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Non-thermal particle production after first-order phase transitions: what happens after bubbles collide?

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In a cosmological first-order phase transition, bubbles of true vacuum nucleate and expand due to the difference in vacuum energy. We study non-thermal particle production from the collisions of such bubbles, which can be relevant for many beyond the Standard Model scenarios, such as baryogenesis and dark matter. The bubble collisions result in local excitations of the background scalar field, producing scalar waves, which can decay into particles that are coupled to the scalar field. We discuss various important aspects of this process, highlighting crucial differences compared to particle production from oscillating scalar fields in preheating/reheating scenarios.

Category

Particle / Astroparticle / Cosmology (Theory)

Author: MANSOUR, Henda (University of Hamburg)

Presenter: MANSOUR, Henda (University of Hamburg)

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