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Status and progress of the novel photon detectors based on THGEM and hybrid MPGD architectures

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We are developing large size THick GEM (THGEM)-based detectors of single photons, mainly meant for Cherenkov imaging applications. The R&D programme includes the complete characterization of the THGEM electron multipliers, the study of the aspects related to the detection of single photons and the engineering towards large size detector prototype. Our most recent achievements include: dedicated studies concerning the ion backflow to the photocathode; relevant progress in the engineering aspects, in particular related to the production of large-size THGEMs, where the strict correlation between the local gain-value and the local thickness-value has been demonstrated and a 300 cm x 300 mm² active area detector has been successfully operated at the CERN PS T10 test beam; the introduction of a new hybrid detector architecture offering promising indication, which is formed by a THGEM layer which acts as CsI support and pre-amplification device followed by a MICROMEGAS multiplication stage. We report about the general status of the R&D programme and, in detail, about the recent progress.

Presenter: TESSAROTTO, Fulvio (Universita e INFN (IT))

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