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Current topics in neutrino physics theory

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Neutrino masses and mixing are a direct evidence that the standard model of elementary particles is incomplete. Furthermore, neutrinos are different from other fermions since, first, their masses are many orders of magnitude smaller in comparison, and second, their mixing angles are significantly larger in comparison to the mixing of the quarks. This brings significant challenge in creating the underlying theory that can successfully explain neutrino masses along with other observations. Two of the other observational evidences for beyond standard model physics are the observed dark matter density and the baryon asymmetry of the universe. A consistent theory to explain all three simultaneously. Such a theory generally will also predict other new physics features in the neutrino sector which could be observed in future experiments. We will outline the status of neutrino masses and mixing and look briefly at what the future holds for neutrino oscillation phenomenology. We will then discuss some models for neutrino masses and mixing and how they can be connected to dark matter and baryogengesis via leptogenesis.

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