Contribution ID: **55** Type: **not specified**

Single and double scattering production of four leptons in lead-lead UPC

Tuesday, 12 December 2017 12:55 (15 minutes)

We will report on our results for electromagnetic (two-photon) single and double scattering production of two positron-electron and muon pairs in ultraperipheral ultrarelativistic two lead ions collisions. We consider double-scattering contribution obtaining measurable cross section. We take into account realistic cuts on electron/positron or muon (pseudo)rapidities and transverse momenta for the ALICE, ATLAS or CMS experiment. Total and differential cross sections will be presented. We will show and compare also energy dependence of the cross sections for one- and two-pair production. We will present, for a first time, results for direct $\gamma\gamma$ production of four leptons in one scattering. We will study an unexplored process $\gamma\gamma \to l^+l^-l^+l^-$.

The nuclear PbPb→PbPb4μ and PbPb→PbPb4e cross sections are calculated in the equivalent photon approximation. In our calculations we use the photon flux taking into account realistic nuclear charge form factor which is a Fourier transform of the realistic charge distribution.

We demonstrate explicitly that the cross section for the single-scattering mechanism is considerably smaller that the cross section for the double-scattering mechanism. This shows that the DS mechanism is sufficient for detailed studies and planning experiments.

This talk will be based mainly on our analyses which were presented in Ref. [1] and [2].

References:
[1] M. Kłusek-Gawenda and A. Szczurek,
Double scattering production of two positron–electron pairs in ultraperipheral heavy-ion collisions,
Phys. Lett. **B763** (2016) 416-421,
[2] A. van Hameren, M. Kłusek-Gawenda and A. Szczurek,
Single- and double-scattering production of four muons in ultraperipheral PbPb collisions at the Large Hadron Collider,
accepted for publication in Physics Letters B, e-Print: arXiv:1708.07742 [hep-ph].

Annotation: I am mother of a twelve-month-old baby therefore I would like to request to give a talk by skype/video.

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Session Classification: WG6: Interactions with Nuclei