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Photo-nuclear collisions in Pythia 8

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Ultraperipheral heavy-ion collisions provide the first opportunity to study collisions between photons and heavy ions in high-energy colliders. The quasi-real photons emitted by the nuclei may fluctuate into a hadronic state and in fact this hadronic contribution will provide the bulk of the photon-hadron cross section. In case of a heavy-ion target the partonic structure of these resolved photons give rise to additional interactions between the photon remnants and the target nucleons increasing the multiplicity of such events compared to a collision with a proton target.

In this talk I will present our current framework to simulate photon-ion interactions with Pythia 8 general-purpose Monte Carlo event generator. As a first step we have applied vector-meson dominance to model the resolved photon and the Angantyr model in Pythia to sample number and type of collisions between a heavy ion and the different vector-meson states. We compare our setup with the full photoproduction model and with the existing HERA data in case of proton target. Then we present comparisons of our approach to the recent ATLAS UPC data with heavy-ion target including multiplicity and rapidity distributions of charged particles. Furthermore we study whether the observed two-particle correlations could be reproduced within the model that does not contain any collectivity from hydrodynamics. In addition, we compare against fixed-target NA61/Shine data for pion-nucleus collisions where we can apply the developed framework in a different environment.

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