Contribution ID: **38** Type: **Poster**

Measurement of MICROMEGAS gaseous detectors on Synchrotron Radiation

With the continuous development of the micro-structure of gaseous detectors in recent years, a lot of the new detection requirements have been proposed in synchrotron radiation facility. To get the stable working time, lower discharge rate with long working term and higher effective gain, the new structure detector has been designed. One structure was based the coated Ge resistive anode readout with bulk Micromegas detector, and the other structure was combined with the detection's advantages of Micromegas and gas electron multiplier (GEM), which was composed of a Micromagas chamber with one GEM foil as preamplifier. In this paper, the two structures of the detectors and detection principles were presented in details. Using a 55Fe X-ray radioactive source in the operation mixtures gas of argon and isobutene (Ar/Iso=95/5), the performances of the detector gain, discharge rate, energy resolution and stable working time are investigated. A further measurement in the four operation mixtures gas has been accomplished at 1W1B laboratory of Beijing Synchrotron Radiation Source. In the experiment, the energy range of X-ray was set from 6 keV to 20 keV and the setting step was 1 keV. Finally, the data of beam test were obtained and analyzed. The preliminary results show that a stable working time could reach more than 30 hours of continuous work, the gain of the detector could exceed 10^6 and the discharge rate could be reduced by nearly 100 times at the same gain.

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Track Classification: Sensors: 1c) Gaseous Detectors