

Quarkonium production and polarization in pp collisions with the CMS detector

Studies of the production of heavy quarkonium states are crucial to improve our understanding of QCD and hadron formation. Large data samples of S-wave quarkonium states decaying in the dimuon channel have been collected by CMS in pp collisions at 7, 8 and 13 TeV, profiting from a very selective trigger and the record-level energy and luminosity provided by the LHC. This allowed the CMS collaboration to perform a series of systematic measurements in quarkonium production physics, including double-differential cross sections and polarizations, as a function of rapidity, transverse momentum, and charged-particle multiplicity, for five S-wave quarkonia: J/ψ , $\psi(2S)$, $Y(1S)$, $Y(2S)$ and $Y(3S)$. CMS can also reconstruct low-energy photons through their conversions to e^+e^- pairs, then tracked in the high-granularity silicon tracker with a very good precision, resulting in an extremely good mass resolution, so that the $J=1$ and $J=2$ χ_c states can be resolved. This allows CMS to determine cross section ratios and feed-down decay fractions involving the χ states, in both the charmonium and bottomonium families. This talk presents the CMS quarkonium production results, in pp collisions, placing emphasis on the latest measurements, which include results from the run 2 of the LHC. Preliminary results on the χ_c polarization should also become available in time for this talk. Such measurements provide crucial inputs for a better understanding of quarkonium production as a signal of new physics in Pb-Pb collisions.

Preferred Track

Quarkonia

Collaboration

CMS

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