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New ideas on Photosensors & Electrodes for DARWIN, the Next-Gen LXe TPC

Xenon double-phase TPCs have proven so far to be one of the best techniques for direct dark matter and other rare event search. The success of this technology has been demonstrated by many experiments in the last two decades, the most recent example being the results of XENONnT and LZ presented in July 2022.

INFN groups, while fully committed to the successful operation of the XENONnT experiment at LNGS, are also looking towards the next generation xenon-based dark matter experiment, DARWIN, with an O(50 t) in the Xe active target.

There are in particular two main experimental challenges: electrode and photosensor technology.

Electrodes must be designed by optimizing their performance when high voltage values are applied while maintaining high transparency, qualities that together guarantee excellent resolution and low threshold on the detected light signals.

Photosensors must be sensitive to the Xenon scintillation light, and have low radioactivity and low occurrence of spurious events, such as after-pulses and dark current, to allow reaching low thresholds.

In this talk, we will briefly present the R&D activities that we plan to carry out on photosensors and electrodes.

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