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Exploring compressed nuclear matter with HADES

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In the energy domain of 1-2 GeV kinetic energy per nucleon, HADES has been performed systematic studies of electron-positron production in C+C, Ar+KCl, p+p, d+p and p+Nb collisions. Our results demonstrate that electron pair emission in small collision systems, such as C+C, can essentially be explained as a superposition of independent N+N collisions with a dominant contribution from the p-n channel.

The comparison of the N+N reference spectrum with the di-electron invariant-mass distribution measured in Ar+KC collisions shows a pronounced excess radiation. The properties of the excess as a function of the transverse mass are quantified.

Further medium effects have been investigated in p+Nb interactions at 3.5 GeV by a direct comparison to p+p reactions measured at the same energy. Differential dielectron production cross sections have been extracted and can be compared in detail in the pi^{0}, eta and the vector meson regions. The results will be discussed and compared to the ones obtained in photo-induced reactions.

Intriguing results were also obtained from the reconstruction of hadrons with open and hidden strangeness in Ar+KCl collisions. While the measured abundance of all reconstructed particles are well described assuming thermalization, the also reconstructed double-strange baryon Xi^{-} appears about ten times more abundant than expected. Also, the phi/omega ratio is much larger than the one measured in N-N collisions and does not require any OZI suppression.

Further investigations of compressed nuclear matter by means of di-electrons as penetrating probes and strangeness production will be followed up over the forthcoming years with an upgraded HADES detector in Au+Au and Ag+Ag collisions.

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