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P4.031 Neutrino spin and flavor mixing and oscillations in longitudinal magnetic field

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In the present contribution we consider neutrino mixing and oscillations in presence of an arbitrary constant magnetic field with nonzero transversal and longitudinal (in respect to the direction of neutrino propagation) components. The electromagnetic interaction of neutrinos is determined by neutrinos diagonal and transition magnetic moments that are introduced for the neutrino mass states. The explicit expressions for the effective neutrino diagonal and transition magnetic moments for the flavour bases in terms of these values for the mass states are derived. The effective evolution Hamiltonian for the flavour neutrino and the corresponding oscillation probability are obtained. The role the longitudinal magnetic field component is examined. In particular, it is shown that: 1) the longitudinal magnetic field coupled to the corresponding magnetic moments shifts the energy of neutrino states, 2) in case of non-vanishing neutrino transition magnetic moments the longitudinal magnetic field produces an additional mixing between neutrino states, both in the mass and flavour neutrino bases.