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Two-dimensional position sensitive ionization chamber with GEM

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HIDEAKI TAKAO, YASUTAKA NISHIO, Kyushu University — We have been
developing a multi-anode ionization chamber for Accelerator Mass Spectrometry
(AMS) at Kyushu University. Furthermore, we are planning to construct a neutron
detector with high position resolution by combining the chamber with Gas Electron
Multiplier (GEM) and a neutron converter. One of purposes is the measurement of
$(\vec{p},pn)$ knockout reaction from unstable nuclei. The multi-anode ionization chamber
is composed of subdivided multiple anodes, a cathode to produce an uniform electric
field, and a Frisch grid. The chamber must have position sensitivity because obtain-
ing a beam profile is required for AMS measurements, where counting loss should
be avoided. Also in the case of the neutron detector, it is necessary to measure
the position to deduce the scattering angles. We have recently established a two-
dimensional position readout system by the following methods: the measurement of
horizontal position is enabled by trimming some anodes into wedge-like shape, and
vertical position can be determined by the ratio of induced charge on the grid to
the total charge on anodes. In addition, improvement of S/N ratio is important for
isotope separation and position resolution. We installed a rectangular-shaped GEM
and tried improving S/N ratio by electron amplification.

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