

Nanodiamond photocathode for MPGD-based single photon detectors at the future EIC

Tuesday 26 May 2020 12:12 (18 minutes)

The construction of a RICH detector for high momenta hadron identification at the future Electron Ion Collider is challenging: the compact detector setup imposes a short radiator, limiting the number of photons. A windowless RICH operating in the far UV region is a possible choice. CsI is a widely used photo-cathode (PC) for far UV photons, but it is hygroscopic, delicate to handle and its Quantum Efficiency (QE) degrades in high intensity ion fluxes.

Layers of hydrogenated diamond nano grains have recently been proposed as an alternative PC material and shown to be promising: they are less delicate than CsI and have good sensitivity in the far UV region.

THGEMs coated with nanodiamond PC have been characterized in a dedicated R&D: the effective QE in different gaseous atmospheres has been compared to the QE in vacuum and the robustness of the PC against ion bombardment has been studied.

The approach is described in detail and all results of this exploratory phase are presented.

Funding information

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Session Classification: Sensors: Photo-detectors

Track Classification: Sensors: Photo-detectors