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The Forward Diffractive Detector for ALICE

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ALICE (A Large Ion Collider Experiment) is one of the four main detectors at CERN LHC. In order to exploit the increased luminosity and interaction rate during the upcoming LHC Run 3 and 4, ALICE is now implementing a significant upgrade of its detectors and systems.

The minimum latency interaction trigger, luminosity monitoring, precision collision time, and determination of centrality and event plane for heavy-ion collisions will be provided by the Fast Interaction Trigger (FIT). FIT consists of three subsystems, among them the Forward Diffractive Detector (FDD).

In this work, we introduce the FDD, which is the upgrade of the former ALICE Diffractive (AD) detector. The FDD detector consists of two stations covering the pseudorapidity ranges of $4.7 < \eta < 6.3$ and $-6.9 < \eta < -4.9$, respectively. This coverage allows FDD to efficiently tag diffractive and ultraperipheral events. The stations are made of two layers of plastic scintillators, divided into four quadrants. Each quadrant has two wavelengths shifting (WLS) bars connected to individual PMTs via a bundle of clear optical fibres. Among the main improvements of the FDD, with respect to the AD, are faster plastic scintillators and WLS, and the use of the newly developed front-end electronics suitable for operation both in a triggered and in a continuous readout mode.

The FDD will ensure that ALICE has the large pseudorapidity coverage needed to (1) select diffractive events down to diffractive masses of a few GeV/c^2 , and (2) to veto particle production in the forward regions in order to obtain clean samples of ultra-peripheral events.

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