Renormalization-Group Equation Approach to Sterile Neutrino Mass Effect

The renormalization-group equation approach to neutrino mass effect involving sterile neutrino is developed in this work. A set of differential equations for the effective neutrino mixing matrix and the masses are derived completely when one generation of light sterile neutrino is considered, based on which the differential equations for oscillation probability are given analytically. The methodology is confirmed by comparing with previous results on the evolution of mixing matrix element with RGE approach in neutrino SM case. Taking JUNO and NOVA as examples of short- and long-baseline experiments, we give the oscillation probabilities numerically. We further apply the RGE method to solve solar neutrino problem and day-night asymmetries are predicted in both JUNO and Jinping neutrino experiment.

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