Contribution ID: **319** Type: **Oral Presentation**

The density of state method in Yang-Mills theories and first-order phase transitions

Wednesday, August 10, 2022 5:30 PM (20 minutes)

Beyond the standard model theories involving early universe first order phase transitions can lead to a gravitational wave background that may be measurable with improved detectors. Thermodynamic observables of the transition, such as the latent heat, determined through lattice simulations can be used to predict the expected signatures from a given theory and constrain physical models. Metastable dynamics around the phase transition make precise determination of these observables difficult and often lead to large uncontrolled numerical errors. In this talk, I will discuss a prototype lattice calculation in which the first order deconfinement transition in the strong Yang-Mills sector of the standard model is analysed using a novel lattice method, the logarithmic linear relaxation method. This method provides a determination of the density of states of the system with exponential error suppression. From this, thermodynamic observables can be reconstructed with a controlled error, providing a promising direction for accurate model predictions.

Primary author: MASON, David (Swansea University)

Co-authors: LUCINI, Biagio (Swansea University); VADACCHINO, Davide (University of Plymouth); Prof. PIAI, Maurizio (Swansea University); Dr RINALDI, Enrico (University of Michigan)

Presenter: MASON, David (Swansea University)

Session Classification: Particle physics beyond the Standard Model

Track Classification: Particle physics beyond the Standard Model