Abstract Submitted
for the OSF12 Meeting of
The American Physical Society

Scalar Dark Matter & Vacuum Stability

MATTHEW GONDERINGER, Wayne State University — The Standard Model of particle physics is a highly successful theory of fundamental particle interactions, especially in light of the recent discovery of a Higgs-like boson at the LHC. Nonetheless, the SM is known to be incomplete because it does not contain a suitable dark matter candidate. Scalar extensions of the SM are simple but nonetheless interesting and well-motivated models that provide a dark matter candidate particle. I present a vacuum stability analysis - which ensures the ground state of the theory has the correct properties - of two of these models. The analysis reveals that light dark matter (10 GeV) requires a moderate self-interaction strength and new physics at or below the 10^9 GeV scale in the first model, and a light (order 10 to 100 GeV) Higgs-like particle with reduced couplings and additional new physics below 1000 TeV in the second model. Experimental limits from dark matter direct detection are also included.

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Date submitted: 05 Sep 2012 Electronic form version 1.4