Present and future of the Quark-Gluon Plasma physics at forward rapidity in ALICE

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Abstract

ALICE is the CERN–LHC experiment specifically designed for the study of the Quark-Gluon Plasma in ultrarelativistic heavy-ion collisions. It is equipped with a Muon Spectrometer at forward rapidity to study the production of low-mass vector mesons, quarkonia, open-heavy flavours and electroweak bosons via their (di-)muon decay.

After almost ten years of data taking with very good performance and high quality scientific results, ALICE detector will be upgraded during the LHC Long Shutdown 2, planned for 2019–2020, in order to fully exploit the large integrated luminosity that will be provided by the LHC in Run 3 and Run 4.

The Muon Forward Tracker (MFT), an internal silicon tracker added in the acceptance of the existing Muon Spectrometer, is part of the ALICE detector upgrade program. It will allow for a crucial improvement of the measurements presently done with the Muon Spectrometer and will give access to new measurements. The precise measurement of the offset to the primary vertex for the muon tracks, in particular, will permit for the first time in ALICE the separation of open charm and beauty production at forward rapidity, rejecting at the same time a large fraction of background muons coming from pion and kaon decays.

In this seminar I will introduce the physics of the Quark-Gluon Plasma and I'll review the most important results obtained so far by ALICE in the single and di-muon decay channels. I'll then describe the MFT project under a technical point of view and I'll discuss the physics performance achievable after the upgrade.