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## Neutrino spin and spin-flavor oscillations in non-dipolar magnetic fields of astrophysical objects

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Abstract: Within the minimally extended Standard Model, neutrinos possess non-zero anomalous magnetic moments. As a result, strong magnetic fields can induce spin and spin-flavor neutrino oscillations, which may affect neutrino fluxes from astrophysical sources. We study the neutrino evolution in realistic magnetic fields and moving matter of astrophysical objects such as supernova bursts and neutron stars. For the first time, we have derived an effective Hamiltonian for neutrinos propagating in non-dipolar magnetic fields, and we have obtained appropriate probabilities for neutrino spin and spin-flavor oscillations. The importance of the work is highlighted by the construction of new Mega-Science neutrino experiments, such as JUNO, Hyper-Kamiokande, Baikal GVD and others.

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