

Observable CMB B-modes from Cosmological Phase Transitions

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A B-mode polarization signal in the cosmic microwave background (CMB) is widely regarded as smoking gun evidence for gravitational waves produced during inflation. Here we demonstrate that tensor perturbations from a cosmological phase transition can produce a B-mode signal whose strength rivals that of testable inflationary predictions across a range of observable scales. Although phase transitions arise from causal sub-horizon physics, they nevertheless exhibit a white noise power spectrum on super-horizon scales. Power is suppressed on the large scales relevant for CMB B-mode polarization, but it is not necessarily negligible. For appropriately chosen phase transition parameters, the maximal B-mode amplitude can compete with inflationary predictions that can be tested with current and future experiments. These scenarios can be differentiated by performing measurements on multiple angular scales, since the phase transition signal predicts peak power on smaller scales.

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