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## FASER Detector Characterization with a Test Beam

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FASER, or the Forward Search Experiment, is a new experiment at CERN designed to complement the LHC's ongoing physics program, extending its discovery potential to light and weakly-interacting particles that may be produced copiously at the LHC in the far-forward region. New particles targeted by FASER, such as long-lived dark photons or dark scalars, are characterized by a signature with two oppositely charged tracks or two photons in the multi-TeV range that emanate from a common vertex inside the detector. The experiment is composed of a silicon-strip tracking-based spectrometer using three dipole magnets with a 20-cm aperture, supplemented by four scintillator stations and an electromagnetic calorimeter. The full detector was successfully installed in March 2021 in an LHC side-tunnel 480 meters downstream from the interaction point in the ATLAS detector. FASER is planned to be operational for the upcoming LHC Run 3.

In 2021 a test beam campaign was carried out using one of the CERN SPS beam lines to characterize and calibrate a subset of the FASER detector in preparation for physics data taking. Placed in the test beam was a FASER tracking station composed of spare ATLAS SCT modules, followed by a simple preshower system consisting of two-layers of tungsten and scintillator, and lastly a 3x2 stack of spare LHCb electromagnetic calorimeter modules. Beams of electrons with energies between 10 and 300 GeV, as well as high energy muons and pions, were scanned across the entire face of the setup. The performance of the detector components as measured in the test beam will be presented, including the calorimeter resolution, particle identification capabilities, and the efficiencies of the tracker and scintillators.

### Collaboration

FASER

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