Dielectrons are excellent probes of the Quark-Gluon Plasma (QGP) created in high-energy heavy-ion collisions. Because they can be produced at all stages of the collision system evolution and do not interact with the medium strongly, dielectrons carry the information from the initial stage to the final stage. In the low mass region (LMR, $M_q < M_p$), the mass spectra of vector mesons will be modified by the hot and dense medium which is related to the chiral symmetry restoration in the medium. In the intermediate mass region (IMR, $M_q < M_p < M_{\phi}$), QGP thermal radiation can be used as a QGP thermometer. However, it is hard to measure the QGP thermal radiation because of the heavy flavor semi-leptonic decay contributions.

In this poster, we present the dielectron production in Au+Au collisions at $\sqrt{s_{NN}} = 54.4$ GeV at STAR. With a 10 times larger data sample than that at 62 GeV from the first phase of the STAR Beam Energy Scan (BES-I) program, in-medium $\rho$ modification can be studied with better precision and compared to theoretical predictions.

**Abstract**

- Dielectrons are produced at all stages of the system evolution and escape with minimum interaction with the medium.
- They can carry the information from the initial stage to the final stage.
- Mass spectrum in LMR is related to chiral symmetry restoration.
- In IMR, QGP thermal radiation can be used as a QGP thermometer.
- STAR collected 875M minimum-bias(MB) events in Au+Au collisions at $\sqrt{s_{NN}} = 54.4$ GeV. With a data sample that is 10 times larger than that for the BES-I program, a more precise measurement is possible.

**Motivation**

- The production of dielectrons at high energies is a key process in the study of QGP.
- The interaction with the medium modifies the mass spectra of vector mesons.
- The QGP thermal radiation can be used as a thermometer.

**Electron identification**

- Electrons are selected by the Time Projection Chamber (TPC) and Time of Flight (TOF) detectors.
- Dilepton identification is based on the TOF and TPC information.

**Pair reconstruction and background subtraction**

- Raw signal is obtained by subtracting the background from unlike-sign spectrum.
- Like-sign same event method is used to estimate the combinatorial background.
- Pair acceptance factor obtained from a mixed event method.

**Result & Summary**

- A significant enhancement of dielectron yields is observed with respect to the hadronic cocktail simulation without $\rho$ contribution in the low mass region.
- An enhancement at intermediate mass region is not observed.

**Outlook**

- STAR acceptance-corrected dielectron spectrum and excess yields will be studied.
- Coherent photonic process at very low $p_T$ region in Au+Au collisions at 54.4 GeV will be studied.

**References**