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Gravitational waves from cosmological first order phase transitions

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Future space-based gravitational wave detectors, e.g. the eLISA satellite constellation scheduled for launch in 2034, can potentially observe primordial gravitational radiation, opening a new window to the early Universe. Gravitational radiation can be generated in first order phase transitions, for example the electroweak transition in some extensions of the Standard Model. In order to obtain detailed understanding of the generation of gravitational radiation, we have initiated a research program using large-scale simulations of an effective order parameter field + fluid systems. We find that the dominant source of radiation are the acoustic waves of the fluid, the sound of the transition. This hitherto unappreciated mechanism gives significantly stronger gravitational radiation background than the earlier estimates have indicated.

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