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Title:	SO(10) grand unified theories with dynamical Yukawa couplings
Authors:	Aulakh, C.S. (/jspui/browse?type=author&value=Aulakh%2C+C.S.) Khosa, C.K. (/jspui/browse?type=author&value=Khosa%2C+C.K.)
Keywords:	Dynamical Yukawa couplings supersymmetric
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Abstract:	Renormalizable SO(10) grand unified theories (GUTs), extended by O(Ng)F family gauge symmetry, generate minimal supersymmetric Standard Model flavor structure dynamically via vacuum expectation values of "Yukawon" Higgs multiplets. For concrete illustration and calculability, we work with the fully realistic minimal supersymmetric GUTs based on the 210126126 GUT Higgs system - which were already parameter counting minimal relative to other realistic models. SO(10) fermion Higgs channels 126,10(120) extend to symmetric (antisymmetric) representations of O(Ng)F, while 210,126 are symmetric. Ng=3 dynamical Yukawa generation reduces the matter fermion Yukawas from 15 to 3 (21 to 5) without (with) the 120 Higgs. Yukawon GUTs are thus ultramiminal in parameter counting terms. Consistent symmetry breaking is ensured by a hidden sector Bajc-Melfo superpotential with a pair of symmetric O(Ng) multiplets ϕ, S , of which the latter's singlet part S_s breaks supersymmetry and the traceless part S^A furnishes flat directions to cancel the O(Ng) D-term contributions of the visible sector. Novel dark matter candidates linked to flavor symmetry arise from both the Bajc-Melfo sector and GUT sector minimal supersymmetric Standard Model singlet pseudo-Goldstones. These relics may be viable light ($<50\text{GeV}$) cold dark matter as reported by DAMA/LIBRA. In contrast to the new minimal supersymmetric SO(10) grand unified theory (NMSGUT) even sterile neutrinos can appear in certain branches of the flavor symmetry breaking without the tuning of couplings.
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