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Custom Electronics and the Front-End Board of the ATLAS LAr Calorimeter Readout for the HL-LHC

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The High Luminosity era of the Large Hadron Collider (LHC) starting in 2027 promises exciting discovery potential, giving unprecedented precision on key new physics models and characterization of the Higgs boson. In order to maintain current performance in this challenging environment, the ATLAS Liquid Argon electromagnetic calorimeter will get an entirely new readout that is fast enough to read out the entire detector with full precision at the LHC frequency of 40 MHz while withstanding high operational radiation doses. On the detector, the new Front-End Board 2 (FEB2) integrates several custom ASICs into a 128 channel board to sample the LAr calorimeter cells, amplify, shape, and digitize the signal pulse, and optically transmit serialized digital data off-detector for further processing. The development of the FEB2 and related custom electronics will be described. New results from the current 32 channel “Slice Testboard” pre-prototype of the FEB2 will be presented. The future steps and outlook of the project will be outlined, with an eye towards installation in the ATLAS cavern beginning in 2025.

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