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## The High Granularity Timing Detector

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In 2026 the high luminosity upgrade of the LHC (HL-LHC) will begin, bringing an improvement of a factor up to five for the luminosity (rate of interaction) in comparison to the original design value. One of the implication of the increase of the luminosity is an increase of the pile-up (number of interactions per collision) from around 25 events during the Run1 up to 200 during the HL-LHC for the ATLAS experiment. To mitigate this effect the different detectors of ATLAS need to be upgraded and new ones need to be installed, one of the new detector is the High Granularity Timing Detector (HGTD) a detector able to measure the time of passage of particle with a very high precision. This detector would be situated in the end-caps of ATLAS at a distance of 3.5 meters of the interaction point. In this presentation I will present the technology behind the HGTD and explain how timing information can be use to mitigate the effect of the pile up in the condition of the HL-LHC. I will then give you a more concrete exemple of this detector capability with a 5D electron reconstruction tested using a full simulation event with a pile-up of 200 in the ATLAS detector.

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