HK 35: Astroteilchenphysik - Poster

Time: Wednesday 14:00–16:00 Location: Foyer Chemie

HK 35.1 Wed 14:00 Foyer Chemie

Deconvolution of the energy loss function in the KATRIN experiment — •Christopher Kranz, Anna Sejersen Riis, Christian Weinheimer, and Volker Hannen for the KATRIN-Collaboration — Instititut für Kernphysik, Universität Münster, Germany

The KATRIN experiment is a next generation tritium β-decay experiment which will improve the ν-mass sensivity to 200 meV/c^2(90% C.L.). In order to extract the β-spectrum from measurements, the energy loss function of electrons scattering on tritium needs to be known. This function can be deconvoluted from measurements of the response function of the KATRIN experiment at different source densities with a monoenergetic electron gun. Several Numerical methods to deconvolute the energy loss function from the data have been investigated and implemented into the analysis code.
In addition an optimal measurement time distribution for the response function is determined to get a minimal systematic error on the deconvoluted energy loss function and hence on the ν-mass squared.
Finally the possibilities of monitoring the column density ρd of the windowless gaseous tritium source (WGTS) during tritium measurements are examined.
This project is supported by BMBF under contract number 05A08PM1.

HK 35.2 Wed 14:00 Foyer Chemie

Gas purification for the XENON Project — •Hans Kettling, Stephan Rosendahl, Ethan Brown, Volker Hannen, Christian Huhmann, Johannes Schulz, and Christian Weinheimer — Institut für Kernphysik, Universität Münster, Germany

The XENON Project will search for dark matter by detecting the nuclear recoil signal induced by a Weakly Interacting Massive Particle (WIMP) in a 2 phase xenon time projection chamber (TPC). Interactions in the liquid phase cause scintillation and ionization signals. The electrons are drifted from the liquid into the gaseous phase and accelerated there, causing fluorescence light. Both light signals are detected by arrays of photosensitive detectors.
The drift length of the electrons strongly depends on the purity of the xenon. In particular oxygen molecules reduce the electron drift length, as they absorb electrons. Therefore, our group designs and tests cryogenic purification systems for xenon in the gaseous and liquid phase.
A SAES getter is used to remove electronegative elements in the gaseous phase such as oxygen or hydrocarbons.
The purification systems will also comprise a distillation column in order to reduce the level of the ^{85}Kr contamination to the low ppt range. This is necessary, as β-decay of ^{85}Kr constitutes one of the backgrounds of the experiment.
We will use ^{83m}Kr as a tracer to optimize the Xe to Kr separation.
This work is supported by DFG and the state NRW under contract INST 211/528-1 FUGG.

HK 35.3 Wed 14:00 Foyer Chemie

Design of a 2-phase Xe TPC for electron drift length measurements — •Johannes Schulz, Karen Bokeloh, Ethan Brown, Christian Huhmann, Hans Kettling, Stephan Rosendahl, and Christian Weinheimer — Institut für Kernphysik, Westfälische Wilhelms-Universität Münster

The XENON-Project will search for Weakly Interacting Massive Particles (WIMPs) by looking for nuclear recoil signals induced in a 2-phase xenon time projection chamber (TPC). WIMPs hitting Xe-atoms produce electrons and scintillation light in the liquid. The electrons are forced by an electric field to drift towards the surface, where they are extracted and accelerated causing scintillation light in the gas. The scintillation signals can be detected by arrays of photosensitive detectors (PMTs) at the bottom and on top of the TPC. The signals of the PMTs give the x- and y-coordinate of the nuclear recoil event, the time between the first and the second light pulse gives the z-coordinate allowing a 3D localization of the interaction. A small TPC with a diameter of 80mm and a hight of 340mm will be integrated in our cryogenic purification system. The light readout will be done by two arrays at seven UV-sensitve Hamamatsu R8520-06-AL PMTs. The first TPC-setup will make drift length of 200mm possible and can stepwise be upgraded to 1000mm later on. Drift length measurements can indicate the level of contamination of the Xe with electronegative impurities. In addition we intend to provide R&D for the XENON-Project.
The project is supported by DFG and State NRW under contract INST 211/528-1 FUGG.