APR13-2013-000568

Abstract for an Invited Paper
for the APR13 Meeting of
the American Physical Society

Status and Future of Double Beta Decay

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Now that the origin of electroweak symmetry breaking is being revealed at the LHC, it is a good time to review where we stand with respect to the origin of neutrino mass. Our best tool for addressing this question is the neutrinoless double beta decay of heavy nuclei. This process, if it exists, would violate the conservation of lepton number by two units, and would measure the absolute scale of the neutrino mass spectrum. But most importantly, double beta decay could give us a window on the non-standard model physics that gives rise to the tiny neutrino masses that we find in nature. In the last two years a new generation of double beta decay experiments has started taking data and producing results, and several more will join them in the near future. It is conceivable that these experiments could report a discovery in the next few years. Meanwhile, on the theory side, a variety of techniques are being applied to the problem of the nuclear matrix elements. These calculations will guide us to the underlying physics, if an experimental observation is made. This talk will review the current status of the double beta decay field and its likely direction in the coming years.