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One to one comparison between R11410 photomultiplier tube and VUV 4 Multi Pixels Photon Counter.

The search for Dark Matter using liquid noble gas time projection chambers is calling for a larger target mass consistently with a reduced background level of radioisotopes present in the detector components. A preliminary screening campaign is the most effective strategy to constrain the radiogenic contamination in the detector, while a trade-off must be considered in selecting the ideal photosensor: high photo detection efficiency for scintillation light in the vacuum ultraviolet wavelength (VUV) range, operation in cryogenic environment, large sensitive coverage, single photoelectron detection capability and reliability over the life span of the experiment.
Photomultipliers with enhanced photodetection efficiency in the VUV range have been developed on purpose and widely used in most of the running detectors: despite their success, PMTs are bulky and in most of the cases can have a non negligible contribution to the overall background budget.
On the other hand, Silicon Photomultipliers seem to be their natural evolution because they are more compact in size and mass, resulting in a less contribution to the detector background, they can be operated at lower voltage and they have sharp single photoelectron response that critically helps at lowest energies.
We report a preliminary direct study of a R11410 Hamamatsu Photomultiplier tube and a VUV4 Hamamatsu Multi Pixel Photon Counter (MPPC) obtained by illuminating the photosensors with monochromatic light. We will furthermore discuss the possible integration of an array of MPPCs with customized pre-amplifiers designed to operate not only in cryogenic environment, but also for applications in extreme environment such in space, desert or ice.

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