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Upgrade of the ALICE detector

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A Large Ion Collider Experiment (ALICE) is the detector at the CERN Large Hadron Collider (LHC) dedicated to the study of strongly interacting matter, in particular the properties of the Quark-Gluon Plasma. The ALICE collaboration plans a major upgrade of the detector during the Long Shutdown 2 (LS2) of the LHC, which is at present foreseen to start in summer 2018. The upgrade strategy is based on collecting > 10 nb^{-1} of Pb-Pb collisions at luminosities up to L = 6 x 10^{27} $cm^{-2}s^{-1}$ corresponding to a collision rate of 50 kHz, where each collision is shipped to the online systems, either upon a minimum bias trigger or in a self-triggered or continuous fashion. Since the TPC drift time of 100 μs is 5 times longer than the average time between interactions, the presently employed gating of the TPC wire chambers must be abandoned. Instead, continuously sensitive readout detectors based on Gas Electron Multipliers (GEMs) will be implemented. Furthermore, the present silicon tracker will be replaced by a new design entirely based on monolithic pixel chips in order to achieve significantly increased secondary vertex resolution and high tracking efficiency. Other ALICE sub-detectors are upgraded to read out Pb-Pb data at 50 kHz with nominal performance. Highly efficient triggering will be ensured by a new interaction trigger detector. A new online system will be implemented that is capable of receiving and processing the full detector information.

We will present the planned ALICE upgrade concept together with a description of the individual detector upgrade plans.

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