

Contribution submission to the conference Heidelberg 2022

Measurements of the total charm and beauty cross sections with the CMS detector — ●JOSRY METWALLY, ACHIM GEISER, NUR ZULAIHA JOMHARI, and YEWON YANG — DESY, Hamburg, Germany

The aim of this project is the determination of the total cross section for inclusive charm and beauty production at the LHC with different center-of-mass energies down to very low transverse momentum, and the comparison with QCD predictions in next-to-next-leading order of perturbation theory. The measurement of the cross sections for the production of heavy quarks at the LHC are one important test of QCD, and can, as has already happened in the case of top production, be used for a measurement of the quark masses.

Other experiments as ATLAS and ALICE covered only small fractions of the available phase space while the LHCb experiment fully covered the forward region, $2.0 < y < 4.5$. For this project, we measure cross sections in the full phase space complementary to LHCb of prompt D mesons, and D mesons from b hadron decays through the decays $B \rightarrow D^* X \rightarrow D^0 \pi_s X \rightarrow K \pi \pi_s X$ and $B \rightarrow D^0 X \rightarrow K \pi X$. One of the challenges is the separation of prompt D mesons and D mesons from b hadron decays near the production threshold. In this talk, the details of this separation and resulting cross sections including a comparison with theory are presented in the accessible phase space of CMS for different center of mass energies and, where it can be performed, a comparison with other experiments is shown.

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Email: josry.metwally@desy.de