

Whispers from the Dark Universe - Particles & Fields in the Gravitational Wave Era

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DESY THEORY WORKSHOP

WHISPERS FROM THE DARK UNIVERSE – PARTICLES & FIELDS IN THE GRAVITATIONAL WAVE ERA

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24 - 27 September 2024 DESY Hamburg, Germany



Contribution ID: 68

Type: **not specified**

The Equation of State of the Universe after a First Order Phase Transition

Thursday 26 September 2024 17:02 (16 minutes)

The dynamics of a cosmological first order phase transition are governed by the interactions of a scalar field, which tunnels to a new vacuum state and results in the nucleation of bubbles. If the interactions of the scalar field with the plasma are sufficiently weak, instant reheating can not be assumed and the energy density of the universe is dominated by the field oscillations after the phase transition. It is commonly assumed that such a scenario would lead to a phase of matter domination. In this talk, I will revisit this assumption using results from lattice simulations, in which we investigate the energy budget of the scalar field dynamics and determine the equation of state of the system after the phase transition. These findings have relevant implications for the subsequent reheating and dark matter production.

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Session Classification: Parallel Thursday Cosmo 1

Track Classification: Cosmology & Astroparticle Physics