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Design of an E x B chopper based on permanent magnets

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Chopper systems are typically used to provide beam time structure and ensure the safety of accelerator operations by deflecting the beam away. The reliability of conventional chopper is entirely based on high-voltage (HV) pulsed power supplies, and when it fails to charge the electrostatic deflection plate, the beam cannot be cut off and will enters the downstream accelerator. To meet the strict beam stopping time requirements of the China Initiative Accelerator Driven System (CiADS), improvements in safety are necessary. To address this issue, a novel E × B chopper has been physically designed, which is based on a permanent magnet and an electrostatic deflection plate. This design ensures the safety of the accelerator while providing the necessary pulse waveform. The device is small and highly reliable, making it suitable for use in most accelerators. The device is small and highly reliable, making it suitable for use in most accelerators. Moreover, beam dynamics simulations of the chopper have been conducted to determine its influence on beam quality, and beam cutting capability analysis has been performed.

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Footnotes

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