## The High-Granularity Timing Detector for the ATLAS experiment at the HL-LHC

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The increased particle flux at the HL-LHC poses a significant challenge to the ATLAS detector's performance, particularly in the forward region which has reduced detector granularities. To address this challenge, ATLAS is adding the High-Granularity Timing Detector (HGTD), utilizing novel Low-Gain Avalanche Detector (LGAD) silicon technology. The HGTD will provide capabilities for pileup mitigation and precise luminosity measurements, complementing the new all-silicon Inner Tracker in the pseudo-rapidity range of 2.4 to 4.0. Two double-sided layers of the HGTD, with a total of 3.7 million 1.3×1.3 mm<sup>2</sup> pixels, will provide a timing resolution of better than 50 ps/track throughout the HL-LHC operational period. This allows improving the assignment of tracks to their correct vertices based on timing information, by discerning the pp interactions happening in each bunch crossing in the temporal dimension. A comprehensive overview will be provided, outlining the requirements, technical designs, recent results from preproduction sensors and readout electronics modules, and the project's status.

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