

Measurement of open heavy-flavour production with ALICE at the LHC

The main goal of the ALICE experiment is to study the properties of the strongly-interacting matter, usually referred to as the Quark-Gluon Plasma (QGP), created in high-energy heavy-ion collisions. Heavy quarks, i.e. charm and beauty quarks, are good probes of the QGP as they are produced in the early stage of the collisions and witness the entire space-time evolution of the system. In particular, the study of heavy-flavour production in Pb-Pb collisions allows us to understand the energy loss mechanism of the heavy quarks inside the QGP by measuring the particle transverse momentum spectra in Pb-Pb collisions with respect to the corresponding cross section in pp collisions scaled by the nuclear overlap function. The angular distribution of open heavy-flavour particles gives information regarding the collective motion of heavy quarks inside the medium. Angular correlations of heavy-flavour particles with hadrons provide more differential information on collective phenomena and energy loss mechanisms for heavy quarks. Measurements in p-Pb collisions help us to understand cold nuclear matter effects such as modifications of the parton distribution function (PDF) in nuclei, energy loss and momentum broadening. Corresponding measurements in pp collisions provide a very good baseline to understand the results in Pb-Pb collisions and a very powerful tool to test perturbative QCD (pQCD) calculations. Measurements of open heavy-flavour particles as a function of charged-particle multiplicity in pp and p-Pb collisions allow us to study the interplay between the hard and soft processes in heavy-flavour production.

In ALICE, open heavy-flavour production is studied through the measurements of the heavy-flavour decay leptons (electrons and muons) at central and forward rapidity and via the reconstruction of D-meson hadronic decays at central rapidity. An overview of the open heavy-flavour production with ALICE in pp ($\sqrt{s} = 2.76$ TeV and 7 TeV), p-Pb ($\sqrt{s_{NN}} = 5.02$ TeV) and Pb-Pb ($\sqrt{s_{NN}} = 2.76$ TeV) collisions will be presented. We will discuss the production cross sections, modifications of the transverse momentum distributions, azimuthal anisotropic emissions and correlations with hadrons in comparison with various theoretical predictions.

Summary

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