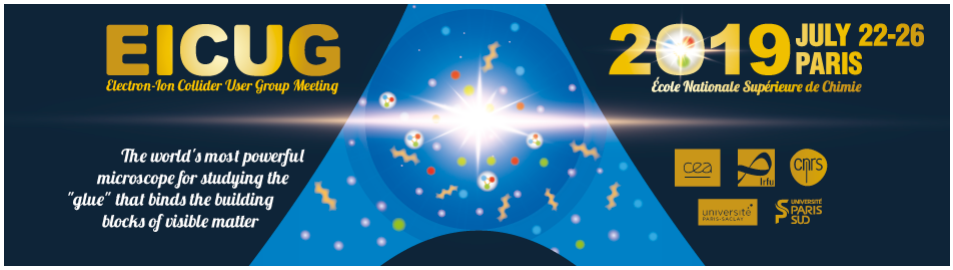

ID de Contribution: **30** Type: **Oral presentation**

Development of a modular mini-pad gaseous photon detector for RICH applications at the EIC

jeudi 25 juillet 2019 09:00 (15 minutes)

EIC Experiments require excellent hadron identification, over a broad momentum range, in harsh conditions. A RICH capable to fulfill the PID requirements of the EIC could use MPGD-based Photon Detectors (PDs) with solid photocathodes. This technology allows covering large surfaces at affordable cost, provides good efficiency, high resolution and compatibility with magnetic field.

PDs based on the coupling of THGEMs and Micromegas have been successfully operated at the RICH-1 detector of the COMPASS Experiment at CERN since 2016. A similar technology could be used for a RICH at the EIC, provided a large improvement in the photon position resolution is achieved. An R&D effort in this direction is ongoing at INFN Trieste.

Prototypes with small pixel size (down to 3 mm x 3 mm) have been built and tested in the laboratory, using X-Ray and UV light sources.
A modular mini-pad PD with 100 mm x 100 mm active area has been tested at the CERN SPS H4 beamline in October-November 2018. Cherenkov photons were produced in a fused silica radiator in front of the detector and converted by a CsI-coated THGEM. A second THGEM and a Micromegas acted as further electron amplifiers. Signals were registered via an APV-25 based front-end by a Scalable Readout System (SRS) DAQ with a dedicated software.

The characteristics of the prototype are described and the main results of the laboratory and beam tests are presented.

CsI is the most widely used photo-cathode for gaseous detectors of single photons, but it is hygroscopic and delicate. A search for a novel photo-cathode material with similar sensitivity in the far ultraviolet region and increased robustness against aging and exposure to air is ongoing.

Layers of hydrogenated diamond nano-grains have recently been proposed as an alternative photo-cathode material and shown to have promising characteristics. The performance of nano-diamond photo-cathodes when coupled to THGEM-based detectors are the objects of a dedicated R&D program. Preliminary results on these studies are reported.

The perspectives of these R&D programs are discussed.

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