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Composite quarks and leptons with low-scale SO(10) unification

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We propose a chiral gauge theory in which the Standard Model (SM) quarks and leptons are composite fields. The theory is based on an SU(15) gauge symmetry that confines the preons and predicts exactly 3 generations of SM fermions. Certain vectorlike quarks and leptons are also formed, and may be within the reach of the LHC. We discuss the running of the SM gauge couplings to 3-loop order, showing that the SM gauge groups may unify under SO(10), which is needed in order to regain asymptotic freedom. We study proton decay and show that the dominant operators lead to novel signatures that can be searched for at DUNE and other future experiments.

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