

New Technologies for Discovery III: The 2017 CPAD Instrumentation Frontier Workshop

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Light detection in liquid Xenon experiments

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Liquid Xenon is widely used in experiments searching for the Weakly interacting massive particle interactions (XENON-1T/XENON-nT, LUX/LZ, Panda-X) and neutrino-less double beta decay (EXO-200/nEXO). Efficient detection of the liquid Xenon scintillation light is required for both type of experiments for electron recoil rejection (dark matter search) and for achieving excellent energy resolution (neutrino-less double beta decay search). In addition, dark matter search experiments rely on electro-luminescence for ionization charge detection. Scintillation and electro-luminescence processes emit photons from 165 to 190nm, i.e. in the vacuum ultra-violet (VUV) range which complicates their detection. In this talk, we will review the state of the art for transporting and then detecting VUV photons in liquid Xenon including the development of reflective materials (Teflon, Al-MgF₂ films) and photo-detectors such as Silicon Photo-multipliers, Photo-multiplier tubes and Gas Electron Multipliers.

Primary author: RETIERE, Fabrice (TRIUMF)

Presenter: RETIERE, Fabrice (TRIUMF)

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