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Open heavy-flavour production from the high-mass dilepton spectrum in pp collisions with ALICE

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In hadronic collisions, charm and beauty quarks are mainly produced in hard partonic scatterings due to their large masses, $m_c = 1.3 \text{ GeV}/c^2$ and $m_b = 4.1 \text{ GeV}/c^2$. They are ideal tools to investigate various aspects of perturbative QCD.

In addition, measurements in pp collisions represent a baseline for cold nuclear matter studies in p-A collisions, and for the characterization of the hot and dense medium, the quark-gluon plasma (QGP), formed in A-A interactions. A detection technique that has received limited investigation until now at LHC energies to measure $c\bar{c}$ and $b\bar{b}$ cross sections consists in exploring the high-mass region of the lepton pairs invariant-mass spectrum. In ALICE, it is possible to reconstruct dileptons both in the electron channel at midrapidity ($|\textit{y}| < 0.9$) in the central barrel, and in the muon channel at forward rapidity ($2.5 < \textit{y} < 4$) with the muon spectrometer.

In particular, the two continuum regions between charmonium and bottomonium resonances ($4 < m_{\mu^+\mu^-} < 9 \text{ GeV}/c^2$) and above the bottomonium states ($m_{\mu^+\mu^-} > 11 \text{ GeV}/c^2$) are significantly populated by the semileptonic decays of hadron pairs containing charm or beauty quarks. In this presentation, a first measurement of heavy-flavour cross sections in pp collisions at $\sqrt{s} = 13 \text{ TeV}$ and forward rapidity will be presented. This result is achieved using Monte Carlo templates from PYTHIA 8 simulations for the mass and p_T dependence of the dimuon yields, and it complements previous measurements obtained by ALICE in the dielectron channel at midrapidity. Both results are compared with FONLL predictions. Finally, the status of the charm and beauty cross section measurements using a Next-to-Leading Order Monte Carlo generator, POWHEG, will be presented, as well as the study of the contribution to the dimuon spectrum of the Drell-Yan process in the very high-mass region.

Primary author: PENNISI, Michele (INFN UniTO)

Presenter: PENNISI, Michele (INFN UniTO)

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