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Probing the photon Wigner distribution with dilepton production at small q_T in UPCs

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In recent years, the description of lepton-pair production in ultra-peripheral collisions (UPCs) of heavy nuclei has attracted significant attention, particularly with the release of new STAR data. When the dilepton pair is produced almost back-to-back, hence at small q_T, the observable starts to be sensitive to the photon Wigner distribution. They are related via Fourier transform to the generalised transverse momentum dependent distributions (GTMDs), which depend on two internal transverse momenta: k_T and Δ_T. The former is the usual intrinsic transverse momentum also found in the transverse momentum-dependent distributions, whereas the latter corresponds to the (transverse) momentum transfer.
Thus, the Wigner distribution provides a priori the most theoretical robust description of such an observable. Moreover, if one is interested in exploring the gluonic content of nuclear matter (e.g., by considering heavy quarkonium production), the QED channel corresponds to the background of the process. Therefore, understanding the *photon* GTMDs is crucial to single out the QCD channel and probe the *gluon* GTMDs.
In this talk I will present the theoretical framework that describes UPCs of heavy ions in terms of photon GTMDs. In particular, I will address the counter-intuitive features that the presence of the two aforementioned transverse momenta generates. I will also discuss how the mass of the produced system modifies both the cross section and some of the various asymmetries that can be measured in this process, based on RHIC and LHC kinematics.

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