

## The Phase 1 Upgrade of the CMS Vertex Detector

The present CMS pixel detector was originally designed for a luminosity of  $1 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$  and a pileup (number of inelastic interaction per bunch crossing) of 25 in 25 ns bunch spacing. These beam parameters will be reached in the middle of the LHC data taking period 2015-2017 (with an additional increase in the center of mass energy up to the value of 13-14 TeV) and then, peak luminosity will keep increasing until 2018 when it will reach the value of  $1.5 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$ . The present detector will remain operative until the end of 2016 and will be replaced with an upgraded pixel system that will be described in this presentation before Long Shutdown 2 (LS2). The design of the upgraded CMS pixel detector allows to cope with the yet higher peak luminosities after LS2 reaching  $2 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$  around 2021 and pileup of 50 or 100 at 25ns or 50ns beam spacing, respectively. The new upgraded detector will have higher tracking efficiency and lower mass with four barrel layers and three forward/backward disks to provide a hit coverage up to absolute pseudorapidities of 2.5. In this presentation the new pixel detector will be described focusing mostly on the barrel detector design, construction and expected performances. Preliminary tests on detector module production will also be presented.

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