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High rate GEM readout and tracking for SBS

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Large areaGas Electron Multiplier (GEM) tracking detectors for the Super Bigbite Spectrometer (SBS) in Hall A at Thomas Jefferson National Laboratory (JLab) have been built at the GEM Detector Lab of the University of Virginia(UVa). The Proton Polarimeter Back Tracker of the SBS consists of 40 GEM modules, each with an active area of 60×50 cm^2. Given the open configuration of SBS, the background hit rates in the GEM modules is expected to be as high as 500 kHz/cm2. Correctly reconstructing the particle tracks of interest in this very high background conditions poses a challenging problem. Furthermore, moving and recording large amounts of data generated in the GEM modules at the required readout rate of a few kHz requires innovative solutions in data reduction and data transfer. In this presentation we report on the newly designed APV25 based fast GEM readout system for SBS and on the techniques to handle the high rate background.

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