

5 - 4 A Normal-pressure MWPC Detector for Position Measurement of Intermediate and High Energy Radioactive Ions at RIBLL2

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A normal-pressure MWPC detector for position measurement of intermediate and high energy radioactive ions at RIBLL2 has been fabricated, which has a sensitive area of 75 mm×100 mm and contains of three wire planes.

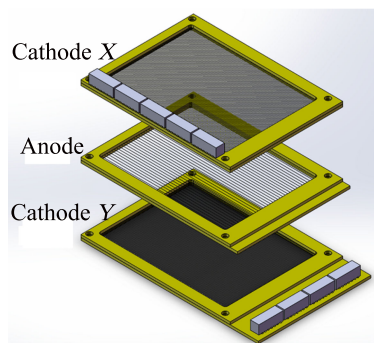


Fig. 1 (color online) Layout of the MWPC wire planes.

Fig.1 shows the layout of the MWPC wire planes. The anode plane is sandwiched between two cathode planes, and the anode-cathode spacing is 4 mm. The anode plane consisted of 15 μm gold-plated tungsten wires with a pitch of 2 mm. The cathode planes X and Y , made of 60 μm stainless steel wires with a pitch of 0.5 mm, and every adjacent four wires are soldered together to form one readout strip of 2 mm in width. The wire directions in X and Y are orthogonal to each other, the wire direction in anode is parallel to the wire direction in Y .

All the anode wires are soldered together and only one fast signal output by AC coupling from the high voltage line is provided to trigger the data acquisition system. The typical potential applied to the anode plane is 1.8~2.5 kV, the readout planes X and Y are on ground.

For extracting the signals from the cathodes, the commercial 10 taps DIP delay line modules 1520A-400-500 from 3D company are employed. 5 and 4 modules are used for X and Y cathode plane respectively.

The performance of the assembled MWPC has been tested with a 5.9 keV X-ray ^{55}Fe source. Fig.2 shows the X and Y spectra of X-rays emitted from ^{55}Fe source.

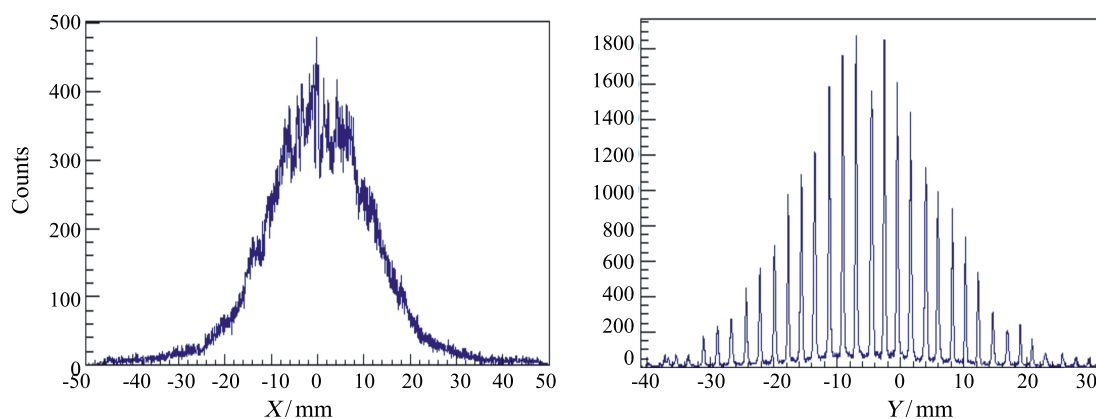


Fig. 2 (color online) Position spectra of X and Y tested with ^{55}Fe source.

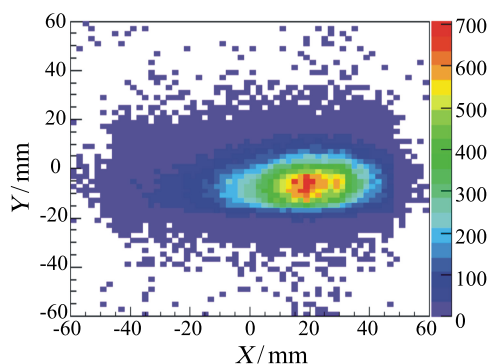


Fig. 3 (color online) Two-dimensional scatter plot of the fragmentation products.

The positions of the intermediate and high energy radioactive beam ions were measured on the second focus plane of RIBLL2 using fragmentation products with Z around 7 from the $^{18}\text{O}+\text{Be}$ reaction at 400 MeV/u. Fig. 3 shows the two-dimensional position spectra of the fragmentation products.

During the tests, the MWPC was operated at a high voltage of 2.5 keV under normal pressure with the gas flow mode. The flowing gas is a mixture of 80% Ar and 20% CO_2 .