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Projected Performance of an Upgraded CMS Detector at the LHC and HL-LHC: Contribution to the Snowmass Process

The physics reach of the CMS detector achievable with 300(0)/fb of proton-proton collisions recorded at $\sqrt{s} = 14\text{TeV}$ is presented. Ultimate precision on measurements of Higgs boson properties, top quark physics, and electroweak processes are discussed, as well as the discovery potential for new particles beyond the standard model. In addition, the potential for future heavy ion physics is presented. This document has been submitted as a white paper to the Snowmass process, an exercise initiated by the American Physical Society's Division of Particles and Fields to assess the long-term physics aspirations of the US high energy physics community.

Summary

This paper summarizes the results about the physics potential of the CMS detector at LHC with the luminosity increase expected in the forthcoming runs. Two luminosities scenarios are considered, one for 300/fb, corresponding to the expectations at the end of Run3, and one for 3000/fb, the ideal goal of HL-LHC. Both scenarios correspond to different stages of upgrade of the current detector.

Primary author: COSSUTTI, Fabio (TS on behalf of the CMS Collaboration)

Presenter: COSSUTTI, Fabio (TS on behalf of the CMS Collaboration)