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Slice energy spread measurements in the european XFEL injector

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Optimising the slice energy spread in X-ray free electron lasers (XFELs) is key to their effective operation, and must be considered from the photoinjector at the very beginning of the machine. The standard approach, in which the measured beam size is entirely attributed to the product of the dispersion and the energy spread, has only a resolution on the order of several keV, meaning that a precise measurement in photoinjectors where the energy spread is predicted to be on the order of a few keV is challenging. However, recent techniques developed at SwissFEL, the Photo Injector Test Facility (PITZ) and at the European XFEL (EuXFEL) enable the slice energy spread to be determined with sub-keV precision. In this paper recent slice energy spread measurements at the EuXFEL are presented and contrasted with previous results. Furthermore its dependence on beamline parameters is explored. Finally, recent developments in the automation and simplification of the measurement procedure at the EuXFEL that allow for a broader investigation of the slice energy spread and its dependence on the beamline configuration are stated.

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Footnotes

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Yes

Primary author: WALKER, Stuart (Deutsches Elektronen-Synchrotron)

Co-authors: TOMIN, Sergey (Deutsches Elektronen-Synchrotron); Dr ZAGORODNOV, Igor (Deutsches Elektronen-Synchrotron)

Presenter: WALKER, Stuart (Deutsches Elektronen-Synchrotron)

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