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HADES investigating in-medium hadron properties at FAIR

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The HADES spectrometer installed at GSI Darmstadt is a second generation experiment designed to measure e+e- pairs (dielectrons) in the SIS/BEVALAC energy regime. The main goal of the experiment is to measure electromagnetic emissivity of a compressed baryonic matter formed in course of heavy ion collisions and ultimately learn about in-medium hadron properties. For this purpose a dedicated programme focusing on systematic investigation of dielectron production in nucleon-nucleon, proton-nucleus and heavy ion reactions is on-going. A comparison of the nucleon-nucleon data to the one obtained in more complex systems allows for isolation of true in-medium effects. Furthermore, thank to excellent particle identification capabilities of the detector, investigations have also been extended to strangeness production, which at these energies is confined to a high density zone of the collision. The obtained data call for further systematic investigations at higher baryonic densities, where no dielectron and very limited data on strangeness exist. For this reason, experiments with HADES on the coming FAIR facility are under preparation. The existing device will be complemented by an electromagnetic calorimeter based on lead-glass modules. The calorimeter will enable to get in addition data on production of the pi0 and eta mesons via their two-photon decay. No respective data are presently available for the energy range 4–40 AGeV, with the consequence that such upgrade is needed to avoid interpretation of future dielectron data based solely on theoretical models. In the talk short overview of results obtained so far will be given. Perspective for future investigations within new FAIR project and the R&D effort to upgrade the spectrometer will be described in detail.

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