Contribution ID: **37**   Type: **not specified**

Application of 2D-GEM with Strip Readout in Synchrotron Radiation

Monday, 1 July 2013 16:45 (1h 10m)

With the faster time data acquisition system and micro-structure GEM gaseous detector, the two-dimensional position sensitive X-ray detection system based 704 electronic channels has developed in Institute of High Energy Physics in the past few years. There were 267 readout strips of 0.l93mm width and the pitch of strips was 0.752mm in X direction. In Y direction, there were 437 readout strips of 0.355mm and the pitch of strips was 0.457mm. To adjust the time search window, the peak information of the signal would be obtained after the signal of strip amplified by the charge sensitive electronic and digitized into FPGA module. Finally, the two-dimensional position of original ionization point would be got by the adjacent strips distribution information of the center of gravity method. The detection system has the active area of 200mm×200mm, the position resolution less than 200μm(Full Width Half Maximum) and effective readout time less than 20μs. From 8keV to 18keV of ! the X-ray energy, the detection system could be used to get the two dimensional imaging. The diffraction imaging measurement of the sample of SiO2 crystal has done in synchrotron radiation experiment terminal。 The study of another detector will also be reported. Used GEM as primary electronic amplifier, "GEM+Micromegas"detector could avoid the disadvantage of the last GEM film's discharge to damage, but also could set the the Micromegas working voltage lower and reduce the discharge or spark. It has stable working time in the same gain and can achieve higher gain performance (> 106). The study of "GEM+Micromegas" detector has done in synchrotron radiation in the X-ray energy range of 6keV ˜ 20keV, the stable performance and the energy resolution that was from10% to 25% has been obtained.

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Session Classification: Monday (poster session)