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Open heavy-flavour measurements with ALICE at the LHC

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The large interest in open heavy-flavour physics in heavy-ion collisions is proven by the many results obtained at both RHIC and LHC energies. Heavy quarks are produced in the early stages of heavy-ion collisions and their abundance is not expected to change throughout the evolution of the system. Hence, they behave as self-generated probes that traverse the hot and dense medium losing energy via subsequent elastic scatterings and/or gluon radiation. The combination of high precision tracking, particle identification and excellent vertexing capabilities offered by ALICE makes it well suited to measure decays of particles containing heavy quarks in a wide momentum region and in different rapidity ranges. We discuss the ALICE heavy-flavour measurements with both exclusive reconstruction of prompt D mesons, and semi-inclusive leptonic decays of charm and beauty hadrons, for pp, p-Pb and Pb-Pb collisions. The D-meson yields as a function of charged-particle multiplicity in pp and p-Pb collisions, expected to be sensitive to the interplay between hard and soft QCD processes, will be discussed and compared to models. Results on angular correlations of D mesons with charged hadrons in pp and p-Pb collisions, relevant to extract information on the heavy-quark fragmentation, will be shown and compared to PYTHIA predictions. The nuclear modification factor measured for D mesons, electrons and muons from heavy-flavour hadron decays and electrons from beauty hadron decays will be presented for p-Pb and Pb-Pb collisions. The results indicate a strong suppression of the yields of heavy-flavour particles at high transverse momentum in central Pb-Pb collisions, due to hot nuclear matter effects. The measurements of the azimuthal anisotropy of heavy-flavour hadron decay electrons, muons and charmed mesons are also reported and suggest a non zero elliptic flow, v_2 , in semi-central Pb-Pb collisions. The nuclear modification factor and elliptic flow results are compared to in-medium energy-loss models.

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