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Dimuon measurements in ALICE: The Muon Forward Tracker Upgrade Project

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The ALICE experiment is dedicated to the study of the quark gluon plasma in heavy-ion collisions at the CERN LHC. The Muon Forward Tracker (MFT) is under consideration by the ALICE Experiment to be part of its programme of detectors upgrade to be installed during the LHC shutdown planned for 2018. The MFT is a silicon pixel detector added in the Muon Spectrometer acceptance ($2.5 < \eta < 4$) upstream of the hadron absorber. The MFT will allow a dramatic improvement of the measurements that are presently done with the Muon Spectrometer and, in addition, will give access to new measurements that are not possible with the present Muon Spectrometer set-up. The enhanced pointing accuracy gained by the muon tracks will significantly improve the mass resolution for the low mass resonances ω and ϕ , as well as – to a lesser extent – for the J/ψ and ψ' . The measurement of these resonances down to low p_T in heavy-ion collisions represents a unique feature at the LHC. The precise measurement of the offset for the muon tracks will also permit a model-independent identification of open charm ($c\tau \sim 150 \mu\text{m}$) and beauty ($c\tau \sim 500 \mu\text{m}$) production, including displaced vertices related to J/ψ production from b . In addition, the MFT will help to reject a large fraction of muons coming from pion and kaon decays, improving the signal over background ratio for all the observables. In order to establish the physics performances achievable at the luminosities expected after 2018, realistic simulations of the MFT setup are being performed within the AliRoot framework. Detailed results will be shown on the physics performances, including background treatment and rejection, for the measurement of low mass neutral mesons and the J/ψ and ψ' resonances down to low p_T , in central Pb–Pb collisions at $\sqrt{s_{NN}} = 5.5 \text{ TeV}$. An overview of the main technological issues related to the MFT project will also be given.

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