



Contribution ID: 82

Type: **not specified**

Heavy ion physics with LHCb Upgrade I

A second major LHCb detector upgrade will be installed during long shutdown 4 (LS4) of the CERN Large Hadron Collider. The new detector will provide excellent performance for studies of Quantum Chromodynamics at high temperature and density, as achieved in collisions of heavy nuclei. The high granularity of the tracking system will allow lead-lead collisions to be reconstructed across the full range of centrality at far forward rapidity for the first time. Moreover, the forward acceptance of the detector, covering the pseudorapidity region close to the beamline, and the capability to reconstruct a wide range of hadrons containing strange, charm, and beauty quarks result in unique potential to probe the medium produced in the collisions. In this document, the heavy ion physics programme that will be pursued in LHCb Upgrade II is summarised, including precision studies of the partonic structure of nuclei, probes of the conditions allowing deconfinement, and measurements of plasma properties.

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