T 75: Calorimeter / Detector Systems III

Time: Wednesday 15:50–16:35 Location: WIL/C133

T 75.1 Wed 15:50 WIL/C133

Neutron and Photon Tagging in Plastic Scintillators — Asma Hadef, Antoine Laudrain, •Asa Nehm, and Sebastian Ritter — JGU Mainz, ETAP

While neutron-photon separation using pulse shape discrimination with liquid scintillators and PMTs is a well-known technique, it represents a major challenge using plastic scintillators with SiPM readout. A setup using an AmBe source has been built in order to study the ability of the EJ-276G plastic scintillator optimized for pulse shape discrimination to distinguish between neutrons and photons. The design also includes a cosmic tagging which allows for the identification and rejection of the cosmic background.

The main approach for the discrimination method is to use the more frequent delayed scintillation photons for neutrons compared to the gammas for the events. Different analysis methods using the amount of delayed photon-electron peaks per event as well as their timing information are implemented and studied in detail.

This method could be used in the electromagnetic calorimeter that is part of the DUNE near detector complex, to provide neutron tagging capabilities and enable neutron energy reconstruction.

T 75.2 Wed 16:05 WIL/C133

Development of PEN as an Optically Active Structural Material for Low Background Experiments — •Brennan Hackett[1], Iris Abt[1], Felix Fischer[1], Béla Majorovits[1], Luis Manzanillas[1,2], and Oliver Schulz[1] — [1]Max Planck Institute for Physcis, Munich, Germany — [2]Synchrotron Soleil, Saint-Aubin, France

Neutrino physics and experiments searching for dark matter are pursuing novel low background and self-vetoing materials for components in order to improve their sensitivity. One material of interest is poly(ethylene-2, 6-naphatalate) (PEN) for its inherent scintillating and wavelength shifting properties, as well as its commercial availability and structural stability. Commercially available PEN films are limited in their applications and occasionally do not fulfill the stringent radiopurity and optical requirements of these experiments. As such, the PEN working group has developed a method to produce PEN components with excellent optical properties of thicknesses up to 5 mm, and with a specific activity of less than mBq/kg. PEN detector holders have been successfully installed in the LEGEND experiment and additional PEN structures are being evaluated to further expand the use of structural scintillators. Details of this R&D effort with commercial PEN and the progress on development of custom synthesized radio-pure PEN will be presented.

T 75.3 Wed 16:20 WIL/C133

Light yields and spatial resolution of a wavelength-shifting fibre structured plastic scintillator detector — Alessia Brignoli[1], Heiko Markus Lacker[1], Christian Scharf[1], •Ben Skodda[1], Valery Dormenev[2], Hans Georg Zaunick[2], and Martin J. Losekamm[3] — [1]Humboldt-Universität zu Berlin — [2]Justus-Liebig-Universität Gießen — [3]Technische Universität München

The "CheapCal" project aims to develop a low-cost and easy-to-build detector for charged particle detection with spatial resolution of about a centimeter. The detector principle is based on an extruded plastic scintillator material with a short light attenuation length, which is structured with parallel oriented wavelength-shifting fibres and a fibre-to-fibre distance of 1.5 cm. The fibres are read-out at each end by a SiPM. Using a Sr-90 beta source, we study the light yield of each fibre as a function of the beta-source position on the scintillator plate from which the particle's intersection point at the plastic scintillator plate is determined. We acknowledge the support from BMBF via the High-D consortium.