Version 1

A next-generation LHC heavy-ion experiment (Addendum)

Geneva, Switzerland
December 18, 2018

1 Interested community

A large fraction of the community involved in the study of ultra-relativistic nuclear collisions in Europe and beyond. Such an experiment is potentially of interest also for the part of the proton-proton community involved in soft QCD and in studies of the production of heavy flavour and quarkonia.

2 Timeline

The R&D studies on the development of ultra-thin wafer-scale, curved Monolithic Active Pixel Sensors (MAPS) have already started in the framework of the ALICE upgrade programme, and are planned to continue until 2025. Production and construction would start in 2026 in view of installation of the detector during the Long Shutdown 4 of the LHC, planned for 2030.

3 Costs

All the detector elements envisaged in the present concept rely on the use of Silicon Pixel sensors, for a total area of about 200 m^2.

However, as opposed to present large-area Silicon trackers, the proposed concept relies on high-volume industrial Complementary Metal Oxide Silicon (CMOS) technology, with important repercussions on the reduction of the cost per unit area.

While a precise cost estimate is not possible at the present stage – since it will depend on the final layout, on the choice of the CMOS technology node and on the evolution of the market prices – we anticipate that the total cost of the experiment should remain well below that of the present ALICE apparatus (about 150 MCHF).

The yearly maintenance and operation costs should then also remain below those of the present ALICE apparatus, which represent about 5% of the original cost.

4 Computing requirements

We anticipate that an experimental apparatus fully based on Silicon Pixel detectors, such as the one discussed here, will present modest requirements in terms of data storage and computing power for calibration, reconstruction and simulation.