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## Double-scattering mechanism of production of two $\rho^0$ mesons in ultraperipheral, ultrarelativistic heavy ion collisions

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We present, for the first time, differential distributions for two  $\rho^0$  meson production in exclusive ultraperipheral, ultrarelativistic collisions via a double scattering mechanism. The calculations are done in the impact parameter space. The cross section for  $\gamma A \rightarrow \rho^0 A$  is parametrized based on an existing calculation. Smearing of  $\rho^0$  masses is taken into account. The results of calculations are compared at the RHIC and LHC energies.

The cross section for the double scattering mechanism is an order of magnitude larger at  $M_{\rho\rho} < 2$  GeV and more than two orders of magnitude at  $M_{\rho\rho} > 3$  GeV, than that for the photon-photon mechanism.

The double scattering mechanism populates somewhat larger  $\rho^0\rho^0$  invariant masses and larger rapidity distances between the two  $\rho^0$  mesons compared to the two-photon mechanism. The mechanism considered gives a significant contribution to the  $AA \rightarrow AA\pi^+\pi^-\pi^+\pi^-$  reaction.

Some observables related to charged pions are presented too. We compare results of our calculation with the STAR collaboration results on four charged pion production.

The shape in invariant mass of the four-pion system is very similar to the measured one.

We discuss a possibility of identifying the double scattering mechanism at the LHC.

Literature:

M. Klusek-Gawenda and A. Szczurek,  
Phys. Rev. C89 (2014) 024912.

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