
ELECTROMAGNETIC EXCITATION OF NUCLEI IN PHOTOABSORPTION REACTIONS AND IN UPC

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We shall present a new approach for calculating the electromagnetic excitation of nuclei as well as differential and total cross section for emission of neutrons from decay of excited nuclear systems for ultraperipheral collisions (UPC) of heavy ions.

We fit the photoabsorption cross section on Au and Pb nuclei using physics-motivated multicomponent parametrization [1]. The giant resonances, quasi-deuteron, excitation of nucleon resonances, and breakup of the nucleon mechanisms are included in the fit to the world data. The neutron emission from the excited nuclear system is calculated within the Hauser-Feshbach formalism. Within our approach we obtain a very good description of the excitation functions for $\gamma+^{197}\text{Au}$ and $\gamma+^{208}\text{Pb}$ reactions with a fixed number of neutrons. The excitation function is used to calculate several cross sections in UPCs. We will discuss both single-photon and double-photon excitation processes. We calculate the corresponding excitation functions for single nucleus excitations.

Finally, we shall present a good agreement of the calculated total cross section for electromagnetic excitation as well as the cross section for one-neutron and two-neutron emissions with the recent experimental data of the PHENIX, PHOBOS, BRAHMS, and ALICE Collaborations.

The presented formalism may be applied to other exclusive ultrarelativistic heavy ion processes (e.g. $AA \rightarrow AA\rho^0$, $AA \rightarrow AAe^+e^-$, $AA \rightarrow AA\pi^+\pi^-$, $AA \rightarrow AA\pi^+\pi^-\pi^+\pi^-$).

REFERENCES

[1] M. Klusek-Gawenda, M. Ciemala, W. Schafer and A. Szczurek, Phys. Rev. **C89** (2014) 054907