T 11: Hochenergie-Neutrinophysik 1

Zeit: Montag 11:00–12:20 Raum: P13

T 11.1 Mo 11:00 P13

Relative Neutrino-Wechselwirkungsquerschnitte bei geladenen Wechselwirkungen — Stefan Roth, Stefan Schoppmann, Achim Stahl, Jochen Steinmann, •Dennis Terhorst und Lukas Flötotto — RWTH Aachen, Physikalisches Institut 3B

Bei vielen aktuellen Neutrino-Experimenten haben die Unsicherheiten der Wirkungsquerschnitte von Untergrundreaktionen einen entscheidenden Einfluss auf die systematischen Fehler. Zur Bestimmung der absoluten Wirkungsquerschnitte ist die genaue Kenntnis des Neutrinoflusses und dessen Zusammensetzung nötig. Wegen starker Modell-Abhängigkeiten bei der Strahlerzeugung sind diese Parameter aber schwierig zu bestimmen, daher werden zunächst die relativen Wirkungsquerschnitte bezogen auf eine Referenzreaktion betrachtet. Dieser Vortrag stellt eine Untersuchung der geladenen Neutrinowechselwirkungen im T2K-Nahdetektor (ND280) vor. Dabei werden verschiedene Wirkungsquerschnitte für Prozesse mit assoziierter Pionerzeugung untersucht. Als Referenzreaktion wird die quasi-elastische Wechselwirkung ($\nu + n \to \mu + p$) herangezogen.

Gruppenbericht T 11.2 Mo 11:15 P13

The OPERA Experiment - Neutrino Oscillation Search — •Benjamin Büttner for the OPERA-Hamburg-Collaboration — Universität Hamburg, Institut für Experimentalphysik, Luruper Chaussee 149, 22761 Hamburg

The primary goal of the OPERA long-baseline neutrino oscillation experiment is the first direct detection of $\nu_\mu \to \nu_\tau$ oscillations.

The hybrid OPERA detector consists of a large-mass target made from lead and photo emulsions - providing micrometric resolution - and electronic detector parts for online readout. It is located in the LNGS underground laboratory, at a distance of 730km from the SPS at CERN, where the CNGS ν_μ beam is produced.

The measurement of ν_τ appearance relies on the detection of the decay of τ leptons which are created in ν_τ charged current reactions. Data acquisition lasted from 2008 to 2012, and numerous beam-induced events have been recorded.

In this talk, the current status of the neutrino oscillation analysis will be presented.

T 11.3 Mo 11:35 P13

ν_e Appearance at OPERA - Electromagnetic Shower Energy Estimation — •Annika Hollnagel for the OPERA-Hamburg-Collaboration — Universität Hamburg, Institut für Experimentalphysik

The long-baseline neutrino oscillation experiment OPERA has been designed for the direct observation of ν_τ appearance in the CNGS ν_μ beam. Located at the LNGS underground laboratory, the OPERA detector is built of about 150000 high-resolution Emulsion Cloud Chamber modules (ECC bricks) and equipped with Electronic Detector (ED) elements for online readout, interaction location, and the measurement of particle charge and momentum.

The micrometric resolution provided by the ECC bricks (required for the detection of the short-lived τ leptons created in ν_τ CC interactions) also allows to identify the electromagnetic showers from ν_e CC interactions. Combined with the information provided by the ED, the shower energy may be estimated. This allows to define selection cuts for improving the signal-to-noise ratio of oscillated ν_e events vs. the intrinsic beam contamination, increasing the sensitivity for standard 3-flavour and sterile ν oscillations.

T 11.4 Mo 11:50 P13

Tracking in large volume liquid scintillator and water cherenkov detectors applied to LENA — •Björn Wonsak — Universität Hamburg

Large volume liquid scintillator and water cherenkov detectors are widely used in neutrino physics. Both detector types allow for measuring the energy deposition and give some (limited) information on the event type. A topological analysis, as in fine grained detectors, was not possible up to now.

A new reconstruction method aiming to provide this ability, which is based on the propagation time of the detected light, is presented. The method is under development. Currently, a spatial resolution of less than 20 cm is reached for single tracks and the energy deposit per track segment seems to be accessible. The aim is to achieve a resolution of a few centimeters and to make the method applicable for complex topologies. In the long run we strive for some capabilities to separate electron induced electromagnetic showers from pion induced ones, the later beeing a major background for neutrino oscillation experiments with long baseline beams.

T 11.5 Mo 12:05 P13

Processing of 3D volume data from new reconstruction method applied to LENA — Daniel Bick[1], Caren Hagner[1], Markus Kaiser[1], •Sebastian Lorenz[1], Michel Meyer[1], Björn Wonsak[1], and Michael Wurm[2] — [1]für die LENA Arbeitsgruppe - Universität Hamburg, Institut für Experimentalphysik, Luruper Chaussee 149, 22761 Hamburg — [2]Universität Tübingen, Physikalisches Institut, Auf der Morgenstelle 14, 72076 Tübingen

In neutrino physics, large-volume liquid scintillator detectors are important and commonly used tools. They use the emitted isotropic scintillation light to collect information on the detected event. However, due to spatial and temporal projection of the emitted light information—from a spatially extended region in the detector onto discrete photosensors—reconstruction of the event's topology is demanding.

A new reconstruction method based on the propagation time of the detected photons is in development. This method produces 3D volume data which reflect the event's geometry and topology. Using Monte-Carlo simulations of single tracks in the LENA detector, the first steps towards automatic extraction of parameters as input for subsequent analyses are presented.