Contribution ID: **21** Type: **Invited**

Photon-photon correlations in Ag+Ag collisions at $\sqrt{s_{NN}} = 2.55$ GeV

Thursday, 9 November 2023 18:05 (25 minutes)

The investigation of femtoscopic correlations between pairs of photons emitted from heavy-ion collisions offers a unique opportunity to investigate the evolving source spacetime characteristics and properties. Unlike commonly studied charged particle correlations, photons are not influenced by strong or electromagnetic interactions, and thus have a longer mean free path. These characteristics indicate that the information they carry remains minimally distorted from their point of origin until detection in experiment. Consequently, it becomes feasible to examine source characteristics not solely based on post thermal freeze-out phases, but also encompass earlier stages of the expansion, without significant distortions caused by neighboring particles.

However, photon detection presents a non-trivial challenge, necessitating eighter a specialized approach of reconstructing photons converted into dilepton pairs, or detectors capable of detecting neutral particles. Additionally, the photon yield is vastly dominated by the decay of π^0 mesons, happening way after thermal freeze-out. Hence femtoscopy is sensitive to the emission sequence of particles, may offer a plausibility of distinguishing between the femtoscopic signal of direct photons and decay photons.

As a constituent of the FAIR/GSI scientific complex, the HADES experiment specializes in detecting light vector mesons through dielectron ($e^{\pm}$) channels generated during high-energy collisions of heavy ions, typically at energies around several (1-2) A GeV. By utilizing various detectors within the spectrometer, a photon sample can been acquired.

The preliminary results from data of Ag+Ag collisions at $\sqrt{s_{NN}} = 2.55$ GeV, as measured by HADES experiment, will be presented.

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Session Classification: Day 4 - Afternoon