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Beam size measurement with gratings at BEPCII

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The vertical beam size measurement was carried out at BEPCII using a phase grating and an absorption grating based on the Talbot effect. Due to the partial coherence of the source, coherence length can be calculated by measuring the visibility decay of interferograms recorded at different distances behind gratings. The vertical beam size of $68.19 \pm 2 \mu\text{m}$ was obtained based on the relationship between coherence length and source size. A comparison of the vertical emittance derived from grating Talbot method and synchrotron radiation visible light interferometer method was presented to evaluate the method. The vertical emittances from two methods are $1.41 \text{ nm} \cdot \text{rad}$ and $1.40 \text{ nm} \cdot \text{rad}$ respectively. The 0.1% difference indicates the grating Talbot method for beam size measurement is reliable. This technique has great potential in small beam size measurement in the fourth-generation synchrotron radiation light source, considering its small diffraction limitation and simple experimental setups.

Footnotes

Funding Agency

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Yes

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