

# $J/\psi$ production and polarization in photon-induced reactions in Pb–Pb collisions with ALICE

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Intense electromagnetic fields from ultrarelativistic heavy ions can trigger photonuclear reactions, which can be used to probe the nuclear gluon distribution at low Bjorken- $x$  and targets gluonic fluctuations. Our study examines ultra-peripheral and nuclear-overlap collisions, covering measurements of peripheral Pb–Pb collisions'  $y$ -differential cross section and coherent  $J/\psi$  photoproduction polarization. We present new Run 2 measurements, including  $p_T$  spectra of incoherent  $J/\psi$  in Pb–Pb UPCs at both forward and midrapidity, revealing lead nucleus substructure. Additionally, we observe  $J/\psi$  photoproduction with proton dissociation in p–Pb collisions, offering fresh insights into proton sub-nucleonic fluctuations. Combining forward and midrapidity data offers a robust test of theoretical models.

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**Primary author:** LAVICKA, Roman (Austrian Academy of Sciences (AT))

**Co-author:** COLLABORATION, ALICE

**Presenter:** LAVICKA, Roman (Austrian Academy of Sciences (AT))

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