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First tests of a RICH detector consisting of a matrix of CsI coated Thick GEMs

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In the framework of the ALICE VHMPID project we have built a RICH detector prototype consisting of a matrix of six triple CsI coated TGEMs each of them having an active area of 10x10cm^2. As a radiator in first tests we used C_5F_{14} in order to correctly compare the TGEM efficiency with the CsI-MWPC efficiency which we used as a reference. One triple TGEM has been placed behind the liquid radiator with the aim to detect the beam particles whereas the other five have been positioned around the central one, at a distance to collect the Cherenkov photons.

In this report, we present the results of a series of exhaustive laboratory tests of this prototype carried out using UV light and electrons from ^{90}Sr: the TGEM geometry optimization, the gas optimization, gas gain measurements in various conditions , the identification of the spark-less zone of the TGEM operation while detecting single photoelectrons and MIPs simultaneously, an evaluation of the CsI quantum efficiency, TGEM efficiency mapping with high position resolution, operational stability with time etc. The main focus, however, will be on first promising results of tests with a beam of charged pions and their preliminary analysis. The achieved results prove the feasibility of building a large area Cherenkov detector consisting of a matrix of TGEMs. We believe that such detectors represents an attractive option for the ALICE RICH upgrade detector which is under study

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