Workshop on detector upgrade for ALPHA experiment
Helsinki, 03.-04. May 2017

Scope of the workshop

The ALPHA experiment situated within CERN Antiproton Decelerator (AD) produces, captures and studies atoms of antihydrogen and compares these with hydrogen atoms. Creating antihydrogen depends on bringing together the two component antiparticles, antiprotons and positrons, in a trapping device for charged particles. The ALPHA apparatus has recently been proposed to be upgraded by detection of 511 keV photons by semiconductor sensors. One possibility for direct high energy photon detection is Cadmium Telluride (CdTe) based sensors. CdTe is evolving detection technology for e.g. nuclear safety and medical imaging applications. Moreover, CdTe sensors can be used in single photon counting mode with very high readout rate if attached into CMOS ASIC chips developed for particle physics applications. High readout rate together with precise spatial resolution potentially unfolds new possibilities for experimental antimatter physics. The focus of this workshop is to bring together expertise from Helsinki Institute of Physics (HIP), University of Helsinki, University of Liverpool, University of Swansea and Ruder Boskovic Insitute (RBI) to discuss and survey common interests for high energy photon detection by CdTe sensors.

Tentative list of participants

Dr. Petteri Pusa, Univ. of Liverpool, UK.
Dr. Stefan Eriksson, Univ. of Swansea, UK
Dr. Eija Tuominen, Detector Laboratory, Univ. of Helsinki
Dr. Panja Luukka, Helsinki Institute of Physics (HIP)
Dr. Jaakko Härkönen, Ruder Boskovic Insitute (RBI), Croatia
Ms. Akiko Gädda, Helsinki Institute of Physics (HIP)
Mr. Alexander Winkler, Helsinki Institute of Physics (HIP)

Tentative agenda

University of Helsinki
Physicum building
Gustaf Hällströminkatu 2

Wednesday 03. May 2017

10:00 – 10:20 Welcome and topics of the workshop (J. Härkönen)
10:20 – 10:50 Upgrade plans of ALPHA experiment (S. Eriksson)
10:50 – 11:20 Detector definitions and technical requirements (P. Pusa)
11:20 – 11:50 Coffee break
11:50 – 12:30 CdTe as sensor material: possibilities and challenges (A. Winkler)
12:30 – 14:00 Lunch (restaurant Roslund, Teurastamon portti, Helsinki)
14:10 – 14:30 CdTe interconnection technology (A. Gädda)
14:30 – 15:00 PSI46dig readout chip with CdTe sensors (P. Luukka)
15:00 – 16:00 Helsinki detector laboratory and clean room visit (E. Tuominen)
16:00 – 17:00 Discussion, including:
- Project timeline

- Budget
- CdTe material acquisition
- Readout of detector

19:00 – Workshop dinner (to be confirmed)

Thursday 04. May 2017
Micronova
Tietotie 2
Espoo

10:00 – 12:00 Tour in clean room facilities (A. Gädda)
12:00 – 13:30 Lunch (restaurant Chilli, Espoo)
13:30 – 15:00 Closing remarks, including:
- detector simulation
- detector design
- processing
- test and quality assurance program
- detector commissioning
- next workshop