



Fluctuations in Strongly Interacting Hot and Dense Matter: Theory and Experiment

EMMI, GSI
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Here is the to do list:

- Higher cumulants from LHC, calibrate the LGT results
- Transport calculation with MEAN FIELD at large μ_B region
- Test efficiency method proposed by Adam et al. at STAR

Theory Efforts (BEST, Volker et al.):

A comprehensive framework describing the space-time evolution of heavy-ion collisions for all beam energies in the range of the BES. This includes:

1. **A 3+1dimensional relativistic viscous fluid dynamics code** which propagates all relevant conserved quantities including baryon-number, strangeness and electric charge.
2. **A detailed modeling and understanding of the initial state** not only with respect to the initial distribution of energy but also of all relevant conserved charges and topological fluctuations.
3. **The implementation of chiral and hydrodynamical fluctuations** necessary to describe the evolution close to the critical point and the first order phase transition.
4. **The propagation of axial charges as well as the realistic evolution of magnetic fields** in a magneto-hydrodynamic framework, essential for the study of manifestations of the chiral anomaly.
5. **State-of-the-art Lattice QCD calculation for the equation of state at finite baryon density.**
6. **State-of-the-art Lattice QCD calculations of non-Gaussian fluctuations** of various conserved charges essential for locating QCD phase boundary via the BES.
7. **Comprehensive comparison with and global analysis of the experimental data from BES** for validation of the dynamical framework, optimization of the choice of the observables and subsequent inference of the QCD phase structure and the chiral anomaly induced effects.

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