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Inverse bubbles from broken supersymmetry

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The dynamics of first order phase transitions shows a non-trivial interplay between the bubble wall and the surrounding plasma, which is fundamental in determining the phenomenology of the phase transition including the associated gravitational wave emission. Building upon recent findings on inverse phase transitions in the early Universe, in this talk I will present the first natural realization of this phenomenon within a minimal O'Raifeartaigh model for supersymmetry breaking. As we shall see, inverse hydrodynamics, which is characterized by the fluid being sucked in by the expanding bubble rather than being pushed / dragged as in standard deflagration / detonation modes, is actually not limited to a phase of (re)heating but can also occur for phase transitions while the Universe cools down, related in this case to spontaneous R-symmetry breaking. This provides a proof of principle highlighting the need to account for these new fluid solutions when considering cosmological phase transitions and their phenomenological implications. The talk is mostly based on [2406.01596] and [2503.01951].

Primary authors: BARNI, Giulio (IFT Madrid); VANVLASSELAER, Miguel (VUB); BLASI, Simone (DESY Hamburg)

Presenter: BLASI, Simone (DESY Hamburg)

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