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The CMS detector upgrade and potential for future Physics

The CMS experiment had a very good start of its Physics Program at the Large Hadron Collider (LHC). One of the main questions in Particle Physics, what is the origin of the particle masses, was partially answered with the Physics runs in 2011 and 2012 when LHC delivered an integrated luminosity of ~25 fb-1 and gave as result the discovery of a Higgs boson with mass of ~125 GeV. The study of the decays of this particle and the couplings with gauge bosons of the Standard Model (SM) and photon are consistent with the SM expectations of the Higgs. The SM does not provide answers to the nature of dark matter, forces unification, matter-antimatter properties difference, then a new Physics is required. The scalar nature of the Higgs particle gives theoretical challenges: radiative corrections can result in a mass increase. New physics can appear at masses near 1 TeV to cancel this growth. The detailed study of the 125 Higgs boson must be pursued to a very high statistical precision. This study and the search for new physics provide a powerful demand for higher luminosity. The LHC machine group has a plan for achieving higher peak and integrated luminosity (HL-LHC). The CMS detector requires upgrades to preserve the efficiency, resolution and background rejection at these higher luminosity. The main challenges that must be overcome to achieve this goal are the radiation damage to the detector from the high integrated luminosity of HL-LHC and the very high 'pile-up' coming from the high instantaneous luminosity. Details of the problems for each subsystem of CMS are given along with the proposed solutions

I intend to submit my contribution for the proceedings

Yes

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