

Direct virtual photon measurements in Au+Au collisions with STAR BES-II data

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In a heavy-ion collision, photons, which do not interact strongly, have the advantage of escaping unimpeded from their emission source. Consequently, photons can carry valuable information about the properties and dynamics of the hot QCD medium created in heavy-ion collisions. Particularly, the transverse momentum distribution of direct virtual photons emitted from the hot QCD medium exhibits sensitivity to the system temperature. The yield of direct virtual photons depend strongly on fireball volume, emission time, total baryon chemical potential, and temperature.

The STAR experiment has recorded large datasets of Au+Au collisions in the Beam Energy Scan Phase-II (BES-II) program, spanning center-of-mass energies $\sqrt{s_{NN}} = 3 - 54.4$ GeV. In this talk, new results on the direct virtual photon measurements in Au+Au collisions at $\sqrt{s_{NN}} = 14.6$ and 19.6 GeV will be presented, including p_T spectra and invariant yields. Additionally, prompt photons from initial hard scatterings are estimated using model calculations and the effective temperature is extracted from non-prompt direct photons at $\sqrt{s_{NN}} = 14.6 - 54.4$ GeV. The physics implications of direct virtual photon yields and effective temperature will be discussed.