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Beam Telescopes at the DESY II Test Beam

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A large part of the global test beam community relies on EUDET-type beam telescopes, which are provided as common infrastructure at the DESY II Test Beam and other major facilities. Considering their age, outdated components, and the increasing performance requirements for detector development, it is clear that an upgrade will become necessary soon. Among the distinguishing features of the EUDET-type beam telescopes are their ease of use and the possibility to integrate a large variety of user devices. The latter is enabled by the use of the AIDA2020 Trigger Logic Unit on the hardware side and the integration in the EUDAQ2 software framework. Both are to be continued with an upgraded telescope version, enabling a seamless switchover for existing device under test integrations. Another crucial aspect is a low material budget for excellent spatial resolution at lower beam energies of O(1GeV), which necessitates the use of thinned monolithic pixel sensors. Here, the best available production-grade option is ALPIDE, which also provides a high detection efficiency, low fake hit rate, and readout times that are an order of magnitude shorter than those of the previously used MIMSOSA26 sensor. A first prototype of a new ALPIDE-based beam telescope (Adenium) has been in continuous user operation at the DESY II Test Beam since summer 2022. The production prototype, which is based on a reworked data acquisition system that puts more emphasis on long-term maintainability, has been successfully commissioned.
This presentation will give an overview of the beam telescopes that are currently in user operation at the DESY II Test Beam and discuss the first test results obtained with the new production prototype.

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