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Calibration UV LED System with tunable light intensity for CALICE tile hadron calorimeter

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We report on several versions of the calibration and monitoring system for the scintillator tile hadron calorimeter for the ILC. Our first calibration and monitoring board (CMB) is used to calibrate all 7600 SiPMs of a 1 m³ hadron calorimeter prototype. Each CMB has 12 LEDs and each LED illuminates 18 SiPMs through 18 optical fibers. The pulse is 10 ns wide and delivers a signal equivalent to 70 MIPs to each SiPM. Newer version has Quasi Resonant LED driver, which drives the LED by a sinusoidal signal, which generates ~3.5 ns optical pulse with high intensity (0.4 nJ) and low EM noise. Together with a special notched optical fiber, a single LED can saturate 12 SiPMs at once with a signal equivalent to 200 MIPs per tile. Next version will be improved to generate longer pulse (~5ns), therefore a higher light intensity. Our development includes an optical distribution through a notched fiber, which shines equally from 72, 12 or 24 points. The light in the final AHCAL prototype will be routed from single LED by 3 fibers having 24 notches each, illuminating row of 72 tiles at once.

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