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The LED pulser system for the Hyper-Kamiokande outer detector light injection system

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The upcoming Hyper-Kamiokande experiment is a next generation water Cherenkov detector based in Japan. Using an upgraded JPARC neutrino beam, Hyper-K aims to make precision measurements of the CP violating phase δ_{CP}, along with neutrinos from astrophysical sources, and proton decay. With a fiducial volume approximately eight times larger than its predecessor Super-Kamiokande, Hyper-K is expected to be systematically limited. Therefore, in order to make precision measurements, an accurate calibration system is required to constrain systematic uncertainties. One of these is the Light Injection (LI) system.

The Hyper-K outer detector (OD) will be instrumented with approximately 3600 3"PMTs, surrounded by wavelength-shifting plates; this is primarily used as a veto region. The OD part of the LI system will consist of 12 narrow-angle collimators and 122 wide-angle diffusers, with the latter illuminated by custom designed and manufactured pulsed LED sources, capable of optical pulses of $\mathcal{O}$(1 ns). These will be used for charge non-linearity measurements and timing offset calibration. This poster describes the OD calibration system and LED pulser boards, focussing on the PCB design for high-frequency circuits, the sub-circuit design to make each LED board functional and the results achieved using these boards.

Authors: Mr BOGDAN, Balint (University of Liverpool); Dr JENKINS, Sam (University of Liverpool)

Presenters: Mr BOGDAN, Balint (University of Liverpool); Dr JENKINS, Sam (University of Liverpool)

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