T 67: Neutrinos, Dark Matter VII

Time: Wednesday 15:50–16:50 Location: POT/0361

T 67.1 Wed 15:50 POT/0361

Optimization of the remoTES design using silicon absorbers — •Kumrie Shera, Gode Angloher, Mukund Bharadwaj, Trosten Frank, Moritz Kellermann, Michele Mancuso, Federica Petricca, Franz Pröbst, Karoline Schäffner, Martin Stahlberg, Vanessa Zema, Antonio Bento, Lucia Canonica, and Abhijit Garai — Max-Planck-Institut für Physik, 80805 München, Germany

Transition Edge Sensors (TES) are sensors that can measure tiny increases of temperature of order μK and are widely used to read out cryogenic calorimeters. However, delicate materials (e.g. with low melting point and/or hygroscopicity) can not undergo the process of fabricating such a sensor on their surface. To deal with this, the COSINUS-experiment developed the remoTES readout design, where the TES itself is placed on a separate wafer and the coupling of the absorber crystal to the TES consists of a gold bonding wire connected to a gold pad on the absorber. In this talk studies done for the optimization of the remoTES design using silicon crystals as a benchmark are shown.

T 67.2 Wed 16:05 POT/0361

Particle Dependent Parameter Determination of Liquid Scintillators for Neutrino Experiments — •David Dörflinger[1], Lothar Oberauer[1], Hans Th. J. Steiger[1,2], Raphael Stock[1], Ulrike Fahrendholz[1], Lennard Kayser[1], Florian Kübelbeck[1], Korbinian Stangler[1], Michael Wurm[2], Dorina Zundel[2], and Manuel Böhles[2] — [1]Technische Universität München (TUM), Physik-Department, James-Franck-Straße 1, 85748 Garching bei München — [2]Institute of Physics and Excellence Cluster PRISMA+, Johannes Gutenberg-Universität (JGU) Mainz, Staudingerweg 9, 55099 Mainz

The Jiangmen Underground Neutrino Observatory (JUNO) aims to detect neutrinos using 20 kton of organic liquid scintillator based on LAB (Linear AlkylBenzene). In order to understand the detector response, a precise determination of particle dependent scintillation parameters is crucial. Compared to gamma radiation, neutrons have a different energy dissipation method in the detector material, which leads to a quenched light output. The quenching factors of the JUNO scintillator and other organic, as well as water based liquid scintillator samples have been studied using a particle accelerator driven neutron source at the INFN-LNL in Legnaro, Italy. The neutrons are produced quasi-monoenergetically by ^{7}Li(p,n) reaction with energies between 3.5 MeV and 5.5 MeV. This work is supported by the DFG Research Unit JUNO (FOR2319) and the clusters of excellence ORIGINS and PRISMA+.

T 67.3 Wed 16:20 POT/0361

Quenching Factor measurements with COSINUS NaI crystals — •Mukund Raghunath Bharadwaj for the COSINUS-Collaboration — Max-Planck-Institut für Physik, Föhringer Ring 6, 80805 München

NaI (Tl) based scintillation detectors have become a staple in the field of direct dark matter searches, with the DAMA-LIBRA experiment being the stand out for its reported dark matter observation which is in direct contrast with numerous other results. In order to accurately calibrate the energies of WIMP induced nuclear recoil signals and conclusively rule out the parameter space covered by DAMA/LIBRA, precise measurements of the quenching factor of the NaI crystals is essential for each of these experiments as it is well established that electron recoils and nuclear recoils have dis-similar scintillation light yields. In this study, we present first preliminary results of a systematic study that has been carried out by the COSINUS collaboration to measure the quenching factor values primarily in the low recoil energies of 1-30keV$_{nr}$ in order to better understand the discrepancies/uncertainities reported by various experiments. Five ultra-pure NaI crystals manufactured by the Shanghai Institute for Ceramics, each of which have varying Tl dopant concentration, were irradiated with a mono-energetic neutron beam to study its impact on the quenching factor values in the desired recoil energy range.

T 67.4 Wed 16:35 POT/0361

Precision Attenuation Length Measurement of Liquid Scintillators for Future Large Volume Neutrinos Experiments — •Korbinian Stangler[1], Florian Kübelbäck[1], Hans Steiger[2], and Lothar Oberauer[1] — [1]TUM, Physik-Department, James-Franck-Straße 1, 85748 Garching — [2]Cluster of Excellence PRISMA+, Detector Laboratory, Staudingerweg 9, 55128 Mainz

Upcoming large volume neutrino experiments (like JUNO or THEIA) place high demands on the purity of their scintillators. The optical properties are important to ensure that a large number of photons reach the light detectors. Therefore, scintillators require attenuation lengths >20m for the wavelengths of interest. Measurements of these optical properties have so far been carried out with UV/Vis spectrometers and cuvette lengths of 10cm which leads to overall uncertainties of the same order of magnitude as the attenuation length. In order to obtain precise measurements, the Precision Attenuation Length Measurement (PALM) was developed with light path lengths of up to 2.8m. The setup aims to determine the attenuation length for a wavelength range between 350 and 1000nm with an uncertainty of less than ten percent. So far, initial calibration and test measurements have been performed on linear alkylbenzene (LAB) to ensure and optimize the performance of the setup.
This work was supported by the DFG Forschergruppe JUNO.