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Design and experiment of an optimized eight-stripline beam energy and energy spread monitor

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In order to achieve nondestructive measurement and feedback of beam energy and energy spread for high repetition frequency Linac, an eight-stripline beam energy and energy spread monitor have been designed to replace destructive monitor sunch as fluorescent screen. Different from the conventional evenly arranged stripline structure, an unevenly arranged stripline layout is proposed to improve the sensitivity. At the same time, impedance transition structures are added to the Feedthroughs and striplines connection parts to further enhance the system sensitivity and resolution. The electronics adopts the method of separating the analog front-end and digital acquisition part from each other, and has the function of bunch-by-bunch measurement and data storage with a high repetition frequency of 1 MHz. The processing of the monitor has now been completed. Experiments show that the position sensitivity with an inner diameter of 63 mm reaches 0.0538 mm^{-1} , which is close to the theoretical result of numerical calculation. Compared with monitors of traditional structure, the performance has been greatly optimized.

Footnotes

Funding Agency

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Yes

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