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Development and performance evaluation of the cavity BPM system for SHINE

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The Shanghai high repetition rate XFEL and extreme light facility (SHINE) under construction is designed as one of the most advanced FEL facilities in the world, which will produce coherent x-rays with wavelengths from 0.05 to 3 nm and maximum repetition rate of 1MHz. To achieve precise beam trajectory measurement and stable alignment of the electron and photo beams in the undulator, the cavity beam position monitors (CBPM) including beam diameters of 35mm in LINAC and Bunch distribution section and 8mm in undulator have been designed and developed for the SHINE. The requirement of the transverse position resolution is better than $1\mu\text{m}$ and 200 nm for a single bunch of 100 pC, respectively. In this paper, we present the design of the cavity BPM system and the processing of the key equipment. The beam test bench has been established at the Shanghai Soft X-ray FEL facility (SXFEL), and preliminary beam experiments indicate that, with the bunch charge about 100pC, the position resolution of CBPM-35mm and CBPM-8mm is better than 330 nm and 70 nm, respectively.

Footnotes

Funding Agency

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Yes

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