The 22nd International Conference on
Strangeness in Quark Matter
22-27 March, 2026, Los Angeles, CA

Contribution ID: **160** Type: **Oral Presentation**

A 4D T'-expanded lattice QCD equation of state with a multi-dimensional critical contribution

Tuesday, 24 March 2026 17:25 (20 minutes)

Recently, a new equation of state based on the two-dimensional T'-expansion scheme with a parametrizable critical point from the 3D Ising model was released [1]. It allows to produce a family of equations of state which can be used to study the effect of the critical point on the QCD phase diagram, crucial to infer its existence and location from experimental results. Employing the newly developed 4D T'-expansion scheme equation of state from lattice QCD [2], we are now extending the critical point contribution from the (T, μ_B) plane to a critical surface at finite μ_B, μ_Q and μ_S. We present preliminary results of this generalization, where the critical surface at finite (μ_B, μ_Q, μ_S) can be parametrized using different functional forms.
[1] M. Kahangirwe, S. A. Bass, E. Bratkovskaya, J. Jahan, P. Moreau, P. Parotto, D. Price, C. Ratti, O. Soloveva, M. Stephanov, Phys.Rev.D 109 (2024) 9, 094046.
[2] A. Abuali et al., Phys.Rev.D 112 (2025) 5, 054502.

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Session Classification: Parallel V: Phase Structure