Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **108** Type: **Oral (Non-Student) / Orale (non-étudiant(e))**

R&D and Status of the LED System for Hyper-K's LED-mPMT Module

Tuesday 10 June 2025 17:30 (15 minutes)

The Hyper-Kamiokande (Hyper-K) far detector is under construction and is planned to begin operation in 2027. The detector will consist of a cylindrical water tank measuring 68 metres in diameter and 72 metres in height, instrumented with 40,000 inward-facing 50-cm photomultiplier tubes (PMTs). To enhance calibration capabilities, 1000 of the conventional PMTs will be replaced by multi-PMT (mPMT) modules: 800 regular mPMTs, each equipped with 19 8-cm fast PMTs, and 200 LED-mPMT modules, each equipped with 14 8-cm fast PMTs and five UV LED light sources pointing in different directions. Each LED system in the LED-mPMT modules includes one diffuser and four collimated UV-light sources at different wavelengths. The combination of these light sources with the fast timing resolution of the mPMTs will allow us to addresses critical calibration aspects for Hyper-K such as (1) calibrating the diffused light source at the opposite wall to improve understanding of the angular response of the 50-cm PMTs and water-attenuation effects, and (2) calibrating the collimated light source to measure water quality in the tank by analyzing light transmission, including position-dependent scattering effects such as those caused by bacteria. In this presentation, I will describe the research and development of the LED system for the LED-mPMT module, its status, and our efforts toward mass production and quality assurance. These efforts ensure readiness for Hyper-K's start of operation and support its goal of achieving unprecedented precision in neutrino measurements and related physics analyses.

Keyword-1

Neutrino, Calibration, R&D

Keyword-2

Hyper-Kamiokande, mPMT

Keyword-3

LED-mPMT

Author: Dr KOERICH, Luan

Co-authors: Prof. BARBI, Mauricio; Prof. KOLEV, Nikolay (University of Regina)

Presenter: Dr KOERICH, Luan

Session Classification: (PPD) T3-9 Neutrinoless double beta decay and neutrino experiments | Double désintégration beta sans émission de neutrino et expériences sur les neutrinos (PPD)

Track Classification: Technical Sessions / Sessions techniques: Particle Physics / Physique des particules (PPD)