

# Physics and Applications of High Brightness Beams



Contribution ID: 15

Type: **Contributed oral**

## Update on Electron Beam Manipulation at the Argonne Wakefield Accelerator Facility

*Thursday, June 22, 2023 3:45 PM (20 minutes)*

The Argonne Wakefield Accelerator (AWA) supports an extensive research portfolio along three themes: electron beam production, electron beam manipulation, and electron beam-driven wakefield acceleration. Current research activities focus on longitudinal distribution shaping and cross-plane manipulations for emittance redistribution between two and three degrees of freedom, such as one-dimensional manipulation based on photoemission laser-pulse shaping, selective transverse collimation combined with emittance exchange technique, and local cross-plane “bump” combining transverse-deflecting cavities with transverse collimation. Likewise, transverse phase-space control focuses on the generation and transport of magnetized beams for electron cooling of hadron beams and the production of flat beams for wakefield excitation in asymmetric structures. Finally, an experiment on emittance repartitioning between the three degrees of freedom is under planning with the ultimate goal of circumventing the need for an electron-damping ring in future linear colliders. In this presentation, we present recent research progress on bunch manipulation and discuss future research directions at the AWA.

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**Session Classification:** Beam dynamics and controls