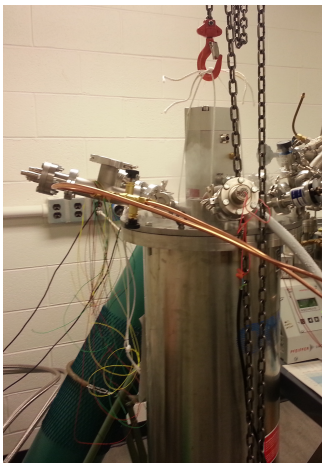
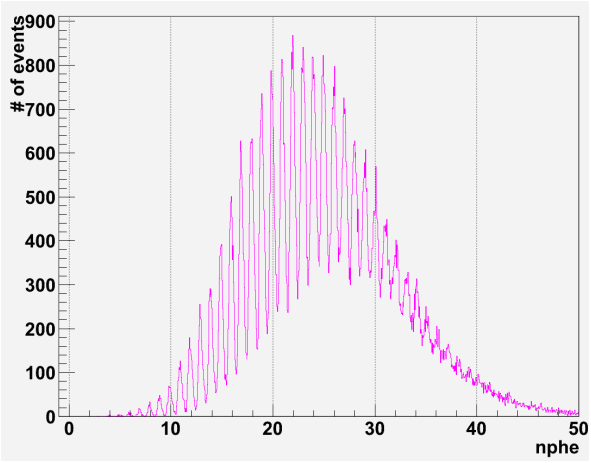
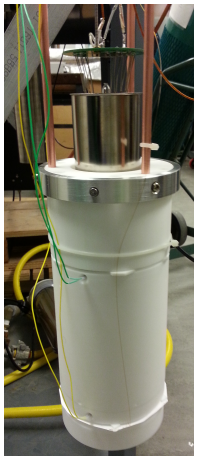
TESI DI LAUREA

Rivelatori ad argon liquido per la fisica astroparticellare

Istituto Nazionale di Fisica Nucleare





# GAP-TPC: a prototype noble liquid detector with very high performance photosensors

Liquid noble gas radiation detectors with energy threshold on the keV energy range are of interest for dark matter searches, measurement of coherent neutrino scattering and other low energy particle physics experiments.

Current noble liquid detectors use cryogenic photomultipliers for the accurate measurement of scintillation light from liquid argon (128 nm shifted to 420 nm) and liquid xenon (170 nm). Recent technological advances and relevant developments in photon detection allow for a substantial innovation of these detectors.

The high detection efficiency and excellent single photoelectron response of SiPMs make them an attractive alternative to photomultipliers for light readout systems of noble liquid detectors. Additional advantages are the much lower intrinsic radioactive background and smaller mass.

This thesis work will consist in developing a new prototype of liquid argon Time Projection Chamber for dark matter detection and low energy particle physics, based on the use of silicon photodiodes operated in the Geiger mode (GAP-TPC).

During the thesis work the student will design, construct, assemble and operate a prototype detector at the INFN Napoli cryogenic laboratories. The full characterization of the performance of this innovative detector is the objective of the thesis.

CONTATTI
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