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D meson nuclear modification factor and v2 in Pb-Pb collisions

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D meson nuclear modification factor and v2 in Pb-Pb collisions

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The remarkable heavy-flavour results from RHIC and LHC show that heavy quarks are affected by the strongly coupled medium created in heavy-ion collisions at high energies. A way to characterize the properties of such a hot and dense medium is to quantify to what extent the medium influences the propagation of the particles through it, and how this varies for different parton species.
Given their large mass, heavy quarks are produced in the early stages of a heavy-ion collision and their abundance is not expected to change throughout the evolution of the system. Therefore, they behave as self-generated probes that carry information of the medium by losing energy via subsequent interactions.
The high precision tracking, particle identification, and excellent vertexing capabilities of ALICE allow for measurements of heavy-flavoured particles in a wide momentum region.
We present the ALICE results on open heavy-flavour, focusing on the production of D0, D+, D*, and Ds mesons measured via the exclusive reconstruction of their hadronic decays displaced from the interaction vertex.
These measurements benefit from the large statistics of Pb-Pb collisions collected in 2011.
The results on the nuclear modification factor RAA for D mesons indicate a suppression of their yield in central collisions relative to binary-scaled pp collisions in a large momentum range. The comparison to the RAA of non-prompt J/Psi (measured by CMS) indicates a difference in the suppression of charm and beauty at high pT, as expected according to the predicted mass hierarchy in energy loss models.
The measurement of the azimuthal anisotropy of charmed mesons in semi-peripheral events is also discussed. The observed non-zero second Fourier harmonic v2 (elliptic flow) for 2<pT<6 GeV/c, together with the different D0 RAA along the event plane and orthogonally to it, could originate from the collective motion and path-length dependence of the energy loss of charm quarks. The results discussed above are also compared to various energy-loss models.

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