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Electroweak Symmetric Dark Matter Balls

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We show that a simple Higgs-portal dark matter model can contain stable non-topological soliton states of dark matter. This macroscopic dark matter candidate has its interior in an electroweak symmetry unbroken vacuum. They can have its radius around the atomic scale and mass as large as 10^{26} GeV. We discuss the formation of these dark matter balls from the first order electroweak phase transition in the early universe. Such dark matter candidates can be searched in a wide range of experiments, we provide constraints from WIMP-like direct detection and also from multi-scattering events in large volume liquid scintillator neutrino detectors, ancient mica and also Xenon-1T.

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