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Lattice simulations of early universe first order deconfinement phase transitions

Friday, 17 December 2021 15:15 (30 minutes)

The detection of gravitational waves has opened an entirely new route to constrain new physics beyond the standard model. A promising direction of investigation is the analysis of gravitational waves produced by first order phase transitions in the early universe. The determination of the expected signatures requires precise measurements of the thermodynamic observables of the transition, such as the latent heat, which can be obtained in principle with numerical calculations on a lattice. In these calculations, a major challenge is the metastable dynamics near the phase transition, which leads to large and often uncontrolled numerical errors. In this talk, as a prototype lattice calculation, I will discuss the first order deconfinement transitions in the strong Yang-Mills sector of the standard model. I will use a novel lattice method, the logarithmic linear relaxation method, which provides a determination of the density of states of the system with exponential error suppression.This enables us to rebuild thermodynamic observables with a significantly smaller and controlled error, providing a promising direction for accurate model predictions.

Could you please give the most relevant category for your talk?

Lattice QCD

Will you be pre-recording your talk?

No

Are you happy for your talk to be recorded?

Yes

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Yes

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Session Classification: Full-length talks