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Characterization of front-end electronics for the High Granularity Timing Detector in ATLAS

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The expected increase of the particle flux at the high luminosity phase of the LHC with instantaneous luminosities up to $L=7.5 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ will have a severe impact on pile-up. The pile-up is expected to increase on average to 200 interactions per bunch crossing. The performance of particle reconstruction will be severely degraded in the end-cap and forward region of the ATLAS detector. The High Granularity Timing Detector (HGTD) is a proposed silicon detector for the forward region of the ATLAS detector in the High Luminosity LHC. It's high granularity and excellent timing resolution can be used to greatly improve pile-up mitigation and open new possibilities in the particle reconstruction, physics analysis and luminosity measurement at the HL-LHC. In this presentation, starting from the physics motivations of the High Granularity Timing Detector, the proposed detector layout and sensor technology, laboratory and beam test characterization of the prototype front-end electronics will be discussed.

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Session Classification: Instrumentation