Poster session 1 - Monday 4 July

P1.015 Scattering length monitoring at the SNO+ detector

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SNO+ is a multipurpose detector located in the Creighton Mine in Sudbury, Ontario, Canada. Its key purpose is investigating neutrinoless double beta decays, amongst other physics goals such as solar and reactor neutrino oscillations. Thus, SNO+ will make a significant contribution to several important aspects of modern neutrino physics. The experiment will undergo several run phases starting with a water-fill phase, followed by a data taking period with a pure liquid scintillator cocktail and a phase in which the scintillator will be loaded with 130Te. To optimise our understanding of the detector energy resolution and reduce its uncertainty, continuous monitoring of optical processes in the detector, such as absorption, reemission and scattering, with high precision is necessary throughout all of these run phases.

This poster presents the Scattering Module of the Embedded LED/Laser Light Injection Entity. It is part of the detector's calibration system, designed for measuring the Rayleigh scattering length of photons within the detection materials. The scattering system comprises of 12 collimated optical fibres installed within the PMT Support Structure sending light through the detector at different directions and thereby achieving beams with variable path lengths in the different detector media. It is designed to measure the scattering properties over a wavelength range of 375nm - 700nm provided by a laser system. This allows a detailed in-situ probing of both the angular and wavelength dependence of the Rayleigh scattering. The Module's hardware components were optimised to produce light pulses of minimal duration enabling precise location of scattering events through timing techniques. In this poster, all hardware components and their installation within the detector will be discussed. Furthermore, the analysis procedure to measure the Rayleigh scattering length in two detector scenarios during the water run phase and the liquid scintillator run phase are presented.