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Development of a New Silicon Tracking Station for the BM@N Hybrid Tracker

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A new silicon tracking station has been developed and implemented as part of the upgrade of the BM@N experiment's tracking system at the Nuclotron, aimed at studying heavy-ion collisions. The station is based on CBM-BM@N–type double-sided silicon microstrip modules equipped with high-rate streaming readout electronics using STS-XYTER chips. Signal routing is realized via ultra-lightweight (0.23% X_0) flexible aluminum cables connected through TAB bonding (Tape Automated Bonding).
Performance of the modules was validated in a series of beam tests at the SC-1000 accelerator (PNPI, Gatchina), demonstrating a spatial resolution of 15.4 μm, a signal-to-noise ratio above 21, and a detection efficiency of 99% for 1 GeV protons. The system is capable of operating at trigger rates up to 78 kHz and occupancies up to 360 kHz·s^{-1}·cm^{-2}.
The station consists of six modules mounted on a low-mass fiberglass frame, located 7 cm downstream of the target, and operates in conjunction with FwdSi and GEM detectors to provide high-precision track reconstruction. Integration with the BM@N data acquisition system is achieved using FPGA-based data buffering and real-time event selection within a configurable trigger window.

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