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The performance of a beam-beam monitoring detector (BeBe) for MPD-NICA

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The QCD phase diagram was explored in certain regions of the parameter space by different experiments and a critical end point in this diagram is a theory-based prediction. In the Nuclotron-based Ion Collider fAcility (NICA) the Multipurpose Detector (MPD) is currently under construction intending to confirm this prediction. Motivated by the low trigger efficiency in low multiplicity p+p collision events given by the Fast Forward Detector (FFD) of MPD, a complementary detector is proposed (BeBe). BeBe is constituted of two hodoscopes (two plastic scintillator disks segmented in 80 cells) ±2m away from the interaction point of MPD. Based on Monte Carlo simulations, a discussion of the potential physics performance of the BeBe detector is given for triggering tasks and for the resolution in the determination of the event plane reaction and the centrality of the collisions at NICA. Also, laboratory measurements to estimate the time resolution of individual BeBe cell prototypes are presented. It is shown that the time resolution of an individual BeBe cell ranges from 0.47 and 1.39 ns depending on the number of photomultipliers attached to the cell. Our results suggest that the proposed BeBe detector can be used for beam monitoring in p+p and heavy-ion collisions at NICA energies with excellent trigger efficiencies for both systems [arxiv:2110.02506, already accepted for publication]. The experimental techniques and methods to determine the performance of BeBe will be described in this talk.

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