

## Qualification of pixel detector modules for the forward sector of the CMS vertex detector

The phase 1 upgrade of the CMS pixel detector will replace the existing pixel detector at the end of 2016 in an extended technical stop. The phase 1 upgrade includes four barrel layers and three forward disks, providing robust tracking and vertexing for LHC luminosities up to  $2.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$  prior to the HL-LHC era. The upgrade incorporates new readout chips and front-end electronics for higher data rates, DC-DC powering, and dual-phase CO<sub>2</sub> cooling to achieve performance exceeding that of the present detector with a lower material budget. The design of the forward detector is presented along with present status of mechanical construction, module assembly, and module qualification. The procedures for module testing and quality assurance are described in some detail.

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