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Qualification of Barrel Pixel Detector Modules for the Phase 1 Upgrade of the CMS Vertex Detector

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To withstand the higher rates of LHC Runs 2 and 3, with expected luminosities of up to 2 x 10ˆ34 cmˆ{-2} sˆ{-1}, the current CMS pixel detector at the LHC will be replaced as part of the CMS Phase I Upgrade during the extended winter shutdown in 2016/17. The new pixel detector features a new geometry with one additional detector layer in the barrel region (BPIX) and one additional disk in the forward region (FPIX), new digital readout chips and improved front-end electronics as well as a new CO2-based cooling system for both the barrel and forward region. An overview of the BPIX detector module production will be given, with special focus on the different stages of quality assurance. A review of the quality tests as well as the calibrations which all produced modules undergo in a temperature and humidity controlled environment will be given, together with a description of the testing setups. Exemplary, the KIT/Aachen production line and its subprocesses will be presented together with their quality and yield.

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