

Cosmological phase transitions with low nucleation rates

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Cosmological phase transitions played a crucial role in shaping the early universe. This talk explores non-standard first-order transitions with extremely low nucleation rates, highlighting two novel possibilities: transitions completing with super-Hubble bubble separation, and bubble-free transitions driven by collapsing domain-wall structures. These scenarios lead to distinctive cosmological signatures—including primordial black holes, topological-defect dynamics, and unconventional gravitational-wave spectra—broadening the landscape of testable early-universe physics.

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