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Triggering with the ALICE TRD

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The Transition Radiation Detector (TRD) in A Large Ion Collider Experiment (ALICE) at the LHC consists of 6 layers of tracking chambers and covers a pseudo-rapidity range of eta < 0.9. At the moment 10 out of 18 azimuthal sectors are installed. The completion is planned during the long LHC shutdown in 2013/14.

We will discuss how a hardware Level-1 trigger, about 7 us after an interaction, can be derived from this detector. Chamber-wise track segments from fast on-detector reconstruction are readout with position, angle and PID information. In the Global Tracking Unit these tracklets are matched and used for the reconstruction of transverse momenta and electron identification of individual tracks. These tracks form the basis for versatile and flexible trigger conditions, s.a. single high-pt hadron, single high-pt electron, di-electron (J/\Psi, Upsilon) and at least n high-pt tracks (jet).

The need for low-latency on-line reconstruction poses challenges on the detector operation. The calibration for gain (pad by pad) and drift velocity must be applied already in the front-end electronics and cannot be calculated off-line based on the recorded data. Due to pressure changes an on-line monitoring and control loop for these parameters is required.

After a long period of minimum bias data-taking in ALICE rare triggers are now used in ALICE. We will discuss the tracking performance at the local and global reconstruction stages and report on first experiences with the TRD based triggers.

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