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Exploring baryon rich QCD matter with electromagnetic probes

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Collisions of heavy atomic nuclei at (ultra-)relativistic energies provide a fascinating opportunity to produce in the laboratory, for a short moment (10⊠23 s), matter under extreme conditions of temperature (1012 K) and density (2⊠5 times ground state density). Such matter radiates photons, whose spectrum re
ects the temperature as well as possible critical behavior in the vicinity of
phase transitions. The spectra of dileptons oer the unique chance to investigate the microscopic properties of QCD matter. The key quantity is the in-medium electromagnetic spectral function, which encodes the eects of the strong interaction on dilepton production in the hot and dense reball.
In this contribution I will rst discuss important experimental results on emissivity of matter obtained by HADES in Au+Au collisions at 2.42 GeV center of mass energy. Virtual photon spectra will be confronted with results of other experiments as well as with available model calculations. A deeper understanding of the microscopic origin of the excess radiation requires systematic investigation of di-electron radiation emitted from baryonic resonances produced o protons in pion-induced reactions. These are studied in HADES making use of pion beams. An important part of the future research program will be the high-precision measurement of the dilepton invariant mass distribution not only below 1 GeV/c2, but in particular between 1 and 2.5 GeV/c2 for dierent beam energies.
I will then give the prospects for intermediate mass measurements with STAR experiment at top RHIC energy and with upgraded HADES at SIS18. I will conclude presenting the potential of dilepton spectroscopy at future high B facilities.

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