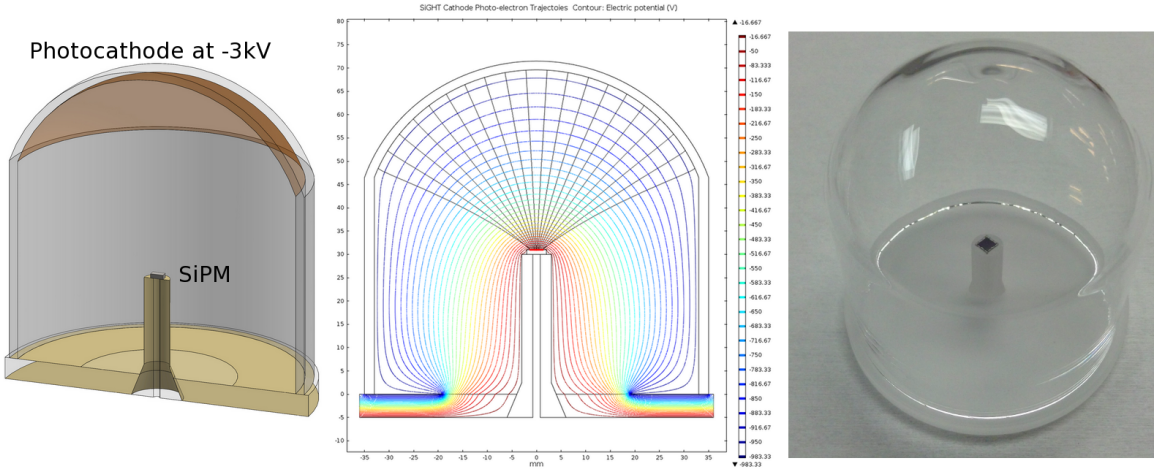
TESI DI LAUREA

Sviluppo di fotosensori innovativi per applicazioni criogeniche



SiGHT: an innovative low background cryogenic hybrid photosensor

A modern, cheap, high performance, cryogenic photodetector is being developed in collaboration with the University of California Los Angeles (UCLA).

The new photosensor concept, called the Silicon Geiger Hybrid Tube (SiGHT), is characterized by ultralow levels of radioactivity and high performances at low temperature, matching the needs of next generation noble liquid experiments for rare event searches.

SiGHT conceptual design builds on the advantages of a large surface innovative photocathode in combination with the unrivalled photon counting capabilities of the SiPM, further enhanced in the cryogenic environment.

The working principle of the device is simple: an incident photon goes through the fused silica dome, is converted by the photocathode into a photoelectron which is drifted and focused on the SiPM thanks to a few kV potential applied between the photocathode and the silicon device. The photoelectron enters the Si device producing an avalanche with a gain up to $5x10^6$ independent of the HV potential.

One of the key developments that will allow to meet the SiGHT targets is the production of a high efficiency photocathode overcoming the traditional limitations set by the high resistivity of conventional bialkali materials at low temperature by the use of graphene or oxide films. Any of these solutions will represent a major breakthrough in the cryogenic photocathode manufacture.

The research will be carried out in the INFN and CNR-SPIN laboratories. It will involve the development of the deposition techniques as well as measurements of the photocathode performances.

CONTATTI
Prof. Giuliana Fiorillo
giuliana.fiorillo@na.infn.it
081-676269

CONTATTI
Prof. Giampiero Pepe
gpepe@na.infn.it
081-676233