



Poster session 3 – Wednesday 6 July

P3.060 SoLiD detector technology

A De Roeck¹ and M Labare²

¹CERN, Switzerland, ²University of Gent, Belgium

on behalf of SoLiD collaboration

SoLiD is a reactor anti-neutrino experiment where a novel detector is deployed at a minimum distance of 5 m from a nuclear reactor core. The purpose of the experiment is three-fold: (1) to search for neutrino oscillations at a very short baseline, (2) to measure the pure U-235 neutrino energy spectrum, and (3) to demonstrate the feasibility of neutrino detectors for reactor monitoring.

This poster presents the unique features of the SoLiD detector technology. The technology has been optimised for a high background environment resulting from low overburden and the vicinity of a nuclear reactor. This is achieved by building the detector from detector elements that have two essential properties. First, the cubic elements are only 5 cm in each dimension, allowing an unseen precision in determining the interaction locations. Second, each element combines two scintillator materials. A plastic scintillator is used as a target volume and to detect the positrons produced in anti-neutrino interactions. Neutrons generated in the same interactions are recorded with a ⁶LiF:ZnS scintillator, which enables the unambiguous identification of neutron signals from background gamma rays. The challenge of collecting the signal from the large number of individual detector elements is solved by using a mesh of wavelength shifting fibres attached to silicone photomultipliers.

The versatility of the detector technology is demonstrated with a 288kg detector prototype, which was deployed at a nuclear reactor in 2015. The data presented includes reactor on, reactor off and calibration measurements. The measurement results are compared with Monte Carlo simulations.