

THE NEUTRINO IN ELEMENTARY PARTICLE PHYSICS - WHAT'S NEW ?

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Abstract

We discuss the role of the neutrino in nature and how it is described within the generally accepted theory of the strong, weak and electromagnetic forces, the Standard Model. The Standard Model in its present form regards the neutrino as a massless particle with half-integer spin and no charge. This view is challenged by recent evidence for the phenomenon of neutrino oscillations, both in vacuum and in matter. If confirmed by independent experiments this would require that at least one of the neutrinos has a non-vanishing (albeit very small) mass. The different oscillation models presently discussed could shed new light on the observed solar neutrino deficit and on preliminary findings of a non-vanishing neutrino mass at recent accelerator based and underground neutrino experiments. While challenging the present form of the Standard Model a neutrino mass can be implemented in a mildly revised form of this model.

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³ The neutron is heavier than the proton (see rest mass in MeV/c² in brackets, data taken from ref.[4]).