Contribution ID: **27** Type: **Contributed Talk**

Double D-meson production in perturbative QCD

Tuesday, 24 March 2020 09:22 (22 minutes)

The LHCb collaboration has measured cross sections for production of two charmed-particles in pp collisions. These include opposite-sign and same-sign open-charm pair production where the former is dominantly produced in a single parton scattering (SPS) but the latter can be used to study double parton scattering (DPS). In this work we have set up a NLO pQCD framework to calculate double D-meson production based on PDFs and D-meson fragmentation functions taking into account both the SPS and DPS contributions. The latter contribution is estimated with an effective cross section approach where the partonic correlations are neglected. We find a good agreement with the LHCb data when using values for the effective cross section consistent with other measurements. We compare the obtained results also to Pythia Monte Carlo simulations. Furthermore, we calculate predictions for double D-meson production in pPb collisions where the role of DPS is further enchanced due to several proton-nucleon scatterings and predict that the cross sections should be large enough to be measured at the LHC with reasonable statistics. We also discuss the role of enhanced DPS contribution in the two-particle azimuthal correlations whose disappearance in the away-side is predicted to be a signature of saturation phenomena.

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Session Classification: QCD with Heavy Flavors and Hadronic Final States

Track Classification: QCD with Heavy Flavors and Hadronic Final States