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Critical dark matter

We study a classically scale invariant Higgs-dilaton model of dynamical symmetry breaking extended with an extra scalar field that plays the role of dark matter. The Higgs boson is light near a critical boundary between different symmetry breaking phases, where quantum corrections beyond the usual Gildener-Weinberg approximation become relevant. This implies a tighter connection between dark matter and Higgs phenomenology. The model has only three free parameters, yet it allows for the observed relic abundance of dark matter, produced via freeze-in or freeze-out, while respecting all constraints. The direct detection cross section mediated by the Higgs boson is determined by the dark matter mass alone and is testable at future experiments.

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