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Single photon test bench for series tests of HAMAMATSU H12700 MAPMTs*

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The CBM experiment at FAIR, Darmstadt, has recently bought 1100 HAMAMATSU H12700 photon sensors to equip the photon detection plane of the CBM RICH detector. Delivery of these MAPMTs just started, and will continue until mid 2017.

This MAPMT features a clear single photon peak ($PV > 1.5 : 1$) at high efficiency (peak quantum efficiency (QE) $\geq 30\%$) whilst having relatively low noise (< 6.4 kHz).

The H12700 was confirmed to be the best choice for these two Cherenkov detectors undergoing a longterm R&D phase also defining selection criteria for the bought MAPMTs.

An automatized single photon scanning test bench has been developed in order to efficiently test and characterize every single MAPMT soon after delivery, and to provide constant feedback to the manufacturer on quality and efficiency of the delivered tubes, allowing for further optimizations in the manufacturing process. The test bench consists of a pulsed LED light source (460 nm), connected to a XY stepper motor table, the MAPMTs are read out using a self triggered readout scheme based on the nXYter ASIC.

This setup allows to derive all important performance characteristics, like single photon efficiency, gain, dark noise, afterpulsing, cross talk, and gain deviation, from a single scan data set.

By September 2016, more than four hundred MAPMTs will be measured, providing interesting data on the stability and variances of the production process.

On the poster, we describe the design of the MAPMT test bench, and present results of all measured MAPMTs.

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Registered

Yes

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