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Probing a modified cosmology through gravitational wave signals from a first-order phase transition

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In this talk I will discuss gravitational waves from supercooled cosmological first-order phase transitions. If such a transition is followed by inefficient reheating, the evolution history of the universe is modified by a period of early matter domination. This leaves an imprint on the predicted gravitational-wave spectra. Using Fisher analysis we show the parameter space in reach of upcoming gravitational wave observatories where reheating can be probed due to its impact on the stochastic background produced by the transition. We use both the simplified geometric parametrisation and the thermodynamical one explicitly including the decay rate of the field undergoing the transition as a parameter determining the spectrum. We show the expansion history following the transition can be probed provided the transition is very strong which is naturally realised in classically scale invariant models generically predicting supercooling. Moreover, in such a scenario the decay rate of the scalar undergoing the phase transition, a parameter most likely inaccessible to accelerators, can be determined through the spectrum analysis.

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