

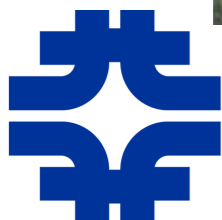
# Fermilab Rings for the *Intensity Frontier*



Northern Illinois University



- Prior to LHC in Europe, the Tevatron was the highest energy particle accelerator in the world
- Today, Fermilab is moving toward higher intensity beams, rather than higher energy beams
  - re-purposing of Tevatron infrastructure to provide lower-energy experiments for precision physics
  - creation of new high-intensity beam source
    - » **high-beam-power linac (PIP-II)**



# Fermilab Rings for the *Intensity Frontier*



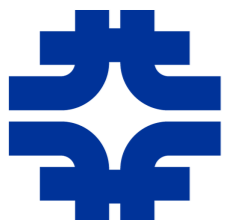
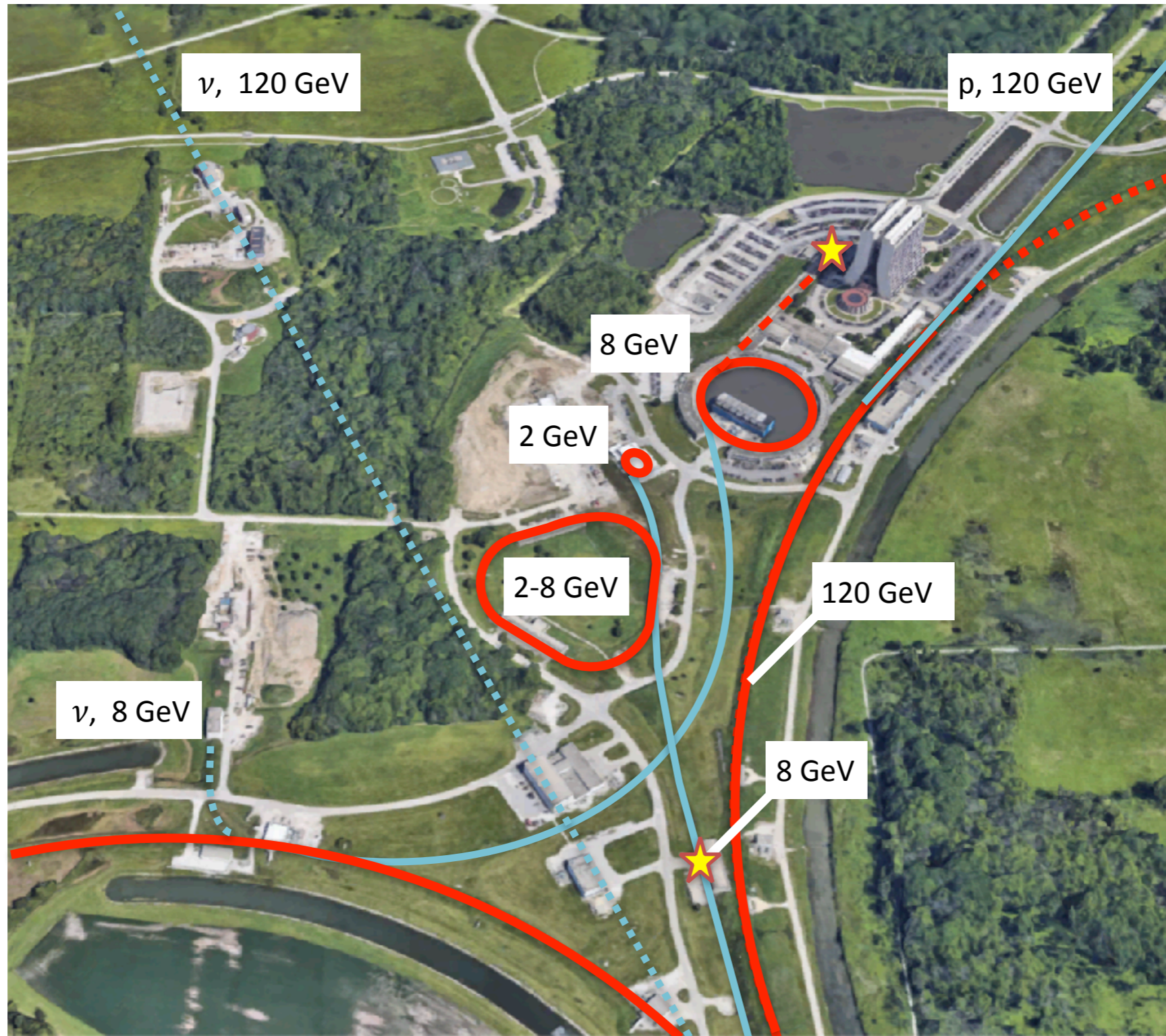
Northern Illinois University



# Fermilab Rings for the *Intensity Frontier*

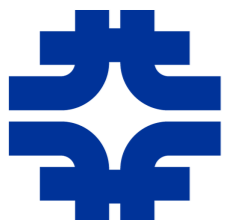
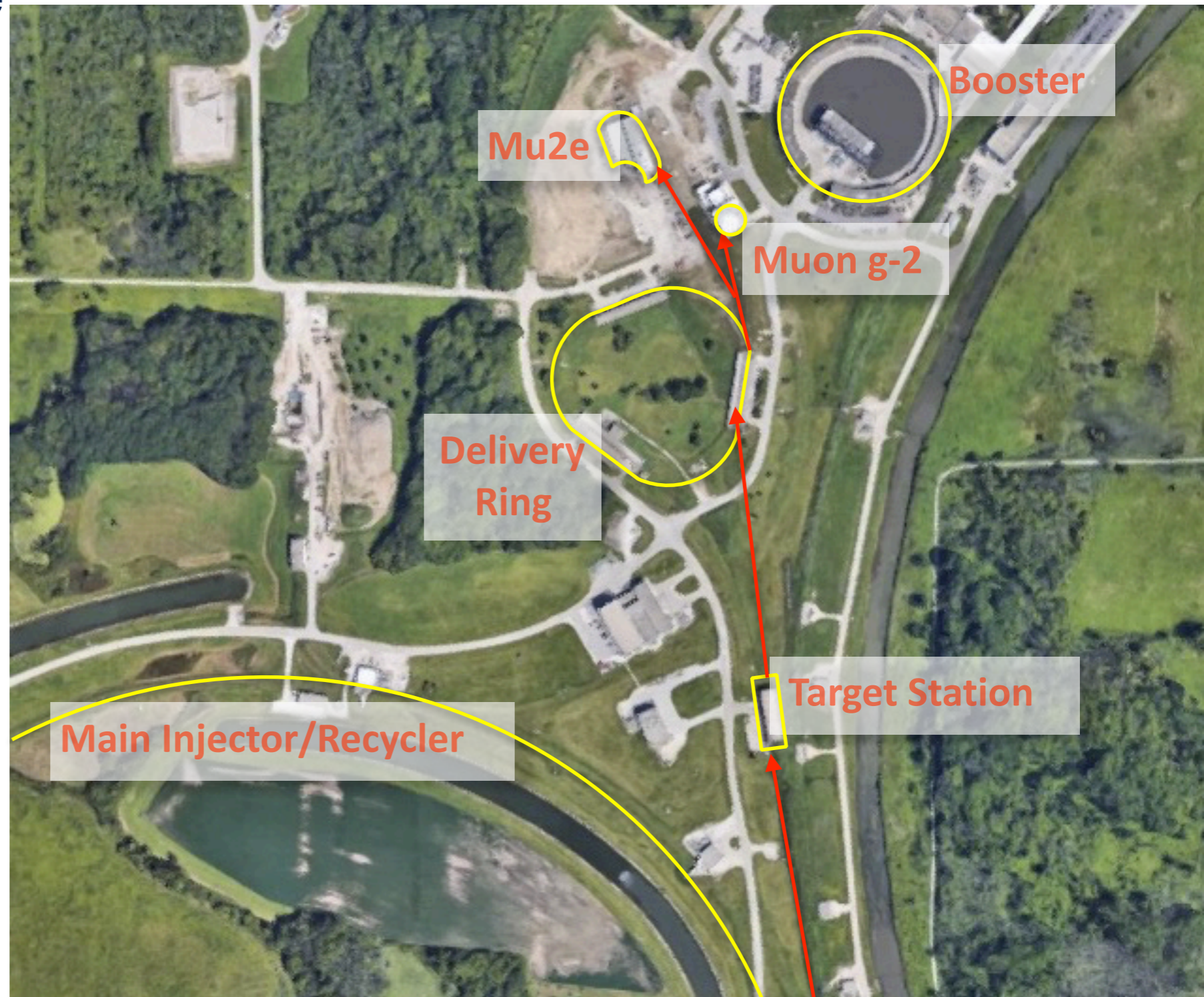


Northern Illinois University



# Ex: The Muon Campus

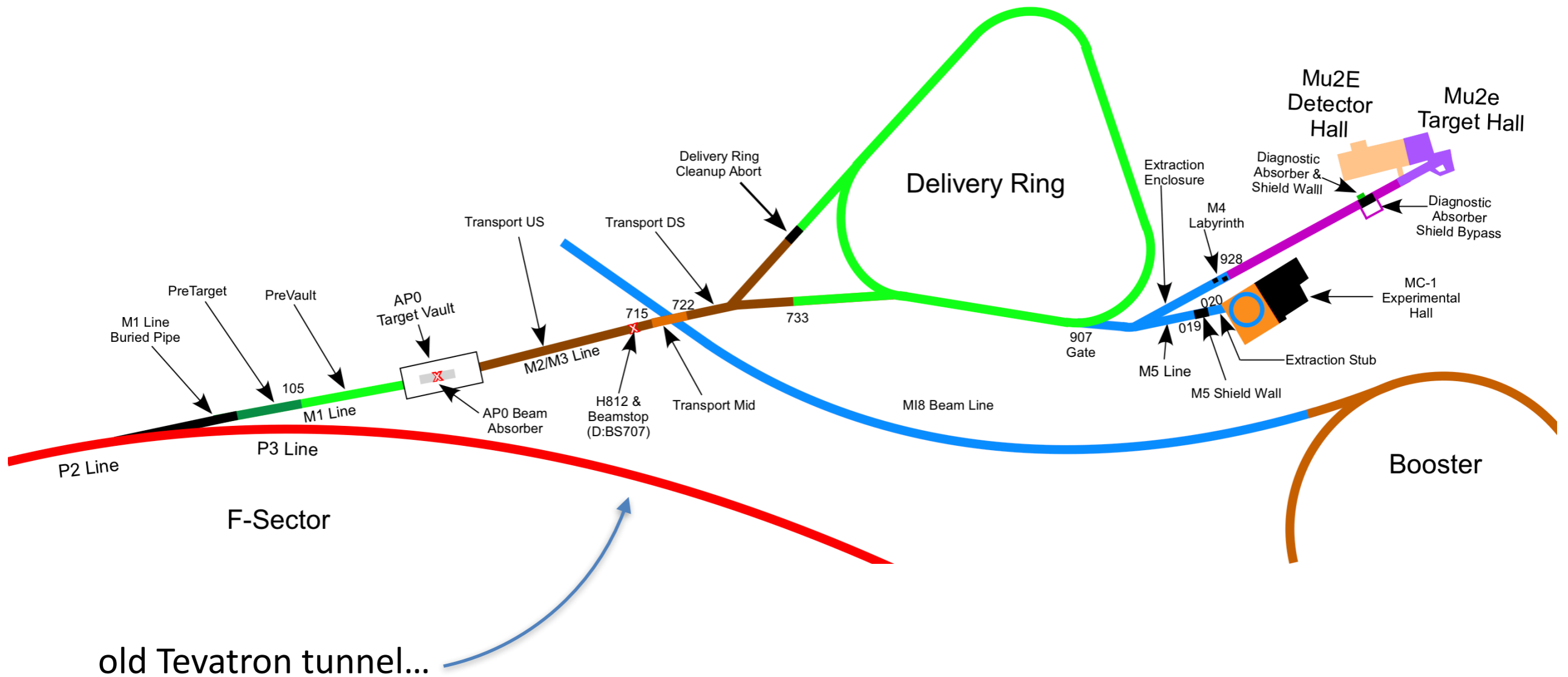
- Delivery Ring has same circumference (slightly larger) than Booster
  - ~500 m
- 8 GeV protons from Booster to Recycler/Main Injector; manipulate bunches to create time structure appropriate for g-2, Mu2e
- Use (not use) target station for g-2 (Mu2e)
- Fast extract (g-2) or slow spill (Mu2e) particles from DR to experiments



# Muon Campus Map



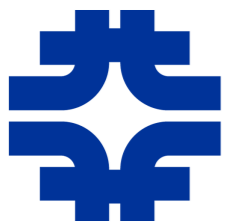
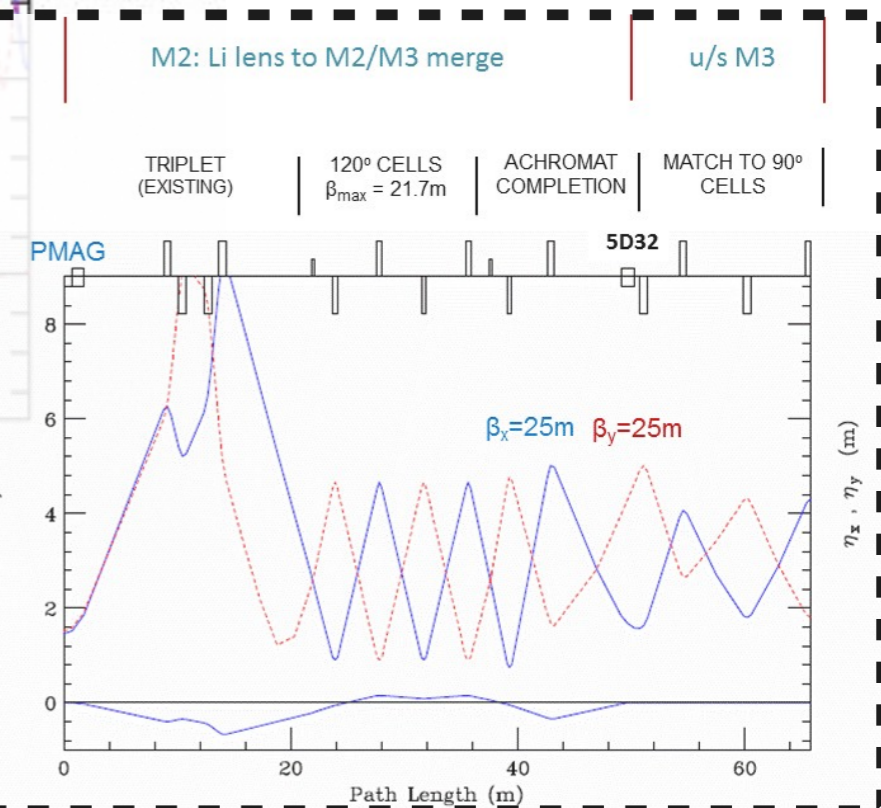
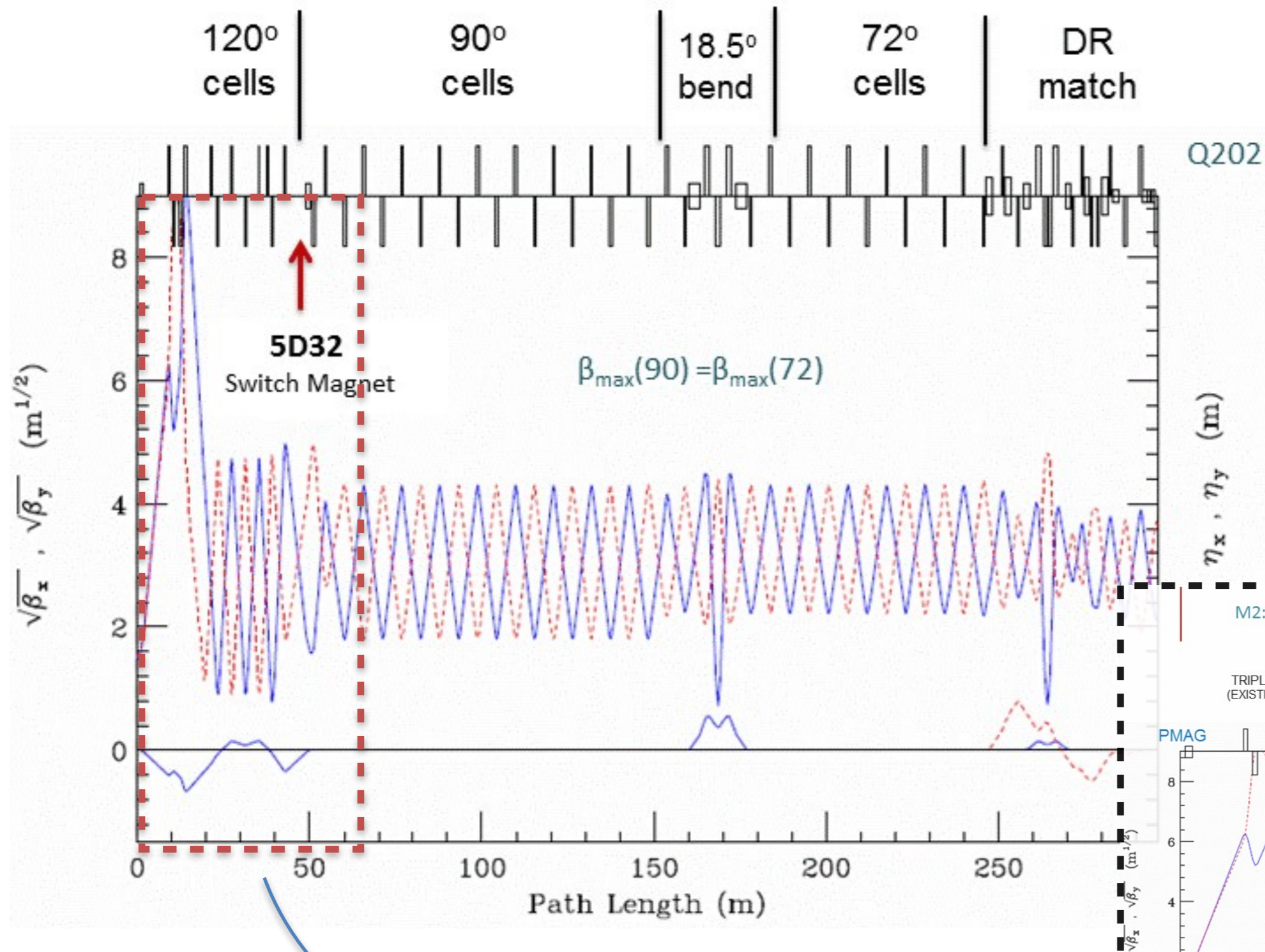
Northern Illinois University



# Beam Transport Lines

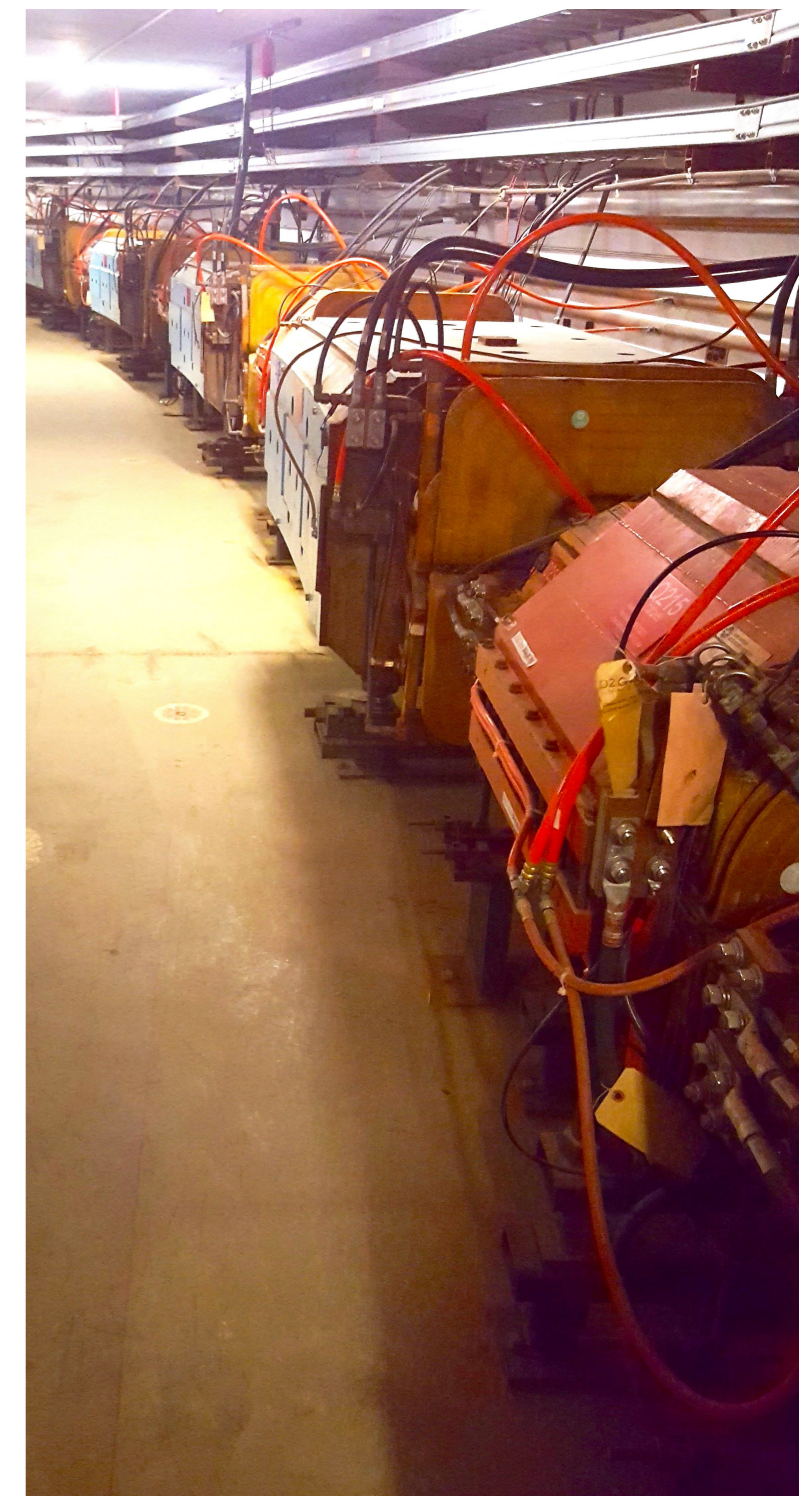
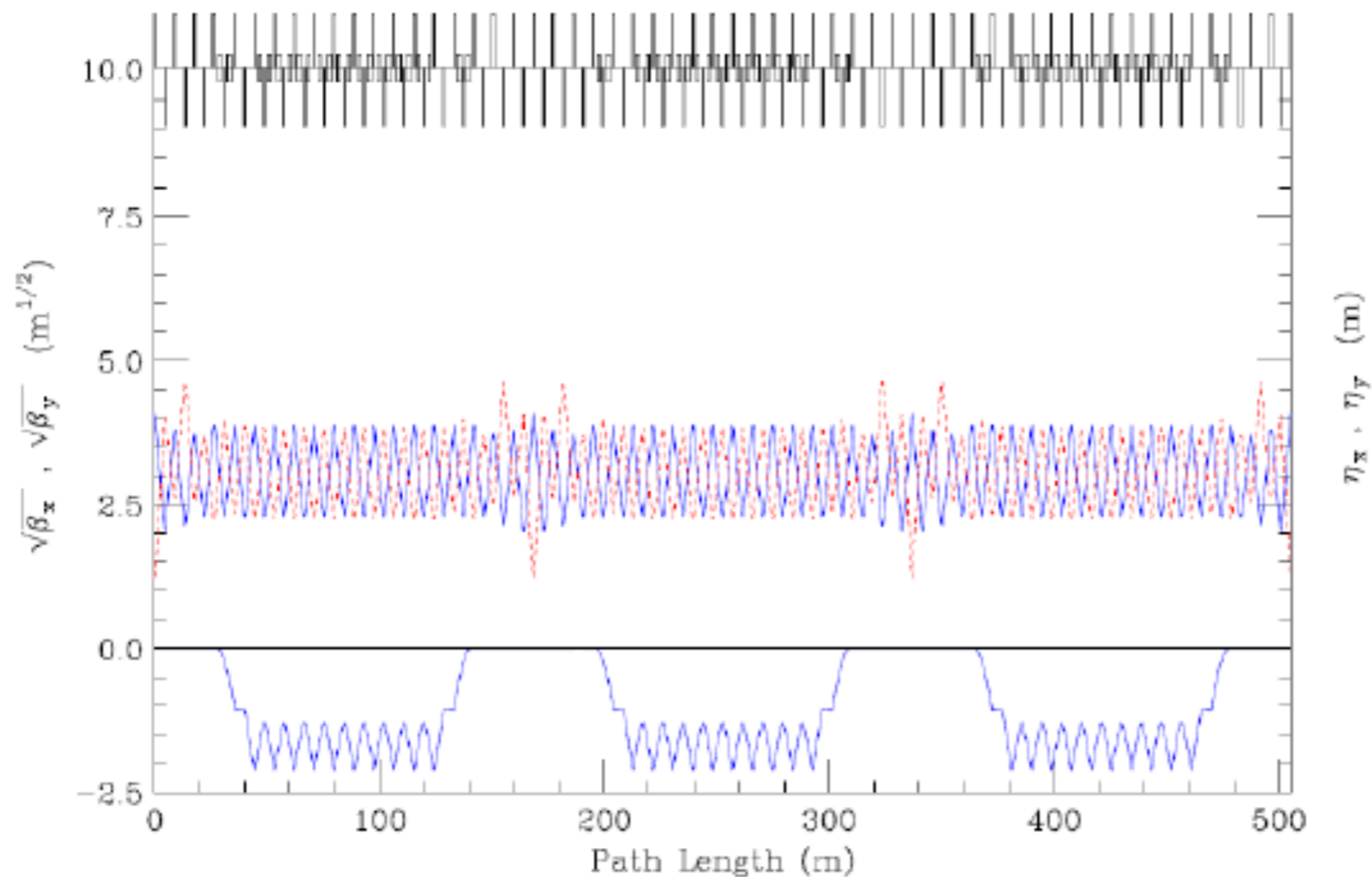


Northern Illinois University

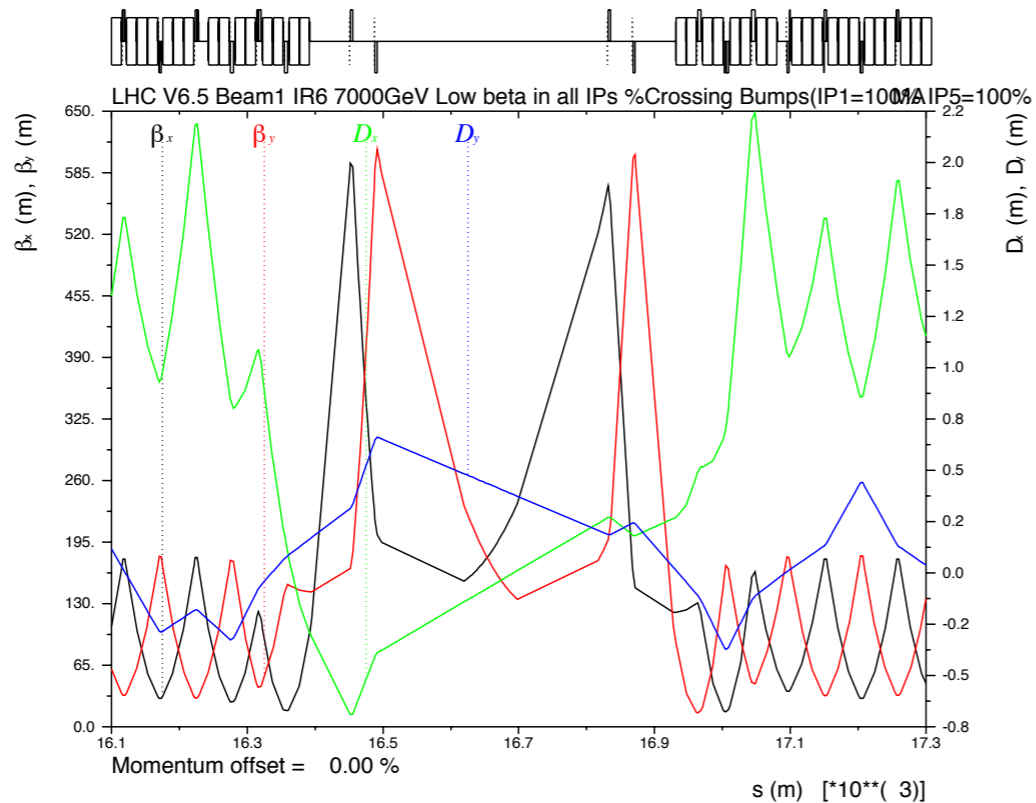
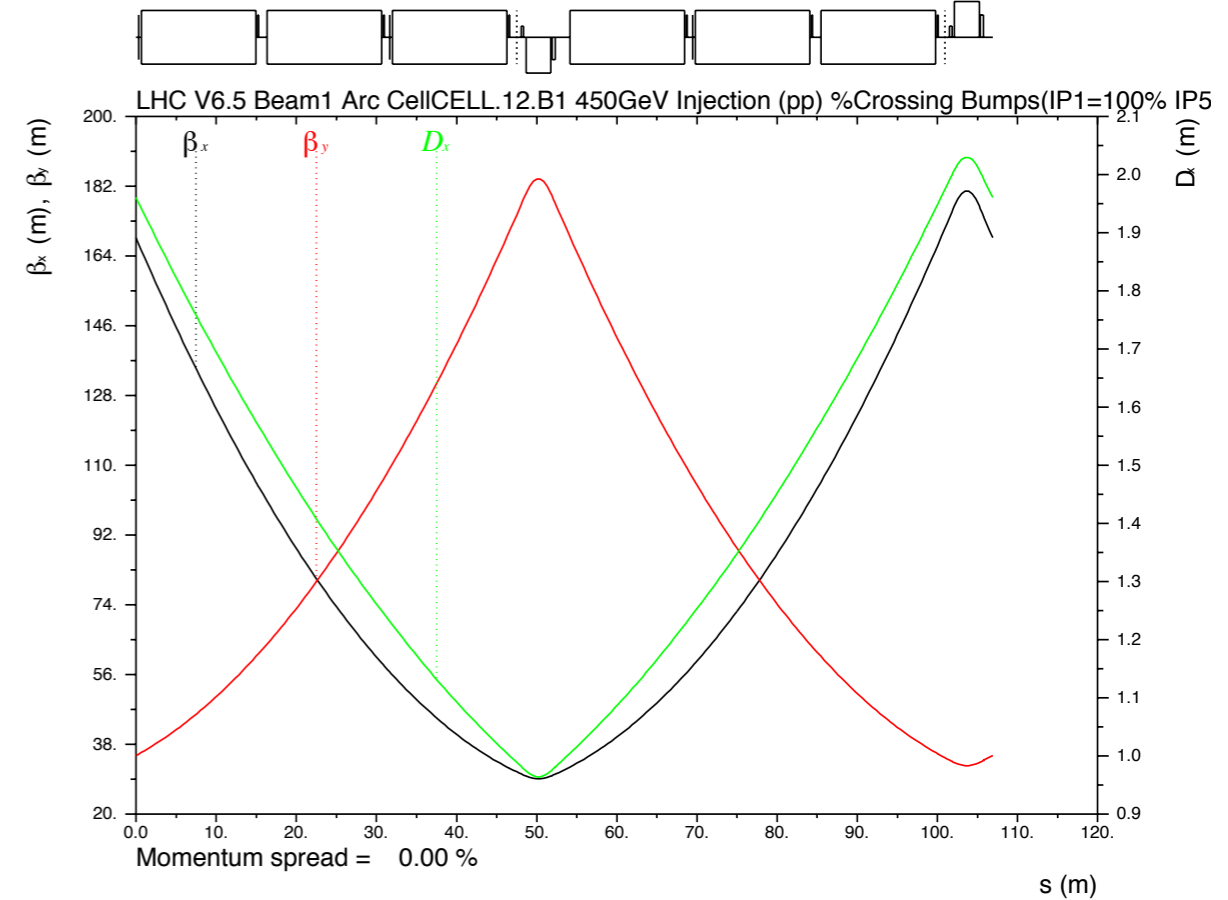
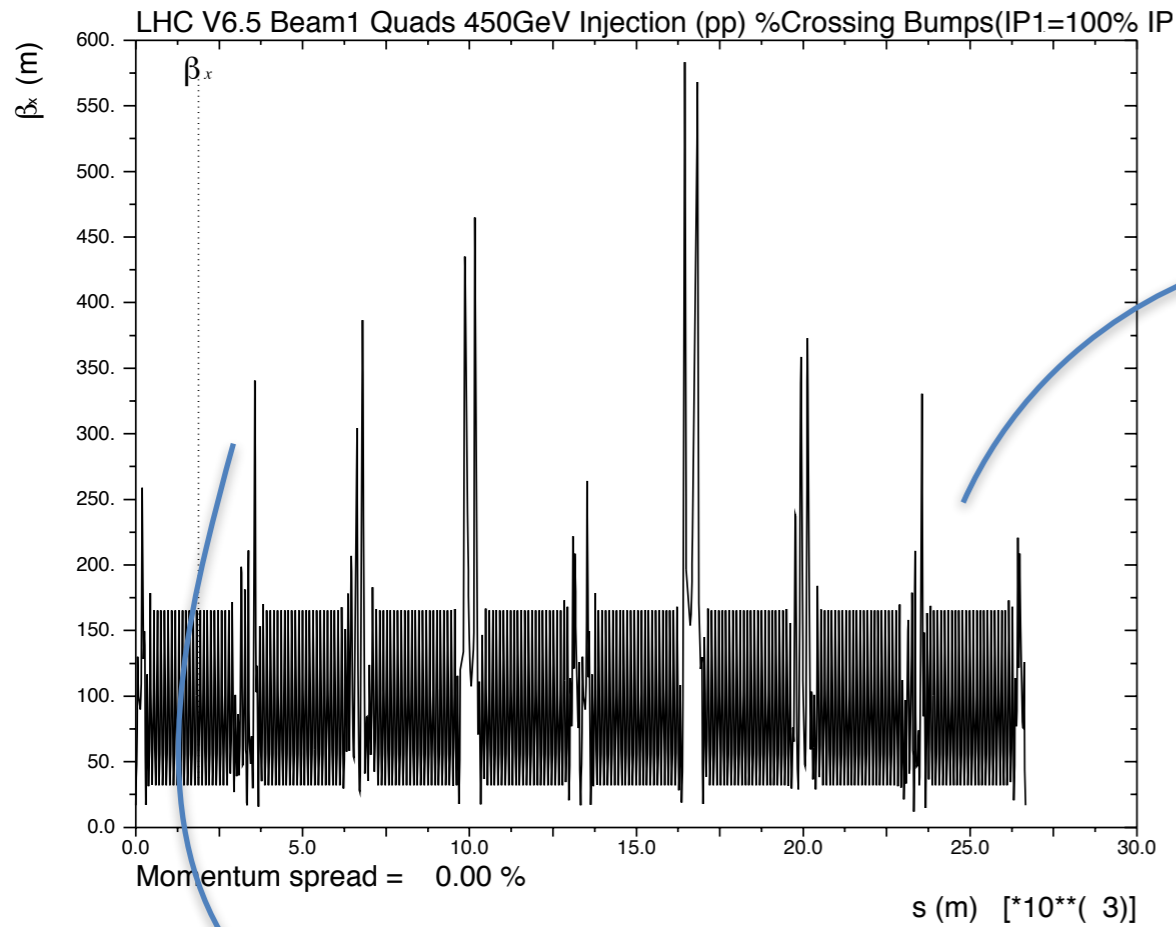


# The Delivery Ring

- Originally, the antiproton source during the Tevatron operation
- Total circumference ~500 m



# Side Note: the LHC



Most of circumference made of FODO cells

8 major “straight sections”, used for injection, extraction, acceleration, *etc.*, and for interaction regions (collisions!)



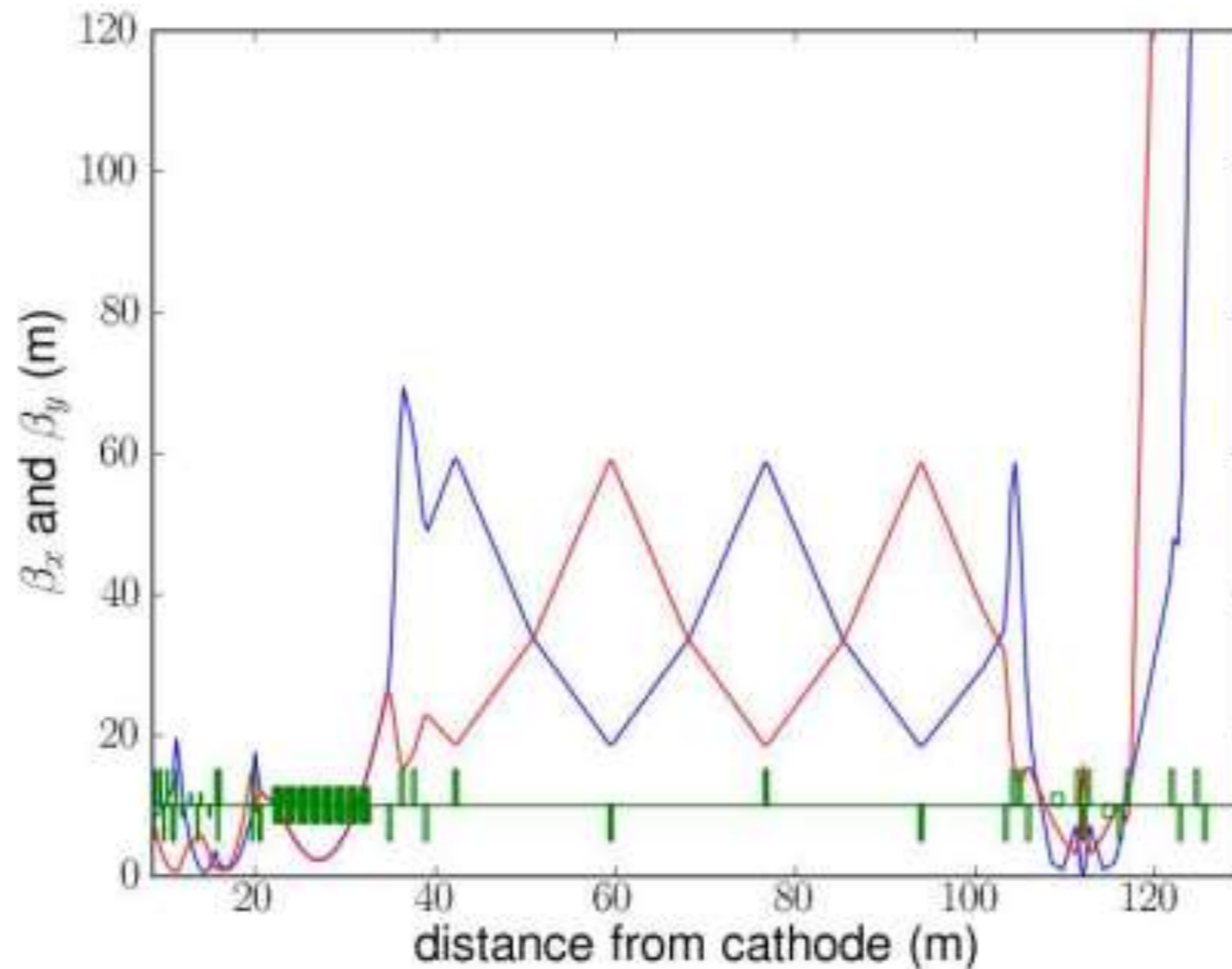


# Electron Injector Linac Optics



## ■ IOTA (Fermilab)

- IOTA: FACILITY AND EXPERIMENTAL BEAM PHYSICS PROGRAM, *JINST* **12** T03002—2017, S. Antipov, D. Broemmelsiek, D. Bruhwiler, et al



**Figure 8:** Optical functions of the 300 MeV IOTA electron injector linear accelerator. The origin is at the 5 MeV photo-injector cathode, and the beam ends at the high energy absorber.

