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Finite temperature transition in Hyper Stealth Dark Matter using Mobius Domain Wall fermions

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The first-order confinement transition of a strongly coupled composite dark matter theory can provide a possible source of gravitational waves in the early universe. In this talk, on behalf of the Lattice Strong Dynamics (LSD) Collaboration, we present our recent investigation on the finite temperature confinement transition of the 1-flavor $SU(4)$ dark gauge theory named Hyper Stealth Dark Matter (HSDM). The dark matter candidate in this theory is a composite bosonic baryon and can have a remarkably low mass bound of a few GeV. We expect the finite temperature transition to be first-order over at least some finite range of fermionic mass and to be a potential source of observable gravitational radiation. The finite temperature simulation of 1-flavor $SU(4)$ is done using Mobius Domain wall fermions. Using various lattice volumes, the order of the transition and its fermionic mass dependence are explored by monitoring the Wilson-flowed Polyakov loop and chiral condensate.

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