



The ATLAS Forward Proton (AFP) integration beam tests and detector performance

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The ATLAS collaboration is currently installing the ATLAS Forward Proton (AFP) detector to measure protons scattered under a small angle from the ATLAS proton-proton interaction point. A combination of 3D Silicon pixel tracking modules and Quartz-Cherenkov time-of-flight (ToF) detectors are placed in Roman Pots 210 m away from the interaction point, at both sides of ATLAS.

Beam tests with a first unified AFP prototype detector combining tracking and timing sub-detectors and a common readout have been performed at the CERN-SPS test beam facility in 2014 and 2015 to complete the system integration and study the detector performance. The successful tracking-timing integration was demonstrated. Good pixel hit efficiencies above 99% were observed. Spatial resolutions in the short pixel direction with 50 μm pitch of about 6 μm per pixel plane and of 3-5 μm for the full 4-plane tracker at a tilt of 14 degrees were found, surpassing the AFP requirement of 10 μm by a factor of 2-3. The timing detector showed also good hit efficiencies above 99%, and a full-system time resolution of 35 ps was found for a half-size ToF prototype detector with two Quartz bars in-line without dedicated optimizations, fulfilling the requirements for initial low-luminosity AFP runs. For 2016 further tests with a more final setup are planned. This presentation will give an overview on the beam test results and the current AFP detector developments.

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