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Virtual Photon Measurements with the HADES at GSI

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The High Acceptance DiElectron Spectrometer (HADES) is dedicated to the measurement of electromagnetic probes from heavy ion collisions and to study the in-medium behaviour of dileptons in the moderate temperature and high density regime of the QCD phase diagram. This region recently gained more attention as conditions turn out to be similar as in neutron-star mergers. Dileptons as penetrating probes are messengers of this dense medium and can reveal the thermal properties and the lifetime of the medium but also give insight into meson properties at high densities.

In this talk we present preliminary results of HADES on the dielectron analysis of 4.5 billion Ag+Ag collisions (0 – 40% centrality) at a centre-of-mass energy of $\sqrt{s_{NN}} = 2.55 \text{ GeV}$. The upgraded RICH detector offers excellent electron identification and suppression of conversion-pairs resulting in a signal-to-background ratio larger than 1 for $M_{e^+e^-} > 500 \text{ MeV}/c^2$. The high statistics data sample in combination with a strongly increased electron detection efficiency and background suppression allow for a differential analysis in terms of centrality or electron-pair-momentum with a signal up to the phi meson mass region. For higher pair-momenta a signal of the omega meson is clearly seen while vanishing for lower pair-momenta. The temperature extracted from the intermediate mass region compares well with the HADES measurement in Au+Au collisions at $\sqrt{s_{NN}} = 2.42 \text{ GeV}$. The obtained dielectron signal spectrum is compared to simulated hadronic cocktail and nucleon-nucleon reference spectra revealing a strong in-medium contribution.

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