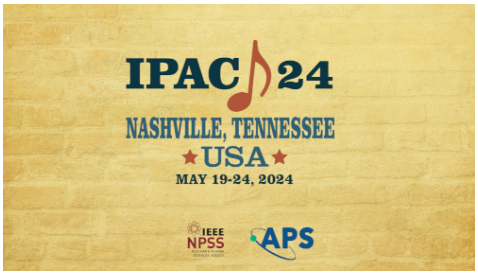

Contribution ID: **1850** Contribution code: **WEPC08** Type: **Poster Presentation**

Emittance growth and transport of an intense relativistic electron beam after foil scattering

Wednesday, 22 May 2024 16:00 (2 hours)

Intense relativistic electron beams such as those produced by the DARHT accelerators, consist of large total currents of 1.6-2 kA at modest energies in the range of 16-20 MeV. Beam envelope codes are generally used to predict the evolution of the first moment of the radial distribution (i.e. beam 2-RMS radius) assuming a constant emittance. Upon passing through a thin metal foil, such as may be used in a vacuum window, the beam experiences multiple Coulomb scattering and foil focusing effects which modify downstream transport. We measure the 4-RMS emittance of the beam with and without a material scattering foil using the solenoid sweep method with a downstream magnet. A 50 μm Ti foil is found to increase the emittance from about 0.09 cm-rad to 2.9 cm-rad after 1.5 m of transport. We also make measurements with aluminum scattering foils 1.5 m upstream and 3 cm upstream of the imaging foil to examine the beam dynamics after scattering. We find envelope codes are able to describe the 2-RMS radius of the beam after foil interaction taking into account appropriate weights on the scattering angle after 1.5 m of transport.

Footnotes

Funding Agency

Paper preparation format

Region represented

North America

Primary author: JAWORSKI, Michael (Los Alamos National Laboratory)

Co-authors: SZUSTKOWSKI, Sebastian (Los Alamos National Laboratory); MOIR, David (Los Alamos National Laboratory)

Presenter: SZUSTKOWSKI, Sebastian (Los Alamos National Laboratory)

Session Classification: Wednesday Poster Session

Track Classification: MC2: Photon Sources and Electron Accelerators: MC2.A08 Linear Accelerators