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Radiative generation of neutrino masses and its experimental signals

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I will first summarize the radiative mass generation mechanism for small neutrino masses, which is an alternative to the seesaw mechanism. Because of loop and chirality suppressions, this mechanism typically requires the scale of new physics to be near the TeV. A recent discovery wherein small neutrino masses arise as two-loop radiative corrections via leptoquark exchange will be presented. The leptoquarks must be within reach of the LHC. In the neutrino sector this class of models predict, by virtue of the structure of the neutrino mass matrix, that the angle theta_{13} should be near its current limit. Leptoquark decays probe the neutrino mass generation mechanism, with their branching ratios into e, mu and tau correlated with the neutrino oscillation phase delta.
This work is primarily based on a forthcoming paper “Two-loop neutrino mass generation via leptoquarks”, by K.S. Babu and J. Julio. The radiative generation mechanism has long history, my contributions in this area include “Two loop neutrino mass generation and its experimental consequences”, by K.S. Babu and C. Macesanu, Phys.Rev.D67:073010,2003, and “Model of calculable neutrino masses”, by K.S. Babu, Phys.Lett.B203:132,1988.

Primary author: Prof. BABU, Kaladi (Oklahoma State University)

Presenter: Prof. BABU, Kaladi (Oklahoma State University)

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