Contribution ID: **384**   Type: **Parallel session talk**

ALICE 3: a next-generation heavy-ion detector for LHC Run 5 and beyond

Tuesday 22 August 2023 16:00 (20 minutes)

The ALICE Collaboration proposes a completely new apparatus, ALICE 3, for the LHC Runs 5 and 6 (arXiv:2211.02491). The detector consists of a large pixel-based tracking system covering eight units of pseudorapidity, complemented by multiple systems for particle identification, including silicon time-of-flight layers, a ring-imaging Cherenkov detector, a muon identification system, and an electromagnetic calorimeter. Track pointing resolution of better than 10 micron for p_T >200 MeV/c can be achieved by placing the vertex detector on a retractable structure inside the beam pipe. ALICE 3 will, on the one hand, enable novel studies of the quark-gluon plasma and, on the other hand, open up important physics opportunities in other areas of QCD and beyond. The main new studies in the QGP sector focus on low-p_T heavy-flavour production, including beauty hadrons, multi-charm baryons and charm-charm correlations, as as well as on precise multi-differential measurements of dielectron emission to probe the mechanism of chiral-symmetry restoration and the time-evolution of the QGP temperature. Besides QGP studies, ALICE 3 can uniquely contribute to hadronic physics, with femtoscopic studies of the interaction potentials between charm mesons and searches for nuclei with charm, and to fundamental physics, with tests of the Low theorem for ultra-soft photon emission. The presentation will cover the detector concept, the physics performance, and the status of novel sensor R&D.

Collaboration / Activity

ALICE

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Session Classification: T12 Detector R&D and Data Handling

Track Classification: Detector R&D and Data Handling