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Neutron emission from the photon-induced reactions in UPC of heavy ions - impact of new ALICE data

The ultraperipheral collisions are a source of various interesting phenomena based on photon-induced reactions. We calculate cross sections for single and any number of n , p , α , γ in ultraperipheral heavy-ion collision for LHC energies emitted in forward/backward directions. We analyze the production of a given number of neutrons relevant for a recent ALICE experiment [1] using zero degree calorimeters, for $\sqrt{s_{NN}} = 5.02$ TeV. In our approach, we include both single and multiple photon exchanges as well as the fact that not all photon energies are used in the process of equilibration of the residual nucleus. We propose a simple two-component model in which $E_{exc} \neq E_\gamma$ and compare its results with the results of HIPSE and EMPIRE codes. We discuss the role of preequilibrium and equilibrium processes. In addition we analyze the role of scattering of high-energy photons for small neutron multiplicities. Emission of the small number of neutrons at high (virtual) photon energies ($E_\gamma > 1$ GeV) seems to be crucial to understand the new ALICE data. All effects work in the desired direction, but the description of the cross section for four- and five-neutron emission is rather difficult. Several open issues will be discussed.

[1] S. Acharya et al. (ALICE collaboration),
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Category

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