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Dipole mode wakefields and beam dynamics tracking simulations for the UK XFEL main accelerating Linacs

Monday 2 June 2025 16:00 (2 hours)

The baseline design for the proposed UK XFEL (United Kingdom X-ray Free Electron Laser) facility includes main linear accelerating linacs, which are comprised of more than 500 9-cell TESLA style superconducting RF cavities, which will accelerate a 1 MHz repetition-rate electron beam comprised of 200 pC bunches up to an energy of 8 GeV. Here the TESLA cavities are simulated and the dipole modes excited by the beam are characterised in order to calculate the transverse long-range wakes. We track the particles through 1 km under the influence of these wakefields using the PLACET code and evaluate the transverse emittance dilution and the energy spread of the electron beam. Mitigation strategies are also explored to enhance the beam quality.

Footnotes

Paper preparation format

LaTeX

Region represented

Europe

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