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Fermion Generation and Mixing from Dualized Standard Model
JACQUELINE FARIDANI, ABDULMAJEED ABDURRAHMAN, Shippensburg University — The puzzle of fermion generations and mass hierarchy are recognized as one of the biggest problems in particle physics. In this work, we present a possible explanation of this puzzle using a non-abelian generalization of electric-magnetic duality. This duality implies the existence of another symmetry dual to color which is necessarily broken when color is confined. This dual color predicts the 3 fermion generations and suggests a Higgs mechanism for breaking the generation symmetry. The fermion mass hierarchy and mixing patterns are also explained. Quarks and leptons are seen to have very different mixing patterns in agreement with experiment. The model offers a perturbative method for calculating mixing parameters and mass ratios between generations, allowing us to calculate to 1-loop order all the 9 CKM matrix elements for quarks, the neutrino oscillation angles and some other quantities. The model is also highly predictive giving correlated predictions in low energy flavor changing neutral current effects and in ultra-high energy post-GZK air shower events from cosmic rays.

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