



Contribution ID: 55

Type: Poster

Metrology in the R&D for a High Repetition Rate Multi User X-ray Free-Electron Laser User Facility

Under development at Argonne National Laboratory is a High Repetition Rate Multi User X-ray Free-Electron Laser user facility. The machine will be driven by an array of highly efficient compact collinear wakefield accelerators (CWA) where the Čerenkov radiation of a 400 MeV high charge drive bunch is used to accelerate a low charge witness bunch to 2 GeV to produce soft x-rays in the FEL. The CWA design is based on a cylindrical corrugated waveguide with a 2 mm internal diameter embedded into a focusing channel of quadrupole magnets with a 3 mm aperture. This poster presents metrology techniques utilized in the exploration of various fabrication methods for producing miniature corrugated Cu waveguide accelerating structures, as well as micro-alignment techniques for a compact quadrupole wiggler array.

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