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Prospects for ALICE with the Muon Spectrometer Upgrade and the new Muon Forward Tracker

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The ALICE experiment is dedicated to an in-depth characterisation of the Quark Gluon Plasma (QGP) formed at the LHC in relativistic heavy-ion collisions. Prominent results from the LHC Run1 involved the measurement of single and dimuons in the ALICE Muon Spectrometer (MS) at -4 < η < -2.5 to look for low mass vector mesons, rare probes from the charmonium and bottomonium families, and open-heavy flavor. These probes allow to investigate the chiral symmetry restoration, to test the predictions from the lattice QCD about the melting temperature of a tightly bound heavy
qqbar pair, to test the in-medium regeneration scenario, and to scrutinise the gluon density in the QGP using the in-medium heavy-quark energy loss. By the end of the Run2, the ALICE experiment will accumulate around 1/nb of Pb–Pb collisions. However, at least 10/nb will be needed to conduct high precision multidifferential studies on rare probes. To that end, LHC will be able to provide high rate running conditions for Run3 and beyond, i.e. 50 kHz for Pb–Pb collisions.
The ALICE apparatus will have to inspect all heavy-ion collisions to achieve the physics goals. We will present the required upgrade for the MS. The new Front-End and Read-Out Electronics are designed to cope with a peaking readout rate of 100 kHz, to be compared with the current capability of 1 kHz.
In addition, a new CMOS monolithic pixel tracking detector, the Muon Forward Tracker (MFT), will be added upstream of the absorber located before the MS, to provide vertexing capabilities at -3.6 < η < -2.45. On top of substantially improving the current performances of the MS, the MFT also opens a wealth of new measurements not accessible presently, such as open charm/beauty separation, ψ(2S) in central Pb–Pb collisions, prompt and non-prompt J/ψ separation. We will present a selection of this new physics program. We will also discuss the design of the MFT and the on-going tests of the prototype pixels.

On behalf of collaboration:

ALICE

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