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Prospects for heavy-flavour measurements in Pb-Pb collisions at the LHC with the new ALICE inner tracker

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The ALICE experiment at the LHC studies Pb-Pb, pp, and p-Pb collisions with the aim of investigating the properties of the high-density state of strongly-interacting matter, expected to be produced in Pb-Pb collisions.

Heavy quarks are sensitive probes to test the medium transport properties and its degree of thermalization since they are formed at shorter time scale with respect to the deconfined state.

The present heavy-flavour measurements in Pb-Pb collisions at the LHC show a large suppression of D meson production at high transverse momentum p_T in central collisions and a non-zero elliptic flow in semi-central collisions. Those measurement are limited by the large combinatorial background especially in the low p_T region, which is most interesting.

The measurement of heavy-flavour baryon production is sensitive to the heavy quark hadronization mechanism. This measurement is difficult to be achieved with the current tracking resolution due to the small displacement (tens of microns for the case of the Λ_c) of the decay tracks from the primary vertex.

The new Inner Tracking System (ITS) will be composed of 7 layers of silicon detectors with a material budget as low as 0.3% of the radiation length per layer. The tracking spatial resolution will improve by a factor 3 (5) in the transverse (longitudinal) direction. The new ITS together with the upgraded readout systems of the other central barrel detectors, will allow ALICE to record Pb-Pb events at a rate 100 times higher than with the current detectors, thus fully exploiting the increased Pb-Pb interaction rate provided by LHC after 2018.

These upgrades will open the possibility to separate charm and beauty, measuring B mesons, Λ_b and Λ_c baryons in their charged decay channels down to $p_T \sim 2$ GeV/c, in addition to D mesons down to zero p_T .

New studies about the heavy-flavour content of jets are also being addressed.

The main features of the inner tracker upgrade and the expected performance for heavy flavour measurements will be presented.

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