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Long-Term Stability Gas Electron Multiplier Radiation Detector with One-Bit Digital Readout SAMANTHA LACOMBE, SEONGTAE PARK, AMIT BASHYAL, BLAKE WATSON, YVONNE NG, University of Texas at Arlington, CALICE COLLABORATION — High Energy Physics (HEP) is the field which investigates the most fundamental particles in the universe using high-energy particle accelerators in an attempt to understand the forces between them. Thus far, the Standard Model describes many of the interactions we observe; however, it is not a complete theory and there is a push to further accurately characterize these particles. For this, future particle accelerator experiments require very precision energy measurement device, the calorimeter. The University of Texas at Arlington's (UTA) HEP group developed and tested three 30cmx30cm prototype Gas Electron Multiplier detectors (GEM) as a viable instrument to carry out such measurements. Two cascaded GEM foils amplify electrons stripped from the Ar-CO2 gas in the chamber while the voltage across the chamber directs the signal to a readout board. The detector provides a high rate of particle detection and can withstand high radiation environments. Determining GEM detectors operational behavior and stability over a long time period is critical to implement the technology. The GEM detector has been exposed to various radiation sources during testing, but to accurately depict the long-term behavior it is important to consider experiments done only under similar conditions. In this talk, we present a long-term analysis to understand the stability of the GEM detector using the statistical method on cosmic ray data.

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