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Low scale seesaw theories and their phenomenology

Monday 6 January 2025 15:40 (35 minutes)

I will describe theories with low scale seesaw mechanisms implemented to generate the SM fermion mass hierarchy. In the first part of my talk, I will explain an extended 2HDM theory where the tree level Universal seesaw and Zee-Babu mechanisms generate the SM charged fermion mass hierarchy and tiny active neutrino masses, respectively. The theory is consistent with SM fermion masses and mixings, with the muon and electron g−2 anomalies and successfully accommodates the constraints arising from charged lepton flavor violation and meson oscillations. In the second part of the talk I will describe three models where the neutrino masses are generated from a three loop level inverse seesaw mechanism, whose radiative nature is ensured by the preserved discrete symmetries, which also guarantee the stability of the dark matter candidate. I will discuss in detail the lepton sector phenomenology of one of the three-loop inverse seesaw models. The model successfully complies with the constraints imposed by the neutrino oscillation experimental data, neutrinoless double beta decay, dark matter relic density, charged lepton flavor violation, electron-muon conversion, and provides essential means for efficient low-scale resonant leptogenesis. Charged lepton flavor violating decays and the electron-muon conversion processes get sizable rates within future sensitivity reach. In the third part of my talk, I will describe two theories with extended gauge symmetries each incorporating distinct inverse seesaw mechanisms for generating neutrino masses at the radiative level. I will discuss their implications in the muon anomalous magnetic moment, charged lepton flavor violation and leptogenesis.

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