Contribution ID: **21** Type: **not specified**

QUartz Photon Intensifying Detector (QUPID): a possible alternative for noble liquid experiments

Wednesday, 29 May 2013 13:10 (25 minutes)

Dark matter and double beta decay experiments require extremely low radioactivity within the detector materials. For this purpose, the University of California, Los Angeles and Hamamatsu Photonics
have developed the QUartz Photon Intensifying Detector (QUPID), an ultra-low background photodetector based on the Hybrid Avalanche Photo Diode (HAPD) and entirely made of ultraclean synthetic fused silica. In this work we present the basic concept of the QUPID and the testing measurements on QUPIDs from the first production line. Screening of radioactivity at the Gator facility in the Laboratori Nazionali del Gran Sasso has shownthat the QUPIDs safely fulfill the low radioactive contamination requirements for the next generation zero background experiments set by Monte Carlo simulations. The quantum efficiency of the QUPID at room temperature is >30% at the xenon scintillation wavelength. At -100C, the QUPID shows a leakage current smaller than 1 nA and a global gain of 1E5. In these conditions, the photocathode and the anode show >95% linearity up to 1uA for the cathode and 3 mA for the anode. The photocathode and collection efficiency are uniform to
80% over the entire surface. In parallel with single photon counting capabilities, the QUPIDs have a good timing response: 1.8+-0.1 ns rise time, 2.5+-0.2 ns fall time, 4.20+-0.05 ns (FWHM) pulse width, and 160+-30 ps (FWHM) transit time spread. The QUPIDs have also been tested in a liquid xenon environment, and scintillation light from 57Co and 210Po radioactive sources was observed.

Primary author: Dr LYASHENKO, Alexey (UCLA)

Co-author: Prof. ARISAKA, Katsushi (UCLA)

Presenter: Dr LYASHENKO, Alexey (UCLA)

Session Classification: Scintillation Light from Noble Elements - R&D Efforts