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First test of the PoWER concept

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The proof of the PoWER concept will be presented. PoWER is based on the use of PEN and acrylic foils, coupled with conventional and Vacuum Ultra Violet (VUV) silicon photomultipliers (SiPM) to read-out liquid argon (LAr) scintillation light. The LAr volume of the detector is divided up into a core region and a veto buffer which surrounds the core, both filled with argon. The two regions are separated by foils of PEN on top of foils of acrylic. PEN is used to down-convert the LAr scintillation light from 127 nm to around 420 nm and acrylic to prevent VUV photons produced in the buffer to be converted by the PEN. SiPMs are arranged in arrays that combine conventional SiPM (C-SiPM) and VUV ones (V-SiPM). Each array has two electronic read-out channels: one for the C-SiPM and the other for the V-SiPM. The unbalance between the number of photons detected by the C-SiPM channel and the V-SiPM one allows one to identify if a ionizing event happened in the veto region or in the core of the detector with high efficiency. A small scale experimental test of the PoWER concept has been performed at UNICAMP (Brazil) with a 10cmX10cmX10cm cubic detector with two arrays of 8 6mmX6mm SiPM (4 C-SiPM and 4 V-SiPM) in LAr. Preliminary results with alpha and gamma particles will be presented.

Primary author: Prof. MACHADO, Ana Amelia (UNICAMP)

Co-authors: Mrs BARBOSA, Mirela (UNICAMP); BOTOGOSKE, Gabriel (Padova University and INFN Napoli); CANCI, Nicola (INFN); DI CAPUA, Francesco (University of Naples and INFN); Ms FRANDINI, Heriques (University of Liverpool); KUŹNIAK, Marcin (Astrocent / CAMK PAN); Dr MENDONÇA, Ana Paula (UNICAMP); Mr PAGLIUSO, Lucca (UNICAMP); Mr PILON, Theo (UNICAMP); Mr SANTOS, Roberto (UNICAMP); SEGRETO, Ettore (UNICAMP)

Presenter: Prof. MACHADO, Ana Amelia (UNICAMP)

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