

Physics and Applications of High Brightness Beams



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Measurement of the slice energy spread of the electron beam based on dispersion and on the optical klystron

We present measurements of the slice energy spread of the electron beam using two methods. The first and more standard way consists in measuring the slice beam size of the electrons in a dispersive location. The second method is based on the optical klystron mechanism, where the radiation produced in undulator modules is enhanced with magnetic chicanes between the modules. In this approach, the energy spread can be derived from the chicane strength giving maximum radiation output. The measurements have been carried out at the soft X-ray beamline of SwissFEL, Athos. Both methods gave equivalent results: an energy spread of around 1 MeV for electron peak currents between 2 and 3 kA. The results validate the measurement based on the optical klystron, which can be especially useful to reconstruct low energy spread values where the conventional approach may be resolution limited.

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