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Resolving the critical bubble in SU(8) confinement transition

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Recently, confining strongly coupled models have been considered as dark matter candidates, and to predict the gravitational wave spectrum from a possible early universe phase transition, the nucleation rate is needed as an input. The nucleation rate of a confinement transition for strongly coupled theories has not so far been determined from lattice, but is instead often estimated using various methods like thin wall approximation.

Motivated by this, we investigate the confinement-deconfinement transition in pure gauge SU(8) model using multicanonical lattice simulations in four dimensions. We attempt to resolve the critical bubble configuration and measure the probability of the configuration, from which the nucleation rate can be estimated. Large volumes are required for the bubble to fit on the lattice, and modifications to the usual Polyakov loop order parameter are needed to accurately resolve the bubble configurations.

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