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Title:	Bajc-Melfo vacua enable Yukawon ultraminimal grand unified theories
Authors:	Aulakh, C.S. (/jspui/browse?type=author&value=Aulakh%2C+C.S.)
Keywords:	Bajc-Melfo vacua superpotentials F-term
Issue Date:	2015
Publisher:	American Physical Society
Citation:	Physical Review D - Particles, Fields, Gravitation and Cosmology, 91 (5)
Abstract:	<p>Bajc-Melfo (BM) two-field <math>(S, \phi)</math> superpotentials define metastable F-term supersymmetry-breaking vacua suitable as hidden sectors for calculable and realistic family and grand unification models. The undetermined vacuum expectation value (VEV) <math>\langle S \rangle</math> of the Polonyi field that breaks supersymmetry can be fixed either by coupling to <math>N=1</math> supergravity or by radiative corrections. BM hidden sectors extend to symmetric multiplets <math>(S, \phi)_{ab}</math> of a gauged <math>O(N_g)</math> family symmetry, broken at the GUT scale, so that the <math>O(N_g)</math> charged component VEVs <math>\langle S_{ab} \rangle</math> are also undetermined before accounting for the <math>O(N_g)</math> D-terms, which fix them by cancellation against D-term contributions from the visible sector. This facilitates Yukawon ultraminimal GUTs (YUMGUTs) proposed in [C. S. Aulakh and C. K. Khosa, Phys. Rev. D 90, 045008 (2014)] by relieving the visible sector from the need to give null D-terms for the family symmetry <math>O(N_g)</math>. We analyze symmetry breaking and spectra of the hidden-sector fields in the supergravity resolved case when <math>N_g=1, 2, 3</math>. Besides the Polonyi field <math>S</math>, most of the superfields <math>S_{ab}</math> remain light, with fermions getting masses only from loop corrections. Such modes may yield novel dark matter lighter than 100 GeV. Possible Polonyi and moduli problems associated with the fields <math>S_{ab}</math> call for detailed investigation of loop effects due to the Yukawa and gauge interactions in the hidden sector and of postinflationary field relaxation dynamics.</p>
URI:	<a href="https://journals.aps.org/prd/abstract/10.1103/PhysRevD.91.055012">https://journals.aps.org/prd/abstract/10.1103/PhysRevD.91.055012</a> ( <a href="https://journals.aps.org/prd/abstract/10.1103/PhysRevD.91.055012">https://journals.aps.org/prd/abstract/10.1103/PhysRevD.91.055012</a> ) <a href="http://hdl.handle.net/123456789/2958">http://hdl.handle.net/123456789/2958</a> ( <a href="http://hdl.handle.net/123456789/2958">http://hdl.handle.net/123456789/2958</a> )
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