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Minimal realistic SU(5) Grand Unified Theory NIMA ASSAD, Univ of California - San Diego — Despite making predictions in unprecedented agreement with experiment, such as the magnetic dipole moment of the electron to one part in a billion, the experimental confirmation of neutrino flavor oscillations, and thus of massive neutrinos, implies that the Standard Model (SM) of particle physics is incomplete. An extension of the SM, which retains its low energy predictions while accounting for massive neutrinos, is achieved through the introduction of the dimension 5 Weinberg operator and its associated energy scale above the electroweak (10ˆ2 GeV), but below the Planck scale (10ˆ19 GeV). The Beyond Standard Model (BSM) class of Grand Unified Theories (GUTs) implicates such a scale (10ˆ16 GeV) in the unification of the three SM gauge couplings, thus making the origin of neutrino mass a theoretically appealing probe into particle behavior at energies currently inaccessible experimentally. Here, we compare the 24F and 15H extensions of the Georgi-Glashow SU(5) GUT to accommodate massive neutrinos and to unify SM gauge couplings while minimizing the theory's additional field content. Using the Monte Carlo event generator MadGraph, each extension is found to produce distinct signatures at the run II of the LHC.

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