Contribution ID: **257** Type: **Oral Presentation**

Mean-field approximation of effective theories of lattice QCD

Friday, 12 August 2022 18:00 (20 minutes)

For the exploration of the phase diagram of lattice QCD effective Polyakov loop theories provide a valuable tool in the strong coupling and heavy quark mass regime. In practice, the evaluation of these theories is limited by the appearance of long-range and multi-point interaction terms. It is well known that for theories with such kind of interactions mean-field approximations can be expected to yield reliable results. Here, those approximations are applied to such effective theories. Using this framework the critical endpoint of the deconfinement transition is determined and results are compared to the literature. This treatment can also be used to investigate the phase diagram at non-zero baryon and iso-spin chemical potential.

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Session Classification: Non-zero Temperature

Track Classification: QCD at Non-zero Temperature