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Photon and dilepton production in heavy-ion collisions

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We address the properties of the hot QCD matter created in relativistic heavy-ion collisions by examining the spectra, elliptic flow v_2 and triangular flow v_3 of the emitted real and virtual photons. Comparing our calculations within the PHSD transport approach to the multitude of data by the ALICE Collaboration at the LHC as well as by the STAR and PHENIX Collaborations at RHIC allows us to determine the space-time evolution of the collision, the sheer viscosity of the produced matter and to put experimental constrains on its electric conductivity. We model the heavy-ion collisions using the PHSD microscopic transport approach, which includes the dynamics of quarks, antiquarks and gluons as well as a covariant dynamical hadronization scheme and the subsequent off-shell hadronic reaction dynamics. The implementation of photon bremsstrahlung in transport approaches has been based until now on the soft photon approximation, which is valid only at low energy of the produced photon. Presently, we have improved the calculation of this channel beyond the soft photon approximation by using the one-boson-exchange model. In order to clarify the channel decomposition of the direct photon spectra, we investigate the centrality dependence of the photon yield at RHIC and, most recently, also at the LHC. We will also present predictions for the photon production in the RHIC Beam-Energy-Scan and the comparison of dilepton data to the results of the PHENIX Collaboration with the Hadron-Blind Detector. Additionally, we propose a new observable with the potential to monitor the dynamics of the QGP equilibration in the initial stages of the collision.

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