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**Seasonal Dependence and Aging Effect of GEM Prototype for the SiD in the ILC** YVONNE NG, JAEHOON YU, ANDREW WHITE, University of Texas at Arlington, UTA ADVANCE DETECTOR TEAM — High energy physics experiments require detectors and electronics that are capable of high precision, stable energy read out. Since 2007, the Advance Detector team in University of Texas at Arlington has been working on the Gas electron multiplier (GEM) detector technology. The detector technology utilizes the avalanche effect of charged particles in high electric field to magnify hadron signals produced in collision for precise and accurate energy interpretation. KPix is a multi-channel 13 bits electronic chip designed for the time synchronous requirements of the Silicon Detector (SiD) in the International Linear Collider (ILC). The chip is coupled with GEM in this experiment to study the aging of the prototype 30cmx30cm detector. In this study, cosmic ray is used as a source to study the gain fluctuation of GEM over a period of 3 years. Statistics methods are implemented to investigate the seasonal dependence of the gain of the signal. Also, the self-trigger mode of KPix v.9 enable the study of the electronics through the chip's electronics gain variation. Results over 3 years shows that GEM is capable of stable data read out with little aging effect. The study provides invaluable information of the detector on its stability as a calorimeter.

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