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Gravitational waves and primordial black holes from supercooled phase transitions

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We discuss strongly supercooled first-order phase transitions in conformal neutrino mass U(1) models. These transitions can generate a detectable stochastic gravitational wave background (SGWB) observable in a wide range of frequencies by LIGO, LISA, and the Einstein Telescope. Strong supercooling can also lead to primordial black hole (PBH) formation if the transition is sufficiently long-lasting. We explore the conditions under which an observable SGWB could be associated with PBHs constituting all dark matter, and discuss possible connections to the underlying high-energy physics.

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