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Status of AFP

Located at the Large Hadron Collider (LHC), the ATLAS experiment has been designed with the goal of measuring the products of proton-proton collisions. ATLAS has full azimuthal angle coverage over a large range in pseudorapidity (from -4.2 to +4.2). However, forward particles, with larger absolute rapidities, escape detection down into the beam pipe. In particular, forward protons produced in central diffraction and double photon exchange processes, that have suffered energy losses between 2% and 15%, are not measured and cannot be studied by ATLAS. The solution is to install dedicated devices, called Roman pots, which can detect such scattered protons.

The ATLAS Forward Proton (AFP) detector consists of a total of four detector stations, two per side of ATLAS located at 205 m and 217 m from the ATLAS interaction point. Each detector station houses a 4-layer Silicon pixel Tracker (SiT) and the stations at 217 m also house Time of Flight (ToF) detectors. The SiT measures proton position with a precision up to 6 μm, allowing a precise reconstruction of the proton kinematics. The ToF detectors consist of 16 L-shaped Quartz Cerenkov bars read out by ultra-fast photomultipliers. The ToF serves to reduce the single-diffraction background by determining the primary vertex of the two forward protons from their arrival times.

After brief introduction of the physics of interest, the main features of the AFP detector (i.e. the movement, cooling, vacuum, readout systems) will be presented. The main focus will be on the performance of the detector system: detector resolution, effects of radiation damage, features of operation in the high pile-up environment.

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