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Innovative electrodes for xenon based dual-phase time projection chambers for direct dark matter detection

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The direct detection of particle dark matter is one of the most compelling challenges of modern fundamental physics. Xenon based dual-phase time projection chambers (*DP-TPCs*) are the leading technology for Weakly Interacting Massive Particles (*WIMPs*) search. The *DP-TPC* approach proved to be reliable, highly sensitive, intrinsically low-background and especially easily scalable until an active volume of few *tons*. However, when scaling to even larger masses other challenges show up, such as the requirement of a stronger drift field and the more stringent mechanical constraints for the larger needed electrodes. This work is based on the realization of transparent conductive layers deposited on a transparent support (*UV* grade fused silica window), that could possibly solve the difficulties related to the realization and correct functioning of the very large electrodes needed for the next-generation *DP-TPCs*. So far Indium-Tin-Oxide (*ITO*), Al_2O_3-doped Zinc-Oxide (*AZO*) and *Graphene* thin films were already designed, fabricated and preliminarily characterized in collaboration with the *CREO* laboratories (in L'Aquila). Currently, other layer materials and deposition techniques are under investigation. A liquid xenon single phase *TPC* of small dimensions is currently being installed at *Laboratori Nazionali del Gran Sasso* of *INFN*. This work focuses on the characterization results of the transparent conductive layers to evaluate their performances in this test facility.

Collaboration

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Role of Submitter

I am the presenter

Primary authors: Dr RAZETO, Alessandro (INFN - LNGS); Prof. FERELLA, Alfredo Davide (Università degli Studi dell'Aquila and INFN); MELCHIORRE, Andrea (Università degli Studi dell'Aquila and INFN); Prof. MACOLINO, Carla (Università degli Studi dell'Aquila and INFN); FERRARI, Cecilia (GSSI and INFN); DI DONATO, Chiara (Università dell'Aquila / INFN); Dr MESSINA, Marcello (INFN - LNGS); GROUP, for the PRIN 2022YYX3WJ

Presenter: DI DONATO, Chiara (Università dell'Aquila / INFN)

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