Contribution ID: **348** Type: **Oral**

A small dual-phase xenon TPC with APD and PMT readout for the study of liquid xenon scintillation

Monday, 2 June 2014 16:50 (20 minutes)

Liquid xenon is used in many fields as detector medium. Dark Matter experiments based on liquid xenon have set the most stringent limits in the past decade and are still leading the field. Also in other areas of particle physics xenon is used as detector medium, for example in the search for neutrinoless double beta decay (EXO), in the search for lepton flavor violation (MEG) or in envisioned projects like gamma-ray telescopes on satellites. There is also ongoing research on xenon-based detectors for medical imaging. Although widely used, the scintillation process of liquid xenon, especially at low recoil energies (few keV), is not well understood.

The MainzTPC, a small 3D position-sensitive dual-phase xenon TPC, has the goal to improve our understanding of the scintillation process and the field quenching in liquid xenon.
The MainzTPC uses two PMTs (Hamamatsu R6041) to detect and measure the fast primary scintillation light including its shape. Additionally an array of eight large area avalanche photo diodes (LA-APDs) detects the large proportional scintillation providing x/y resolution.
Here we report on the performance of the TPC and the response of the LA-APDs to the xenon scintillation light.

Summary

The design of the MainzTPC and the according cryo-system is finished and its assembly is ongoing at the moment. Till the TIPP2014 we expect to have the TPC running and first tests performed. Meanwhile the photo sensors that will be used are tested and characterized. The large area APDs are tested in liquid xenon on quantum efficiency for the xenon scintillation light as well as voltage and temperature dependence of their internal gain (g>1000).

Also, the DAQ using a high sample rate (5GS/s) FADC is set up in parallel to the measurements of the light detectors and construction and assembly of the TPC.
In the talk, we will report on the response of the photo sensors (especially the APDs) and the comissioning and first results from the comissioning of the TPC.

Primary authors: BESKERS, Bastian (Johannes Gutenberg University Mainz); SISSOL, Pierre (Johannes Gutenberg University Mainz)

Co-authors: Dr GRIGNON, Cyril (Johannes Gutenberg University Mainz); SCHEIBELHUT, Melanie (Johannes Gutenberg University Mainz); OTHEGRAVEN, Rainer (Johannes Gutenberg University Mainz); Prof. OBERLACK, Uwe (Johannes Gutenberg University Mainz)

Presenter: BESKERS, Bastian (Johannes Gutenberg University Mainz)

Session Classification: II.d Dark Matter

Track Classification: Experiments: 2d) Dark Matter Detectors