



Contribution ID: 512

Type: Parallel Talk

Wigner distributions of photons in nuclei and the centrality dependence of $\gamma\gamma$ processes

Thursday, 7 July 2022 17:50 (15 minutes)

Ultrarelativistic Heavy Ions of large charge Z are accompanied by a large flux of Weizsäcker-Williams photons. This opens up the opportunity to study a variety of photo-induced nuclear processes, as well as photon-photon processes.

We would like to present a formalism which allows to calculate differential distributions of leptons produced in semi-central (impact parameter $< 2 \times$ nucleus radius) nucleus-nucleus collisions for a given centrality. In this approach the differential cross section is calculated using the complete polarization density matrix of photons resulting from the Wigner distribution formalism. We will present several differential distributions such as invariant mass of dileptons, dilepton transverse momentum and acoplanarity for different regions of centrality. The results of the calculations will be compared to experimental data of the STAR, ALICE and ATLAS collaboration. Very good agreement with the data is achieved without free parameters in all cases. Our new approach gives much better agreement with experimental data than the previous approaches used in the literature. This more complete approach is based on so-called Wigner distribution, because being a Wigner function, the standard photon fluxes in momentum space and impact parameter space are obtained after integration over impact parameter or momentum space.

We obtain a good description of the data without introducing additional final state rescattering of leptons in the quark-gluon plasma. More work is thus necessary to identify observables that can probe electromagnetic properties of the QGP.

In-person participation

Yes

Primary authors: SZCZUREK, Antoni; KLUSEK-GAWENDA, Mariola (Institute of Nuclear Physics Polish Academy of Sciences); SCHAEFER, Wolfgang (Institute of Nuclear Physics PAN)

Presenters: SZCZUREK, Antoni; KLUSEK-GAWENDA, Mariola (Institute of Nuclear Physics Polish Academy of Sciences); SCHAEFER, Wolfgang (Institute of Nuclear Physics PAN)

Session Classification: Heavy Ions

Track Classification: Heavy Ions