Abstract Submitted
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R&D towards a Liquid Xenon Advanced Compton Telescope (LXeACT)[1] UWE OBERLACK, CHRISTOPHER OLSEN, PETR SHAGIN, Rice University, ELENA APRILE, KARL LUDWIG GIBONI, ROBERTO SANTORELLI, Columbia University — The scientific potential of gamma-ray astronomy in the energy regime of nuclear transitions has long been recognized. Yet, only the tip of the iceberg has been probed by gamma-ray telescopes to-date, due to a lack of sensitivity. A future "Advanced Compton Telescope" (ACT) could boost this field by improving sensitivity 100-fold over current instruments. We are working on advancing the liquid xenon time projection chamber (LXeTPC) technology to combine the uniq advantages of this detector type (large homogeneous sensitive volumes with a minimum of electronics channels and hence power, high efficiency, radiation hardness, low background, etc.) with the spectroscopic requirements of the ACT. Rapid advances in UV photosensor technologies have opened new opportunities for the successful development of a LXeACT. These are: (a) Improvement of energy resolution by combination of ionization and scintillation signals. (b) Application of time-of-flight in a compact telescope configuration. We report on the status of our current R&D program, which includes characterization of novel photosensors, such as APDs and Geiger-mode APD pixel arrays (SiPMs), inside LXe.

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