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Measurements of Coherent J/ψ Azimuthal Asymmetry in Peripheral Pb+Pb Collisions with the CMS Experiment

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The Lorentz-boosted electromagnetic field surrounding relativistic heavy ions can be treated as a large flux of linearly polarized, quasi-real photons. The coherently photoproduced J/ψ mesons inherit the linear polarization of these photons, leading to an azimuthal asymmetry in their decay products relative to the impact parameter. This asymmetry can be estimated using the second-order event plane in peripheral heavy-ion collisions. This novel polarization-dependent observable provides new insights into the transverse spatial distribution of gluons inside large nuclei.

In this talk, we present the centrality and rapidity dependence of the $\cos 2\phi$ angular modulation of decayed muons from coherent J/ψ , measured relative to the second-order event plane in Pb+Pb collisions at $\sqrt{s_{\rm NN}} = 5.36$ TeV. We also discuss the physics implications of these findings and the opportunities offered by future LHC heavy-ion runs.

Author: Ms HUA, Xueli (South China Normal University (CN))

Presenter: Ms HUA, Xueli (South China Normal University (CN))

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