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Status of GEM trackers for Super Bigbite Spectrometer in Hall A for 12 GeV CEBAF Upgrade at JLab

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The Continuous Electron Beam Accelerator Facility (CEBAF) of the Thomas Jefferson National Laboratory (JLab) has been upgraded to deliver 12 GeV high intensity beams. The upgrade will allow outstanding study of nucleon structure and structure functions in the valence quark region with an unprecedented accuracy. The Super Bigbite Spectrometer (SBS) combines a large acceptance detector package with a dipole magnet located close to the target, to provide a large solid angle for high luminosity experiments in Hall A. The SBS, however, requires very high counting rate detectors with excellent spatial resolution to cope with the large background rate and excellent momentum resolution of the detected recoil protons. With high counting rate and excellent spatial resolution capabilities, of around 70 microns over large area, the GEM technology has been adopted for the for the three tracker station of the SBS.

We will give an overview of the status of the SBS GEM trackers, highlighting the achievements over the past years in term of the overall performances of the prototypes and spatial resolution studies from test beam. We will discuss the lessons learned from the challenges imposed by requirement of large area and low mass GEM detectors for the operation in high background environment and will report on the ongoing production of large area SBS GEM modules. Finally, we will present the latest developments on the APV25-based Multi-Purposed Digitizer (MPD) readout electronics for the SBS GEM trackers.

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