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## New high-precision measurement of the nuclear modification of prompt and nonprompt charmonia at unprecedentedly high ( $p_T$ ) in PbPb collisions with CMS

Quarkonia are versatile tools to probe the dynamics of heavy quarks and of bound states at various scales in heavy ion collisions. While their prompt production rate mainly results from interactions between charm quarks and the medium constituents, the significant fraction of charmonia originating from the decay of B hadrons (nonprompt charmonia) offers a proxy for the behavior of beauty quarks as well. In addition, measurements at high transverse momenta ( $p_T$ ) provide new experimental handles for the study of in-medium energy loss of color charges. We report the most precise nuclear modification factor results of prompt and nonprompt  $J/\psi$  and  $\psi(2S)$  mesons, including ratios among these contributions, thanks to the large sample of lead-lead (PbPb) collisions data recorded by the CMS experiment. The prompt measurements extend beyond the highest  $p_T$  ranges ever reported for quarkonia in heavy ion collisions. The results are discussed together with the measurements of the elliptic ( $v_2$ ) and triangular ( $v_3$ ) flow coefficients for similar charmonium contributions in order to establish a comprehensive picture of the fate of heavy quark bound states throughout the time evolution of the medium. Finally, the precision of the nonprompt data will constrain the degree of interaction of beauty quarks within the quark-gluon plasma.

### Category

Experiment

### Collaboration (if applicable)

CMS

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