Production and Quality Control of CMS Phase-2 Inner Tracker Pixel Modules

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A quad-module for the Phase-2 upgrade of the CMS Inner Tracker is a hybrid detector consisting of four (2×2) CMS readout chips manufactured in 65 nm CMOS (RD53B_CMS) and a silicon pixel sensor with a pixel size of $25 \times 100\ \mu m^2$ and a thickness of 150 μm, coupled via fine-pitch flip-chip bump bonding. In this design, the space between adjacent readout chips is bridged using large sensor pixels.

Module production and quality control procedures are presented in this talk, including powering test for chips and sensors, open bump bond identification, and thermal stress tests. Furthermore, the performance of large pixels is presented with quad modules tested at the DESY testbeam facility, using electrons with an energy of 5.2 GeV.