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Novel ion trap design concept as a LAr purity monitor

Liquid Argon Time Projection Chambers (LArTPCs) are precision particle detectors whose performance depends on the non-attenuation of ionization electrons produced by the charged particles that cross their volume, which must drift up to several meters before being collected. For this to happen, the LAr used as active volume must be extremely pure of electronegative impurities that could absorb the ionization electrons. Thus, it is fundamental to monitor the LAr purity at all times during detector operation. This work presents a new design concept for a technology to monitor LAr purity that consists of trapping ions within a volume of the LArTPC and estimating LAr purity based on the time the population of ions remains trapped. Early results of a deterministic simulation of the physical behavior of barium ions confined by a RF trap submersed in LAr are presented. We explore in which conditions such ions remain stably trapped.

Mini-abstract

This work presents for which conditions an ion trap could be used as a LAr purity monitor.

Experiment/Collaboration

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