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Measurement of the impact-parameter dependent azimuthal anisotropy in coherent rho0 photoproduction with ALICE

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Exclusive vector meson photoproduction in ultraperipheral heavy-ion collisions is a well-established tool to probe the gluon structure of the colliding nuclei. This talk will focus on the observation of entanglement-enabled spin interference in the ρ0 meson photoproduction, in the form of angular anisotropy. Such an anisotropy appears due to two different factors: the first is that the photons involved in the process are linearly polarized along the impact parameter and the second is the quantum interference between the two entangled amplitudes that contribute to the ρ0 photoproduction cross section. Furthermore, the interference effect strongly depends on the impact parameter of the collision, which acts as the distance between the openings of a two-slit interferometer.

In this talk, we present the first measurement of this anisotropy in coherent ρ0 photoproduction from ultraperipheral Pb–Pb collisions at a center-of-mass energy of √sNN=5.02 TeV per nucleon pair, as a function of the impact parameter of the collision, estimated classifying the events in nuclear-breakup classes defined by neutron emission. The ρ0 mesons are detected by the ALICE experiment through their decay into a pion pair. The anisotropy occurs as a function of ϕ, defined as the azimuth angle between the two vectors formed by the sum, and the difference, of the four-momentum of the pions, respectively. It results in a $\cos(2\phi)$ modulation of the photoproduced ρ0; the amplitude of the modulation is found to increase by about one order of magnitude from large to small impact parameters. This trend has found to be compatible with the available theoretical predictions.

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