Measurements of dielectron production in Au+Au collisions at $\sqrt{s_{\rm NN}} = 27$, 54.4 and 200 GeV with the STAR experiment

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for the STAR Collaboration

Dielectrons are suggested as excellent probes of the hot and dense medium created in relativistic heavy-ion collisions due to their minimal interactions with the partonic and hadronic medium. They can carry the information from the initial to the final stage of a collision. The study of the dielectron mass spectrum could help to disentangle various contributions. In the low mass region (LMR, $M_{ee} < M_{\phi}$), the mass spectra of vector mesons are modified due to their interaction with the medium which is related to the chiral symmetry restoration. In the intermediate mass region (IMR, $M_{\phi} < M_{ee} < M_{J/\Psi}$), dielectrons from thermal radiation are predicted as a QGP thermometer, although the contributions from heavy quark semi-leptonic decays make the extraction of the thermal radiation contribution very challenging.

In this talk, we will present the dielectron spectra in Au+Au collisions at $\sqrt{s_{\rm NN}} = 27$, 54.4 and 200 GeV with the STAR experiment. The 1.3 B (1.5 B) minimum-bias events of Au+Au collisions at $\sqrt{s_{\rm NN}} = 27$ (54.4) GeV taken in 2017 (2018) significantly enhance the precision of the in-medium ρ modification measurement compared to the published STAR BES-I results. Lower heavy quark semi-leptonic decay contributions compared to those at top RHIC energies and the large data samples may allow the first extraction of the medium temperature with IMR dielectrons at RHIC. The Heavy Flavor Tracker (HFT) installed at STAR in 2014 enables a better understanding of the semi-leptonic decay contributions by providing high-precision tracking and vertex information. The first measurement of the dielectron spectra with the HFT in $\sqrt{s_{\rm NN}} = 200$ GeV Au+Au collisions will be presented. The physics implications of these measurements will be discussed and put into context of previous results.