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EHU Qc Seminar

Gravitational waves from phase transitions in the early Universe: sound waves and MHD turbulence

Alberto Roper Pol (University of Geneva)

Abstract: Gravitational waves (GWs) can be produced by a first-order phase transition in the Early Universe via the fluid perturbations induced in the primordial plasma by the expansion and collision of broken-phase bubbles. I will review the production of GWs by the anisotropic stresses of velocity and magnetic fields induced in a first-order phase transition and present analytical estimates and numerical simulations that address the stochastic GW background produced by acoustic motion (sound waves) and magnetohydrodynamic (MHD) turbulence that could be detectable by GW observatories like LISA or PTA, potentially allowing us to shed light on the nature of the electroweak phase transition and to probe beyond the Standard Model physics. In addition, the presence or production of magnetic fields at a phase transition will yield to highly coupled non-linear fluid perturbations, described by MHD, that will impact the stochastic GW background. The study of these effects can be used to put constraints on primordial magnetic fields that could evolve until present time and be observable in the cosmic voids of the large-scale structure of the Universe, allowing us to study sources of GWs in the early Universe in a multi-messenger approach.

Theoretical Physics Seminar Room
Wednesday, April 29th , 2026
11:40 am



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