Contribution ID: **1084** Type: **Oral**

Production of various elements in ultraperipheral ^{208}Pb–^{208}Pb collisions at the LHC

Tuesday 25 October 2022 15:45 (15 minutes)

As confirmed by theory and measurements, one, two or three neutrons are emitted frequently in ultraperipheral collisions (UPC) of heavy relativistic nuclei, in particular, ^{208}Pb. The exchange of soft equivalent Weizs\"{a}cker–Williams photons dominates in such interactions. This leads to the excitation and decay of Giant Dipole Resonances (GDR) in colliding nuclei typically below the proton emission threshold. Less is known about the electromagnetic dissociation of ^{208}Pb induced by more energetic photons leading to more violent fragmentation of ^{208}Pb. The UPC of lead nuclei at the LHC were simulated with Relativistic ELectromagnetic Dissociation (RELDIS) model to evaluate the contribution of photonuclear reactions in the domain of quasideuteron absorption and at higher photon energies. It was found that ^{208}Pb dissociates into a single nuclear residue and several protons and neutrons with a negligible contribution of photofission. The cross sections of production of Pb, Tl, Hg, Au, Pt, Ir, Os, Re, W, Ta and Hf were calculated along with the cross sections of emission of given numbers of protons. The contributions to these cross sections from the GDR excitations (7–40~MeV), quasideuteron absorption (40–140~MeV) and hadron photoproduction on intranuclear nucleons at higher photon energies were calculated. The cross sections of production of specific isotopes $^{197,198,\ldots 207}$Tl were also calculated, and the contribution of the quasideuteron absorption to the production of the heaviest thallium isotopes was shown. It was demonstrated that due to the presence of a single heavy residue in the final state mostly accompanied by protons and neutrons, the cross sections of the production of specific elements can be well approximated by the proton emission cross sections, which can be measured in the ALICE experiment at the LHC.

Authors: DMITRIEVA, Uliana (Institute for Nuclear Research, Russian Academy of Sciences); PSHENICHNOV, Igor (Institute for Nuclear Research, Russian Academy of Sciences)

Presenter: DMITRIEVA, Uliana (Institute for Nuclear Research, Russian Academy of Sciences)

Session Classification: High Energy Physics

Track Classification: High Energy Physics