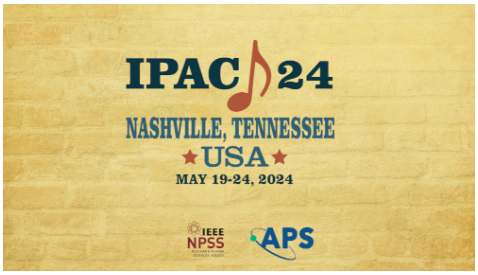

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Electron-emitted THz radiation optimized with a model-less algorithm

Monday, 20 May 2024 16:00 (2 hours)

The FERMI free-electron laser makes use of electron bunches in the 50 fs to 1 ps range. After the FEL process, the spent electron bunches are sent through a thin metallic foil placed in the main beam dump, where coherent transition radiation with THz frequencies is generated and transported to the TeraFERMI beamline. Intensity and spectral properties of those THz pulses strongly depends upon the transverse spot size and the temporal charge distribution of the electron bunch. As simulations revealed, the quadrupole setting in the dispersive region of the main beam dump impacts on the electron temporal distribution and consequently on the THz radiation. MIMOFB optimizers have been routinely used for fine tuning these quadrupoles and properly steering the beam trajectory to improve the TeraFERMI THz-intensity and minimize radiation doses in the dump region. A large campaign of measurements has been carried on during different machine configurations and user beamtimes, and the main results are presented in this paper.

Footnotes

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