



Contribution ID: 587

Type: **Parallel**

Studying charm-quark hadronization and charm-baryon production measurements in pp at the LHC

Precise measurements of charm-hadron production in proton-proton (pp) collisions at the LHC are fundamental to investigate the charm-quark hadronization and test perturbative QCD-based calculations. Recent advances in charm-meson spectroscopy have led to the discovery of several excited charm-strange states, whose production yields in hadronic collisions are unmeasured. Quantifying these yields provides valuable insights into charm-quark hadronization, given the significant contribution to the ground-state charm-hadron yields from their decays. Recent measurements in pp collisions show baryon-to-meson ratios significantly larger than those in e^+e^- collisions, challenging the validity of theoretical calculations based on the factorization approach and assuming universal fragmentation functions across collision systems. Several QCD-inspired models and Monte Carlo generators use different approaches to describe the charm-quark hadronization. However, most of them do not manage to simultaneously describe the production of strange and non-strange charm baryons. Precise measurements of those states are thus crucial to understand the mechanisms of charm-quark hadronization in pp collisions.

This contribution presents various measurements exploiting the large data sample of pp collisions at $\sqrt{s} = 13.6$ TeV collected from the start of LHC Run 3. In particular, the production yield ratios of D_s^+ to D^+ mesons in pp collisions at $\sqrt{s} = 13.6$ TeV as a function of charged-particle multiplicity are shown and compared to state-of-the-art model predictions. New production measurements of the orbitally excited charm-strange mesons $D_{s1}(2536)^+$ and $D_{s2}^*(2573)^+$ in pp collisions at $\sqrt{s} = 13.6$ TeV are also reported. Their production-yield ratios relative to ground-state D_s mesons are presented, extending recent final results from proton-proton collisions at $\sqrt{s} = 13$ TeV. In addition, the first measurements of the production of charm-baryons Λ_c^+ , $\Sigma_c^{0,+;++}(2455)$, $\Sigma_c^{0,+;++}(2520)$ are presented and compared with model predictions. An outlook on the production measurements of the charm-strange baryons ($\Xi_c^{0,+}$, ($\Xi_c^+(3055)$), ($\Xi_c^+(3080)$) and Ω_c^0) in pp collisions at $\sqrt{s} = 13.6$ TeV is reported.

Secondary track

Author: COLLABORATION, ALICE

Session Classification: T05

Track Classification: T05 - QCD and Hadronic Physics