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Chips for calibration of the ATLAS LAr calorimeter

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The LHC upgrade at CERN implies an increase in the dynamic range for the electromagnetic liquid argon (LAr) calorimeter of the ATLAS detector, a change in the power supply system and an increase of the luminosity and thus of radiation effects on detectors. This requires completely redoing the LAr calibration system. The new system should provide a 16-bit range current (from 625 nA to 320 mA) with 1‰ accuracy while being radiation tolerant. The former operating principle is used: a very precise DC current is stored in an inductor when this current is switched off it generates a precise pulse injected in the readout electronics. This is achieved by two different chips: the first one, in TSMC 130nm technology, provides the 16-bit current DAC as well as the calibration management system (I2C slow control and commands to obtain pulses); the second chip, in XFAB 180nm technology, embeds four high-frequency switches (1GHz) to generate the fast pulses for calibration. This talk will present these two chips in details and give measurement results as well as irradiation test results for both technologies.

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