Contribution ID: **23** Type: **not specified**

Multi-Grid High-Pressure Gas Proportional Scintillation Counter - A New Approach

In this work a new prototype of HPXe detector for charged particles, hard X-rays and γ-rays is presented. This new detector consists of a high-pressure xenon based proportional scintillation counter (MGHP-GPSC) with a cylindrical geometry. The detection of ionizing radiation in the MGHP-GPSC relies on secondary scintillation as the amplification stage followed by the production of photoelectrons in a photosensitive material, which is in direct contact with the gas. From the point-of-view of the general properties expected, the HPXe-GPSC presents some promising characteristics: energy resolution expected to be close to the intrinsic (0.56% for an incident radiation of 662 keV), since the statistical fluctuations in the number of secondary scintillation photons produced by the drifting electrons in the gas are small, an estimated detector gain of about 21 phe-/(primary e-) will help to attenuate the microphonic effects and since there is no charge gain it will also have negligible space charge effects. In addition, we expect it to be a ruggedized detector since it does not make use of photomultiplier tubes or other photosensors with optical windows.
A general characterization of the detector was carried out using simulation tools as GEANT4 and MATLAB and some of the results are here resumed. When comparing with an earlier version, this detector presents a higher active volume (3369 cm3), improved solid angle (Ω/4π) (0.50-0.85), increased detection efficiency (>25% for 662 keV /15 atm), that will hopefully lead to a better energy resolution.
As a result of the combination of these characteristics, the detector is expected to be very competitive when compared with ionization chambers and proportional ionization counters, especially in more extreme environmental conditions, which may be important for several applications ranging from homeland security to instrumentation for boreholes in geological prospection.

Primary author: Mr CORTEZ, André (Laboratório de Instrumentação de Física Experimental de Partículas)

Co-authors: Prof. CONDE, Carlos (Universidade de Coimbra); Prof. BORGES, Filipa (Universidade de Coimbra); Dr DO CARMO, Sérgio (Universidade de Coimbra)

Presenter: Mr CORTEZ, André (Laboratório de Instrumentação de Física Experimental de Partículas)