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Performance and Upgrade of Trigger Detectors for the BM@N Experiment

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A system of trigger detectors was developed and successfully operated in the BM@N experiment during the 2023 run with ^{124}Xe ions at 3.8 AGeV and beam intensities up to 10^6 ions per spill. The trigger beam counters are based on thin scintillators and specialized photomultiplier tubes that provide good pulse-height resolution and picosecond timing in the strong magnetic field of the BM@N magnet. Operational experience from this run enabled an evaluation of the trigger system's performance, its time and amplitude response, and the effect of radiation damage in scintillators. The results of these studies provided important feedback for further development of the trigger system.

Following the run, the system underwent a comprehensive upgrade to improve signal quality as well as the mechanical stability and maintainability. A redesigned mechanical configuration was implemented in the trigger beam counters to minimize the material in the beam path. The design ensures efficient light collection and allows precise alignment and rapid replacement of the scintillators. Evaluation of the upgraded system's performance is planned for the next run later this year. This contribution presents the improved detector design and its integration into the BM@N setup.

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