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# Comparative study of position resolution and gain map of Single and Double GEM

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Gas Electron Multipliers (GEM) are well known for their excellent position resolution, high rate handling and discharge handling capability among Micro-Pattern gaseous detectors (MPGDs). GEM detectors are used for large scale tracking and imaging application of charge particles like muons. The GEM detectors consist of GEM foil which acts as amplifiers and different combinations of these foils are used depending upon the applications. In the current work, experiments have been conducted to study the position resolution and gain uniformity for different combinations of the GEM detector. The GEM detector consisting of 10 by 10 cm standard GEM foils were used for this purpose with single and double foil configuration. For data collection and processing a Scalable Readout System (SRS) has been used, collecting data from four APV25 front-end boards. The readout has 256 readout strips each in x and y planes which were connected to APV25 front-end boards through 130 pin Panasonic connectors.

For position resolution measurement a Fe-55 soft x-ray source has been attached to AEROTECH PRO165 3-Axis XYZ Linear Stage with 0.5 μm resolutions. The source has been moved with a step of 50 μm in both x and y direction diagonally and the change in position obtained from the detector is used to determine the position resolution. The experiment has been carried out with single and double GEM and comparative studies have been carried out. The gain varies drastically from one configuration to another and similar behavior has been observed in the charge spread data. To obtain position a Center of Gravity method has been used which gives better result once the number of strip hit is high enough for it to work. As a result, the results from double GEM were better than the single GEM. The gain uniformity data was collected by moving the source across the detector and was found to be within ±12% range.

## What is your experiment?

Particle Tracking

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