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Bubble wall velocity from local equilibrium: A new approach

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Cosmological first-order phase transitions (FOPTs) serve as comprehensive probes into our early Universe with associated generations of stochastic gravitational waves and superhorizon curvature perturbations or even primordial black holes. In characterizing the FOPT, phenomenological parameters like transition temperatures, strength factors, bubble separations, and energy budgets can be reliably extracted from the macroscopic features of the underlying particle physics models except for the terminal velocity of the bubble wall expansion, making it the last key parameter to be determined most difficultly due to the non-equilibrium nature of the microscopic transition model. In this talk, I will introduce a new approach to determine the bubble wall velocity model-independently assuming local equilibrium.

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