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Seeing highly anisotropic gravitational wave backgrounds from phase transitions

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Anisotropies of gravitational wave background (GWB) from a first-order phase transition could provide a new map of primordial inhomogeneities, analogous to the CMB. In multi-field inflation, this map could differ significantly from CMB if its inhomogeneities are sourced by a quantum field different from the one sourcing CMB (adiabatic) inhomogeneities. While a highly anisotropic GWB could provide valuable new information about light fields from inflation, its isotropic component is expected to be small due to the isocurvature constraints from CMB. In this talk, I will propose a model that makes this tradeoff less severe by including an additional period of matter dominance in the early universe. I will show improvement in the detection prospect of GWB with large anisotropies and elaborate on other interesting features of this model such as the production of primordial black holes.

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