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Collective neutrino oscillations

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Collective oscillations of neutrinos represent emergent nonlinear flavor evolution phenomena instigated by neutrino-neutrino interactions in astrophysical environments with sufficiently high neutrino densities. The symmetries of the problem in the full three flavor mixing scheme and in the exact many-body formulation by including the effects of CP violation and neutrino magnetic moment will be discussed. The connection between neutrino collective oscillations and the dynamics of core-collapse supernovae and the origin of chemical elements will be elucidated.

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