

Abstract for an Invited Paper
for the APR09 Meeting of
The American Physical Society

Neutrino Mass and the Origin of Matter

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Discovery of neutrino masses and the possibility that the neutrinos are their own anti-particles has provided a new way to resolve a long standing puzzle of cosmology i.e. why the universe consists only of matter and no anti-matter. In this talk, I explore this connection between neutrino mass and matter-anti-matter asymmetry. At the heart of this approach is the so-called “seesaw mechanism” which provides a way to understand why neutrino masses are so much smaller than the masses of other standard model particles by postulating the existence of heavy right handed (RH) neutrinos. The decay of these heavy RH neutrinos in the early universe can provide the seed for the observed matter-anti-matter asymmetry. I discuss possible tests of this idea in upcoming neutrino experiments. Since the masses of the right handed neutrinos are not known, it is quite possible that they are light enough to be produced at the Large Hadron Collider; in this case, they instead of being “creators” can be “destroyers” of matter-anti-matter asymmetry pointing to other ways for understanding this asymmetry. Their search at LHC can therefore throw light on the moment of matter creation.