Contribution ID: **626** Type: **Oral**

Thermal dilepton production in heavy-ion collisions at Beam Energy Scan (BES) energies

Tuesday 5 September 2023 15:10 (20 minutes)

Dileptons are an invaluable tool for mapping out the phase diagram of QCD because they grant observational access to the entire space-time history of heavy-ion collisions. We calculate thermal dilepton yields from Au+Au collisions at BES energies – $\sqrt{s_{NN}}$=7.7, 19.6, 27, 54.4, 62.4, 130, and 200 GeV – using a realistic (3+1)-dimensional multistage dynamical framework. The underlying emission rates, which include baryon chemical potential dependence for the first time, are implemented from perturbation theory in a manner which smoothly interpolates between the strict next-to-leading order and the Landau-Pomeranchuk-Migdal regimes. By comparing the slope of the invariant mass spectrum with the average temperature of the fluid (at different evolution times), we assess the efficacy of this observable as a thermometer of the quark-gluon plasma (QGP). Furthermore, we are able to explore the capability of dileptons as a QGP 'baryometer' via their sensitivity to the dynamical evolution and dissipation of baryon charge included in the simulations. We also investigate the correlation between the medium lifetime and the integrated dilepton yields in central and peripheral Au+Au collisions across the different beam energies. Finally, we compare the thermal dielectron invariant mass spectra with those from hadronic cocktail contributions and available STAR measurements. Our results provide a quantitative baseline for dilepton yields at BES energies and highlight the importance of this observable in probing features of QCD thermodynamics.

Category

Theory

Collaboration (if applicable)

Primary authors: CHURCHILL, Jessica (McGill University); DU, Lipei (McGill University); FORSTER, Bailey (McGill University); Prof. GALE, Charles; GAO, Han; JACKSON, Greg (INT, University of Washington); JEON, Sangyong

Presenter: Prof. GALE, Charles

Session Classification: EM Probes

Track Classification: EM Probes