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Experimental application of the multi-profiles method for the measurement of projected emittance at SXFEL

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High-brightness electron bunches with small transverse emittance are required to drive X-ray free-electron lasers (FELs). For the measurement of the transverse emittance, the quadrupole scan and multi-profiles method are the two most common methods. The quadrupole scan method is more flexible in freely choosing the data points during the scan, while the multi-screen method allows on-line emittance measurements. The latter is especially the case for high repetition-rate FELs, such as the SHINE, which offer the possibility of on-line diagnostics. The quad scan method that has been previously used by SXFEL to measure projected emittance is a more homogeneous and non-comparative way. Recently, algorithms and procedures for measuring projected emittance by the multi-profiles method have been developed and implemented, which can give the SXFEL more options for measuring projected emittance and improve the accuracy of measurements. In this paper, we present the latest results of the multi-profiles method of projected emittance measurement on the SXFEL, and compare it with quad scan method, further discussing the implementation of on-line diagnostics at the SHINE.

Footnotes

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