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Leptogenesis, fermion masses and mixings in a flavored SUSY SU(5) GUT

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We propose a highly predictive 4D SU(5) GUT with a D_4 flavor symmetry to study fermion masses and mixings. The Yukawa matrices of quarks and charged leptons are obtained after integrating out heavy messenger fields from renormalizable superpotentials while neutrino masses are originated from the type I seesaw mechanism. The group theoretical factors from 24- and 45-dimensional Higgs fields lead to ratios between the Yukawa couplings in agreement with data, while the dangerous proton decay operators are highly suppressed. By performing a numerical fit, we find that the model captures accurately the mixing angles, the Yukawa couplings and the CP phase of the quark sector at the GUT scale. The neutrino masses are generated at the leading order with the prediction of trimaximal mixing while an additional effective operator is required to account for the baryon asymmetry of the universe (BAU). An analytical and a numerical study of the BAU via the leptogenesis mechanism is performed where strong correlations between the parameters of the neutrino sector and the observed BAU are obtained.

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