

Scalars 2017



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Unified model of fermion masses with a Universal Texture Zero

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Content :

We show that a universal texture zero in the (1,1) position of all fermionic mass matrices, including heavy right-handed Majorana neutrinos driving a type-I see-saw mechanism, can lead to a viable spectrum of mass, mixing and CP violation for both quarks and leptons, including (but not limited to) three important predictions: the Cabibbo angle, the charged lepton masses, and the leptonic 'reactor' angle. We model this texture zero with a non-Abelian discrete family symmetry that can easily be embedded in a grand unified framework, and discuss the details of the phenomenology after electroweak and family symmetry breaking. We provide an explicit numerical fit to the available data and obtain excellent agreement with the 18 observables in the charged fermion and neutrino sectors with just 9 free parameters. We further show that the vacua of our new scalar familon fields are readily aligned along desired directions in family space, and also demonstrate discrete gauge anomaly freedom at the relevant scale of our effective theory.

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