Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **192** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Bubble Nucleation Events are Correlated

Monday 7 June 2021 16:57 (3 minutes)

False vacuum decay in quantum mechanical first order phase transitions is a phenomenon with wide implications in cosmology, and presents interesting theoretical challenges. In the standard approach, it is assumed that false vacuum decay proceeds through the formation of bubbles that nucleate at random positions in spacetime and subsequently expand. In this paper we investigate the presence of correlations between bubble nucleation sites using a recently proposed semi-classical stochastic description of vacuum decay. This procedure samples vacuum fluctuations, which are then evolved using lattice simulations. We compute the two-point function for bubble nucleation sites from an ensemble of simulations, demonstrating that nucleation sites cluster in a way that is qualitatively similar to peaks in random Gaussian fields. We comment on the implications for first order phase transitions during and after an inflationary era.

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Session Classification: M4-4 Cosmology (DTP) / Cosmologie (DPT)

Track Classification: Theoretical Physics / Physique théorique (DTP-DPT)