

Abstract Submitted
for the APR14 Meeting of
The American Physical Society

Flavor oscillation Length for Neutrinos in Magnetized Matter¹

XUANHUA WANG, TODD TINSLEY, Hendrix College — A magnetic field has no effect on neutrinos since they are neutral particles with no known magnetic moment; however, the presence of a magnetic field will affect the electron field which may influence the neutrino interaction with electrons. We considered only the forward scattering of neutrinos off free electrons through the charged current interaction, which accounts for matter-enhanced flavor oscillation. We found that the interaction Hamiltonian is not altered by the presence of a magnetic field except when the neutrino scatters off an electron in the lowest Landau level. In this case the Hamiltonian depends only on the angle between the neutrino's momentum and the direction of the magnetic field. Therefore, the strength of the magnetic field influences the result only through the Landau level distribution of electrons. This result might be considered when studying neutrinos around cosmological objects like supernovae or neutron stars, where the magnetic field is extremely strong and the change in neutrino oscillation length is not negligible. I will present the calculation of Hamiltonian of the above interaction in magnetized matter and the change of oscillation length in this case.

¹This work is supported by Hendrix Odyssey program.

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Date submitted: 09 Jan 2014

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