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PO FSE ABRUZZO
2007»2013 || OBIETTIVO
"Competitività regionale
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CFA lecture series

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Noble Liquid Detectors for Dark Matter Search

- ABSTRACT-

Noble Liquid Detectors for Dark Matter Search Noble liquid detectors, using liquid xenon (LXe) and liquid argon (LAr) in particular, are leading the search for interactions of WIMP dark matter in laboratory-based experiments. This is achieved through the combination of a large, monolithic dark matter target of a very low background with three-dimensional localization of the interaction vertex, which allows for target fiducialization and multiple-scatter rejection. The background in dual-phase time projection chambers (TPCs) is further reduced by the simultaneous measurement of the scintillation and ionization signal from a particle interaction, which is used to distinguish signal from background signatures, as well as through pulse shape discrimination of the scintillation signal. I will review the properties of LXe and LAr, the mechanisms of ionization and scintillation and the principle of operation of single phase and dual-phase detectors. I will also provide an overview of the various dark matter experiments worldwide which are based on noble liquids.

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JULY 14, 2014 – 2:30 PM