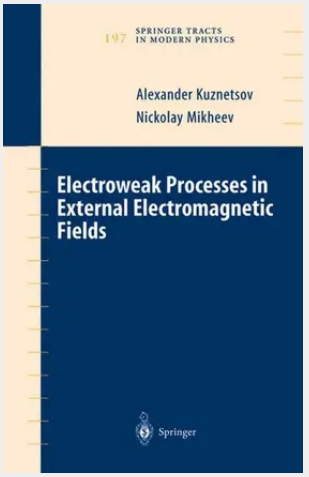
Kuznetsov / Mikheev

Electroweak Processes in External Electromagnetic Fields

Usually, it is not easy to de?ne the main dates of creation of a new science – the birth date, when the ?rst distinct idea was generated, and the - turity date, when the science manifested itself as a separate and consistent discipline. For particle astrophysics, the science that has developed very - tensively over the last two decades, the birth is most likely to be dated to the beginning of the 1930s. Just then, after the discovery of a neutron by J. Chadwick in 1932, the concept of a neutron star was proposed by L.D. L- dau, and independently by W. Baade and F. Zwicky. The maturation of this science can be more or less con?dently be dated to 1987 when extragal- tic neutrinos were registered for the ?rst time from the supernova SN1987A explosion in the Large Magellanic Cloud, a satellite galaxy of our Milky Way. There are at least two excellent books on the topic written by G.G. R- felt: Stars as Laboratories for Fundamental Physics (Univ. Chicago Press, Chicago 1996) and by H.V. Klapdor-Kleingrothaus and K. Zuber: Particle Astrophysics. 2nd ed. (Inst. of Phys., Bristol 2000), where the basics of this new science can be studied. However, new facts and ideas appear so fast that it is necessary for specialists to follow not only journal papers but also electronic preprints, in order to keep abreast of the latest developments.

This book systematically describes several methods oc calculation of the effects of strong electromagnetic fields in quantum processes, using analytical solutions of the Dirac equation and Feynmann diagrams at both the loop and tree levels. Such extreme conditions allow for investigation of the role quantum processes play in astrophysical objects and the early Universe. It will be useful for students of theoretical physics and scientists with knowledge of QFT and the Standard Model of Electroweak Interactions.



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