

Operational Experience of the Phase-1 CMS Pixel Detector

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In 2017, CMS has installed a new pixel detector with 124M channels that features full 4-hit coverage in the tracking volume and is capable to withstand instantaneous luminosities of $2 \times 10^{34} \text{cm}^{-2} \text{s}^{-1}$ and beyond. Many of the key technologies of modern particle detectors are applied in this detector, like efficient DCDC low-voltage powering, high-bandwidth μ TCA backend electronics, and light-weight CO2 cooling. By now the detector has been successfully operated for two years in p-p and heavy ion collisions and very valuable experience has been collected with the afore mentioned components. During the long shutdown of LHC from 2019 to 2021 the CMS pixel detector will be extracted and the modules of the inner most layer that suffered the most from radiation damage will be replaced. For that reason, a better readout chip as well as a new token bit manager chip will be used for these modules that fixes problems observed during operation. This talk gives an overview of the detector performance in 2018 and describes the improvements made and challenges faced in the last two years of the detector operation.

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