Coulomb Dissociation Measurements in Isobaric Collisions at $\sqrt{s_{NN}} = 200$ GeV with the STAR Experiment

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Abstract

The STAR experiment conducted isobaric collisions using ${}^{96}_{44}\mathrm{Ru} + {}^{96}_{44}\mathrm{Ru}$ and ${}^{96}_{40}\mathrm{Zr} + {}^{96}_{40}\mathrm{Zr}$ ions, offering a valuable opportunity to study Coulomb dissociation and investigate nuclear structure. Although these isobars have the same mass number, their differing proton and neutron numbers may lead to distinct charge distributions and neutron density profiles, which could be reflected in differences in Coulomb dissociation. As a process driven by the strong electromagnetic fields generated during ultra-peripheral collisions (UPCs), Coulomb dissociation can lead to neutron emission through photon exchange between the ions. In the STAR experiment, neutron emission can be measured by utilizing the Zero-Degree Calorimeters (ZDCs).

In this poster, we present new measurements on neutron emission from ${}^{96}_{44}\mathrm{Ru} + {}^{96}_{44}\mathrm{Ru}$ and ${}^{96}_{40}\mathrm{Zr} + {}^{96}_{40}\mathrm{Zr}$ collisions at $\sqrt{s_{NN}} = 200$ GeV. By analyzing these results, we aim to gain deeper insights into the nuclear structure properties of isobaric nuclei, such as neutron skin thickness and nuclear radii. Furthermore, these findings contribute to our understanding of the electromagnetic fields generated in heavy-ion collisions.