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Neutrino forces in neutrino backgrounds

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In the non-relativistic limit, scattering of two particles by boson exchange can be described using a static potential, i.e. that of a force between them. The exchange of two fermions can also lead to a force, as if the two fermions behave like an effective boson. These forces are called “quantum forces”, and the range of these forces is inversely proportional to the mass of the fermions being exchanged. Thus, the exchange of neutrinos leads to the longest-ranged fermion exchange force since neutrinos are the lightest fermions in the Standard Model. In this talk, I will briefly review the neutrino force. I will then talk about scenarios where the effects due to the neutrino force can be enhanced significantly due to a neutrino background, potentially providing sensitivity to neutrino physics parameters that have so far eluded us.

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