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Long Term Multiplication Behavior Studies of the 30cmx 30cm prototype Gas electron Multiplier YING WUN YVONNE NG, JAEHOON YU, SEONGTAE PARK, ANDY WHITE, University of Texas at Arlington, UTA HEP TEAM — The Gas Electron Multiplier (GEM) technology is one of the next generation radiation detector technologies that utilized the ionization in gaseous medium and the electron avalanche to detect a magnified charge value from various radiation and charge particles. With its low building cost, low discharge rate and high resolution, GEM is currently being considered to be one of the candidate gap detectors for the International Linear Collider (ILC) in Japan. It is therefore of crucial for us to study the long term stability of amplification power of the detector. Using cosmic radiation as our radiation source, data has been taken continuously in the past 2 years by the high energy physics group in University of Texas at Arlington to characterize the stability of the 30cmx30cm detector. Effect of atmospheric pressure to the detector amplification is eliminated by a correction algorithm. Noise study has been done to eliminate excessive noise produced by the detector as well as its readout chip. Result shows that the detector gives us a stable 35fC average MPV for the cosmic MIPs with few fC of chamber noise and about 0.5 of chip noise. GEM should work well as a digital calorimeter for uses in the ILC project.

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