Thermal dielectron measurements with the STAR experiment

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Thermal dielectrons, which are produced throughout the entire evolution of relativistic heavy-ion collisions and are not involved in strong interactions, are suggested as the ideal probes of the hot and dense medium. By measuring the mass spectra of thermal dielectrons, one can extract the average temperature of the medium in different stages. Since the thermal dielectron emission rate is proportional to the medium's electromagnetic spectral function, the integrated yields offer valuable insights into the microscopic interaction mechanism between the electromagnetic current and the medium. Additionally, the azimuthal angle distribution of the single decayed electrons in the dielectron rest frame provides means to explore the polarization of thermal dielectrons.

In this talk, we will report on STAR measurements of thermal dielectrons produced in Au+Au collisions at BES-II energies ($\sqrt{s_{\rm NN}}$ = 7.7 - 19.6 GeV), as well as in Ru+Ru and Zr+Zr collisions at $\sqrt{s_{\rm NN}}$ = 200 GeV. The presented results will cover the electron angular distributions in the dielectron rest frame, thermal dielectron invariant mass spectra, excess yields, and temperature measurements. Furthermore, the energy dependence of these experimental results and the physics implications will be discussed.