

# First-principle beam-dynamics simulations of alpha magnets for bunch compression of bright beams

*Tuesday 27 August 2024 16:00 (2 hours)*

Producing bright electron beams is crucial for coherent light sources, where increasing the peak current is typically accomplished through bunch compression in magnetic chicanes. Alpha magnets, with their unique phase-space manipulation capabilities, have emerged as an attractive choice for compressing sub-10 MeV electron beams generated by radio frequency photoinjectors. This paper presents detailed numerical modeling of the beam dynamics of high-charge, bright bunches undergoing compression within an alpha magnet. The model incorporates space-charge effects and coherent synchrotron radiation, providing a comprehensive understanding of the complex interactions and behaviors of the electron beams during the compression process.

## Footnotes

## Funding Agency

**Author:** AL MARZOUK, Afnan (Northern Illinois University)

**Co-author:** PIOT, Philippe (Northern Illinois University)

**Presenter:** AL MARZOUK, Afnan (Northern Illinois University)

**Session Classification:** Tuesday Poster Session

**Track Classification:** MC1: Beam Dynamics, Extreme Beams, Sources and Beam-Related Technologies: MC1.1 Beam Dynamics, beam simulations, beam transport