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SU(5) GUT with Multi Vector Multiplets

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Grand Unified Theories (GUTs) aim to unify the gauge groups of the Standard Model into a single symmetry at high energies. However, in the minimal SU(5) model, the predicted proton lifetime is significantly shorter than the current experimental lower bound, and the gauge couplings do not precisely converge at a single point. In this study, we address these issues by introducing multiple heavy fermions in the 5 and 10 representations, in addition to the usual three chiral generations. Our analysis shows that with a sufficient number of such fermions, the gauge coupling constants achieve exact unification at a single scale, while proton decay is adequately suppressed to satisfy experimental constraints.

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