

Photon induced processes from semi-central to ultraperipheral heavy-ion collisions

jeudi 16 septembre 2021 16:30 (30 minutes)

Ultrarelativistic heavy ions are accompanied by a large flux of quasi-real Weizsäcker-Williams photons. This opens a broad range of research possibilities, as the Weizsäcker-Williams photons can be used to study photon-photon fusion reactions as well as photonuclear reactions in a wide range of energies, see for example the review [1].

Of special interest here are diffractive photoproduction reactions, which appear in two major classes: the coherent diffraction in which the target nucleus stays intact and the incoherent (or quasielastic) diffraction in which the nucleus breaks up, but no additional particles are produced in the nuclear fragmentation region.

We will discuss the coherent and incoherent diffractive photoproduction of heavy vector mesons J/ψ and Y based on our recent papers [2, 3]. Good agreement with available experimental data by the ALICE and LHCb collaborations can be obtained within a color-dipole approach. Diffractive photoproduction of heavy-flavour vector mesons has long been discussed as a probe of the target's gluon distribution, and we will discuss implications for the nuclear glue. Here additional nuclear shadowing from the $c\bar{c}g$ -Fock state is needed to obtain agreement with data.

Very recently, the role of Weizsäcker-Williams photons in peripheral, inelastic, heavy ion collisions has come under scrutiny. Recent measurements of dilepton production of the STAR collaboration in $\sqrt{s}NN=200$ GeV Au-Au collisions indicate an excess at small pair p_T most notably in peripheral collisions. We show, that it can be that has attributed to the initial photon fusion which is most significant at small pair transverse momenta [4]. The centrality dependence of the pair transverse momentum distribution is calculated in a novel factorization approach involving Wigner distributions of photons [5].

- [1] C. A. Bertulani, S. R. Klein and J. Nystrand, "Physics of ultra-peripheral nuclear collisions," *Ann. Rev. Nucl. Part. Sci.* 55 (2005) 271 [nucl-ex/0502005].
- [2] A. Luszczak and W. Schäfer, "Incoherent diffractive photoproduction of J/ψ and Y on heavy nuclei in the color dipole approach," *Phys. Rev. C* 97 (2018) no.2, 024903 [arXiv:1712.04502 [hep-ph]].
- [3] A. Luszczak and W. Schäfer, "Coherent photoproduction of J/ψ in nucleus-nucleus collisions in the color dipole approach," *Phys. Rev. C* 99 (2019) no.4, 044905 [arXiv:1901.07989 [hep-ph]].
- [4] M. Klusek-Gawenda, R. Rapp, W. Schäfer and A. Szczurek, "Dilepton Radiation in Heavy-Ion Collisions at Small Transverse Momentum," *Phys. Lett. B* 790 (2019) 339 [arXiv:1809.07049 [nucl-th]].
- [5] M. Klusek-Gawenda, W. Schäfer and A. Szczurek, "Centrality dependence of dilepton production via $\gamma\gamma$ processes from Wigner distributions of photons in nuclei," *Phys. Lett. B* 814 (2021), 136114 [arXiv:2012.11973 [hep-ph]].

Auteur principal: SCHAEFER, Wolfgang (Institute of Nuclear Physics PAN, Krakow)

Orateur: SCHAEFER, Wolfgang (Institute of Nuclear Physics PAN, Krakow)

Classification de Session: Seminars