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Supercooled First-Order Phase Transitions in Early Universe Cosmology

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Many extensions of the Standard Model predict first-order phase transitions (FOPTs) that may have occurred in the early universe. In particular, theories with classical scale invariance are associated with strong phase transitions capable of producing gravitational-wave signals potentially detectable in future interferometer experiments. Recently, the possibility of primordial black hole production during FOPTs has also been explored. Moreover, the supercooling typical of this class of transitions can give rise to a short period of inflation, after which the universe must be reheated, either through perturbative reheating or preheating. We also find that, during reheating, a significant amount of dark matter can be produced.

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