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# Quarkonium cross sections, polarizations and spectroscopy in pp collisions with CMS

*Sunday 5 August 2018 14:00 (30 minutes)*

Studies of the production of heavy quarkonium states are very important to improve our understanding of QCD and hadron formation, given that the heavy quark masses allow the application of theoretical tools less sensitive to nonperturbative effects. Thanks to a dedicated dimuon trigger strategy, combined with the record-level energy and luminosity provided by the LHC, the CMS experiment has collected large data samples of quarkonia produced in pp collisions at 7, 8 and 13 TeV. Thanks to its high-granularity silicon tracker, CMS can also reconstruct low-energy photons through their conversions to  $e+e-$  pairs, thereby accessing the radiative decays of the P-wave quarkonium states, with a very good mass resolution, so that the  $J=1$  and  $J=2$  states can be resolved.

This allowed the CMS collaboration to perform a series of systematic measurements in quarkonium production physics, including double-differential cross sections and cross-section ratios, polarizations, and feed-down decay fractions involving the  $\chi$  states, in both the charmonium and bottomonium families. Some of these measurements extend to transverse momentum around or exceeding 100 GeV, probing kinematic regions where the theory calculations are the most reliable.

Such measurements also provide crucial inputs to a better understanding of quarkonium production as a signal of new physics in Pb-Pb collisions.

This talk presents the most recent CMS quarkonium production results, obtained with the 13 TeV pp data, including some first measurements of P-wave production.

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