Contribution ID: **146** Type: **Contributed Talk**

MHSP with position detection capability

Friday 16 September 2005 11:30 (15 minutes)

MicroHole and Strip Plate detector (MHSP) has an intrinsic capability for position detection. This new gaseous multiplier conceived as a combination of an MSGC and GEM in a single, double sided element, integrates two successive independent stages of charge amplification, a GEM-like hole-avalanche and an MSGC-like anode-strip avalanche. Like the GEM, the MHSP is fabricated with printed circuit board (PCB) technology from a 50-μm Kapton film, metallized with 5-μm-thick copper-layers on both sides. On the top-side, a GEM-like pattern of holes is etched through, where on the bottom side a standard microstrip pattern is etched, with the holes centred on the cathode strips and the anodes running between them.
The MHSP achieve gains higher than 10ˆ4, and a ratio between top and anode signal of about 0.3, allowing measuring the charge signal produced on both sides with good efficiency. The first implementation of a position sensitive readout for this new detector is described and tested. The readout consists of a resistive layer crossing the anodes and connected to a preamplifier, on each side. By weighing the charge pulses on both preamplifiers it is possible to determine the interaction point. The second coordinate is attained by structuring the top side of the MHSP with individual strips and using a resistive layer orthogonal to the strips. A 100-ohm resistance layer between consecutive strips was found to be the best compromise between position linearity and energy resolution.
Preliminary results using 22-keV x-rays presents a good linear trend between the measured and the actual position, with a deviation of about 0.8 mm. The performance of the MHSP position detector will be presented and discussed for 1D and 2D readout.

References, e.g.
[1]-A proposed new microstructure for gas radiation detectors: the Micro-Hole-and-Strip Plate, J.F.C.A. Veloso, J.M.F. dos Santos e C.A.N. Conde, Review of Scientific Instruments, Vol. 71, 6(2000)2371-2376.
[2]- Progress in MHSP gaseous electron multiplier operation, J.M. Maia, D. Mörmann, A. Breskin, R. Chechik, JFCA Veloso, JMF Dos Santos, IEEE Transactions on Nuclear Science Ns-51 (2004)1503-1508.

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Session Classification: S15 : Novel Gas-based Detection Techniques

Track Classification: Novel Gas-based Detection Techniques