special cases; 6.7 Majorana mass matrix; 7 Neutrino oscillations in vacuum; 7.1 Standard Derivation of the Neutrino Oscillation Probability; 7.2 Antineutrino case; 7.3 CPT, CP, and T transformations; 7.4 Two-neutrino mixing; 7.5 Types of neutrino oscillation experiments; 7.6 Averaged transition probability; 7.7 Large m[sup(2)] dominance; 7.8 Active small m[sup(2)]; 8 Theory of neutrino oscillations in vacuum; 8.1 Plane-wave approximation
8.2 Wave-packet treatment8.3 Size of neutrino wave packets; 8.4 Questions; 9 Neutrino oscillations in matter; 9.1 Effective potentials in matter; 9.2 Evolution of neutrino flavors; 9.3 The MSW effect; 9.4 Slab approximation; 9.5 Parametric resonance; 9.6 Geometrical representation; 10 Solar neutrinos; 10.1 Thermonuclear energy production; 10.2 Standard solar models; 10.3 Model-independent constraints on solar neutrino fluxes; 10.4 Homestake experiment; 10.5 Gallium experiments; 10.6 Water Cherenkov detectors; 10.7 Vacuum oscillations; 10.8 Resonant flavor transitions in the Sun
10.9 Regeneration of solar [sub(e)]'s in the Earth10.10 Global fit of solar neutrino data; 11 Atmospheric neutrinos; 11.1 Flux of atmospheric neutrinos; 11.2 Atmospheric neutrino experiments; 12 Terrestrial neutrino oscillation experiments; 12.1 Sensitivity; 12.2 Reactor experiments; 12.3 Accelerator experiments; 13 Phenomenology of three-neutrino mixing; 13.1 Neutrino oscillations in vacuum; 13.2 Matter effects; 13.3 Analysis of oscillation data; 14 Direct measurements of neutrino mass; 14.1 Beta decay; 14.2 Pion and tau decays; 14.3 Neutrinoless double-beta decay; 15 Supernova neutrinos 15.1 Supernova types

Sommario/riassunto

Our Universe is made of a dozen fundamental building blocks. Among these, neutrinos are the most mysterious - but they are the second most abundant particles in the Universe. This book provides detailed discussions of how to describe neutrinos, their basic properties, and the roles they play in nature. - ;This book deals with neutrino physics and astrophysics - a field in which some of the most exciting recent developments in particle physics, astrophysics and cosmology took place. The book is the most up-to-date, comprehensive and self-contained treatment of key issues in neutrino physics. It