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Associated production of quarkonia and open heavy-flavour hadrons in pp collisions with ALICE

In high-energy hadron-hadron collisions at the LHC, Multiple Parton Interactions (MPI), where multiple hard-parton scatterings occur in a single collision, play a significant role. Among these, Double Parton Scattering (DPS) represents the simplest case, where two independent scatterings take place simultaneously. The DPS contribution to processes involving two final states, A and B, can be described as the product of the cross-sections for the independent production of A and B, divided by an effective cross section. This effective cross section is a phenomenological parameter linked to the transverse spatial overlap between partons in the proton. Studying DPS helps to improve our understanding of Quantum Chromodynamics (QCD), particularly in the context of multi-parton distribution functions and potential correlations in parton color and spin. Heavy quark production arises from hard-parton scatterings due to their significant masses, making these processes ideal for studying DPS. One way to explore DPS is by measuring the production cross sections of charm-hadron pairs. In this contribution, we present the latest results on the production of charm-hadron and quarkonium pairs, specifically D^0D^0 , D^0J/ψ , and $J/\psi J/\psi$, at midrapidity and forward rapidity in proton-proton (pp) collisions. These measurements are based on data collected with the ALICE detector at the LHC during Run 2 at a center-of-mass energy of $\sqrt{s} = 13$ TeV and Run 3 at $\sqrt{s} = 13.6$ TeV. These results contribute to a deeper understanding of DPS in QCD and provide valuable insights into the structure of partonic interactions at high energies.

Category

Experiment

Collaboration (if applicable)

ALICE

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