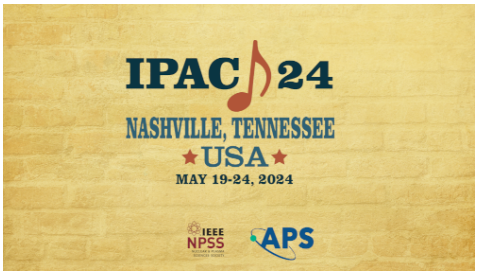

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Wakefield studies for an ultra compact X-rays free electron laser

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High flux, coherent hard X-rays constitute an efficient tool for applications in high resolution (sub nm) chip metrology which offers notable advantages to the modern semiconductor industry. A candidate source for such photons is represented by a recently proposed compact X-rays free electron laser (XFEL) based on high gradient cryogenic accelerating structures and short period cryogenic undulators. Moreover, such a design can be upgraded with the introduction of a regenerative amplifier scheme, known as XRAFEL, for increasing both the flux and the coherence of the Xray pulses. Unfortunately, the high performance obtained in the compact accelerating structures and undulator magnets are also accompanied by strong wakefields that can potentially introduce emittance dilution, large energy spread or even instabilities. In this paper we utilize a custom tracking code, MILES, to perform wakefield studies for the high brightness beam propagating in this machine. In particular, our analysis emphasizes the short-range and long-range beam break up interaction in the main linac as well as the energy spread introduced in the undulator system.

Footnotes

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