

12th Beam Telescopes and Test Beams Workshop



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Test-beam qualification of the PS modules for the CMS Phase-2 Outer Tracker

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The LHC is to enter a High Luminosity era in 2029, and many systems are to be upgraded or replaced in order to overcome challenges brought up by the vastly increasing luminosity. The corresponding Phase-2 upgrade of the CMS experiment is scheduled for Long Shutdown 3 in 2026. This includes installation of the entirely new Outer Tracker, consisting of two types of double-sensor modules, namely, pixel-strip (PS) and strip-strip (2S). As of spring 2024, production of such modules has reached a kick-off stage, essentially meaning that demonstrator modules have been built with close-to-final components to verify the design and production processes and to perform integration tests.

This talk covers specific aspects of the design and production of PS modules, including the novel functionality of the on-module track angle discrimination, and the procedure of precision mechanical assembly, which is crucial for the aforementioned feature. Subsequently, results of the module qualification at the DESY-II Test Beam Facility are presented, comprising particle detection efficiency studies and tests on the angle discrimination.

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