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Integrated HydroKinetic Model at Relativistic Heavy Ion Collider Energies

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Understanding the phase structure of strongly interacting matter is a central goal of ongoing and future heavy-ion experiments, such as RHIC's Beam Energy Scan (BES) and FAIR's Compressed Baryonic Matter (CBM) program. These efforts aim to explore the Quantum Chromodynamics (QCD) phase diagram at high baryon densities, where a critical point and a first-order phase transition are conjectured to exist. To support the interpretation of experimental data, we have developed a new theoretical framework [1] extending the integrated hydrokinetic model (iHKM) [2] to the lower collision energies relevant for these programs. This model allows for dynamical simulations using different equations of state, both with and without a phase transition. In this talk, I will present our first results for the RHIC BES energy range, comparing model predictions with experimental data. Our findings suggest hints of a phase transition at lower collision energies, while a crossover behavior remains more consistent with observables at higher energies.

[1] M. Adzhymambetov, Y. Sinyukov arXiv:2412.00458 [hep-ph] (2024).
[2] V. M. Shapoval, M. D. Adzhymambetov, Yu. M. Sinyukov, Eur. Phys. J. A 56 (2020) 260, [arXiv:2006.16697 [nucl-th]], https://doi.org/10.1140/epja/s10050-020-00266-x.

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