

# Circular modes for linacs

*Sunday 25 August 2024 16:00 (2 hours)*

Circular mode beams are beams with non-zero angular momentum and strong inter-plane plane coupling. This coupling can be achieved in linear accelerators (linacs) through magnetization of electrons or ions at the source. Depending on the magnetization strength, the intrinsic eigenmode emittance ratio can be large, which produces intrinsic flatness. This flatness can either be converted to real plane flatness or can be maintained as round coupled beam through the system. In this paper, we discuss rotation invariant designs that allow circular modes to be transported through the lattice while accelerating and maintaining its circularity including low-energy space charge effects. We demonstrate that with rotation invariant designs the circularity of the mode can be preserved as round beam while maintaining intrinsic flatness to be converted to flat beam later or injected into a ring.

## Footnotes

## Funding Agency

This work was supported by the U.S. Department of Energy, Office of Nuclear Physics, under Contract No. DE-AC02-06CH11357.

**Primary author:** GILANLIOGULLARI, Onur (Illinois Institute of Technology)

**Co-authors:** MUSTAPHA, Brahim (Argonne National Laboratory); SNOPOK, Pavel (Illinois Institute of Technology)

**Presenter:** GILANLIOGULLARI, Onur (Illinois Institute of Technology)

**Session Classification:** Student Poster Session

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