

# Effect of Thermal Fluctuations on Electromagnetic and Hadronic Observables

Geometric and quantum fluctuations in the initial state of heavy-ion collisions leave fingerprints in the measured multi-particle correlation functions. Thermal fluctuations during the quark-gluon plasma (QGP) evolution are another source of dynamical fluctuation. They are conceptually important and can play a crucial role in second-order viscous hydrodynamic simulations [1].

In this work, we present a full calculation of hadronic and photon observables including the thermal fluctuations. The evolution of thermal fluctuations is treated as a linearized perturbation on a hydrodynamic background [2]. Effects on event-by-event charged hadron  $v_n$  distribution, and on event-plane correlations will be addressed. Furthermore, because thermal photons are produced at all stages of evolution, they offer a window on earlier stages when temperatures are high and fluctuations are more significant. We elucidate the effects of fluctuations on electromagnetic phenomenology, with an emphasis on direct photon observables.

[1] P. Kovtun, G. D. Moore and P. Romatschke, Phys. Rev. D 84, 025006 (2011).

[2] C. Young et al. , Phys. Rev. C 91, 044901 (2015).

## Preferred Track

Electromagnetic Probes

## Collaboration

Not applicable

**Primary author:** Mr SINGH, Mayank (McGill University)

**Co-author:** Dr SHEN, Chun (Brookhaven National Laboratory)

**Presenter:** Mr SINGH, Mayank (McGill University)

**Session Classification:** Poster Session