

11th International Workshop on Ring Imaging Cherenkov Detectors (RICH2022)



Contribution ID: 69

Type: **presentation**

Progress on coupling MPGD-based photon detectors with nanodiamond photocathodes

Friday 16 September 2022 11:25 (25 minutes)

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A Bari-Trieste Collaboration

Abstract:

Hydrogenated nanodiamond grains represent an alternative to CsI for detection of single VUV photons in gaseous detectors. A dedicated R&D study on the performance of nanodiamond photocathodes coupled to THGEM-based photon detectors is ongoing.

The first phase of these studies includes the comparison of QE in vacuum and in gaseous atmospheres and measurement of aging effects under irradiation and exposure to moisture: promising values for the VUV sensitivity and high robustness have been observed.

The second phase consists in the characterization of the performance as electron multipliers of THGEMs coated with a variety of nanodiamond photoconverting layers: preliminary encouraging results from the ongoing systematic studies have been obtained.

For the third phase, a photon detector prototype with hybrid Micromegas and THGEMs architecture has been built and equipped with hydrogenated nanodiamond photocathode on the first THGEM layer.

We report on the status and perspective of this R&D programme.

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Session Classification: Photon detection techniques for Cherenkov counters

Track Classification: Photon detection techniques for Cherenkov imaging counters