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Light messengers from heavy quarks - Measurements of leptons from heavy-flavor decays with ALICE at the LHC

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“Light messengers from heavy quarks - Measurements of leptons from heavy-flavor decays with ALICE at the LHC

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Hadrons carrying heavy flavor, i.e. charm or beauty quarks, are unique probes in hadronic collisions at high energies. Given their large masses charm and beauty quark-antiquark pairs are produced almost exclusively via hard parton scattering process in the initial phase of the collisions. Therefore, the measurement of heavy-flavor hadron production cross sections in pp collisions at the LHC serves as a sensitive test for perturbative quantum chromodynamics at the high energy frontier.

In p-Pb collisions the yields and kinematical distributions of heavy-flavor hadrons are subject to cold nuclear matter effects such as modifications of the parton densities in nuclei with respect to nucleons, i.e. shadowing or saturation at low Bjorken x , k_T broadening, or energy loss in cold nuclear matter.

Heavy-flavor measurements in pp and p-Pb collisions help to characterize the initial state of heavy-ion collisions and provide a mandatory reference for corresponding studies in Pb-Pb collisions, where the quarks propagate through the hot and dense medium and interact with its constituents. The resulting medium modifications of the heavy-flavor momentum distributions can provide unique information on the interaction of partons with the medium and, furthermore, can help to constrain the transport properties of the medium.

ALICE is well suited for heavy-flavor measurements at the LHC, not only through the full reconstruction of hadronic D-meson decays at mid rapidity but also via the measurement of electrons (muons) from semileptonic heavy-flavor hadron decays at mid (forward/backward) rapidity. An overview of the lepton measurements with ALICE will be given. Special emphasis will be put on recent results from pp and p-Pb collisions relevant for the characterization of the initial state in Pb-Pb collisions, such as lepton production cross sections, nuclear modification factors, and correlations with hadrons.”

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