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Shonosuke Takeshita ”W boson mass and grand unification via the type-II seesaw-like mechanism”

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We propose an SU(5) GUT model extended with two additional pairs of 10 representation vector-like fermions. The CDF collaboration W boson mass anomaly is explained by using the VEV of a real SU(2)L triplet scalar coming from the 24 representation Higgs. The vector-like fermions are decomposed partly into vector-like quark doublets. Those vector-like quark doublets acquire mass from two sources; through the Yukawa interaction with the real SU(2)L triplet via a type-II seesaw-like mechanism. And, they acquire mass from the 24 representation Higgs. We assume that the mass for the vector-like quark doublets is expressed in terms of the real triplets mass. By combining the constraints on the vector-like quark masses with those on the heavy Higgs boson masses, we can obtain the narrow allowed mass ranges for the vector-like quark doublet and the real triplet. Therefore, our model can be tested in searches for these particles in the near future. In addition, the two additional pairs of vector-like fermions allow the SM gauge couplings to unify successfully at MGUT ≈5.1×10^15 GeV. Our model is also testable by the future Hyper-Kamiokande experiment via the proton decay lifetime τ_p (p⊠π^0 e^+)<1.0×10^35 years.

Session Classification: Short talks