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Further studies on the position-sensitive THCOBRA for imaging purposes

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The THCOBRA [1] consists on a hybrid device combining characteristics of a THGEM and a MHSP in one single structure. The structure presents two multiplication stages allowing to reach the high gains needed to use resistive line readout methods. The 2D-THCOBRA structure used has an active area of about 10×10 cm². The 2D-THCOBRA have shown a fair energy resolution capability of about 22% (FWHM) for 5.9 keV, and a charge gain above 104 in Ne/5%CH₄ [2]. For 2D-imaging, two orthogonal resistive lines are located at the end of the electrodes in both sides of the structure for position sensitivity. The charge is collected in the edges of each resistive line and then the resulting four signals amplitude are digitized and processed to allow visualizing the resulting images. Also, from the amplitude of each pair of signals it is possible to determine the centroid of the electron avalanche distribution. Imaging capability of this device was recently studied and is described in reference [2]. Although, in that case, the position resolution was limited to about 2.5 mm due to the high photoelectron range in the present mixture (Ne/5%CH₄). A recent study using a CsI photocathode and a 2D-THCOBRA structure [3], has achieved a spatial resolution below 0.4 mm for single photoelectron. A charge gain evaluation of the THCOBRA for different pure gases and gas mixtures more suitable for imaging purposes, as well as an evaluation on the count rate allowed by this device and a study of its stability for each of the filling gases used, will be presented together with its image capability.

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