Beam raster for P2

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P2 Retreat

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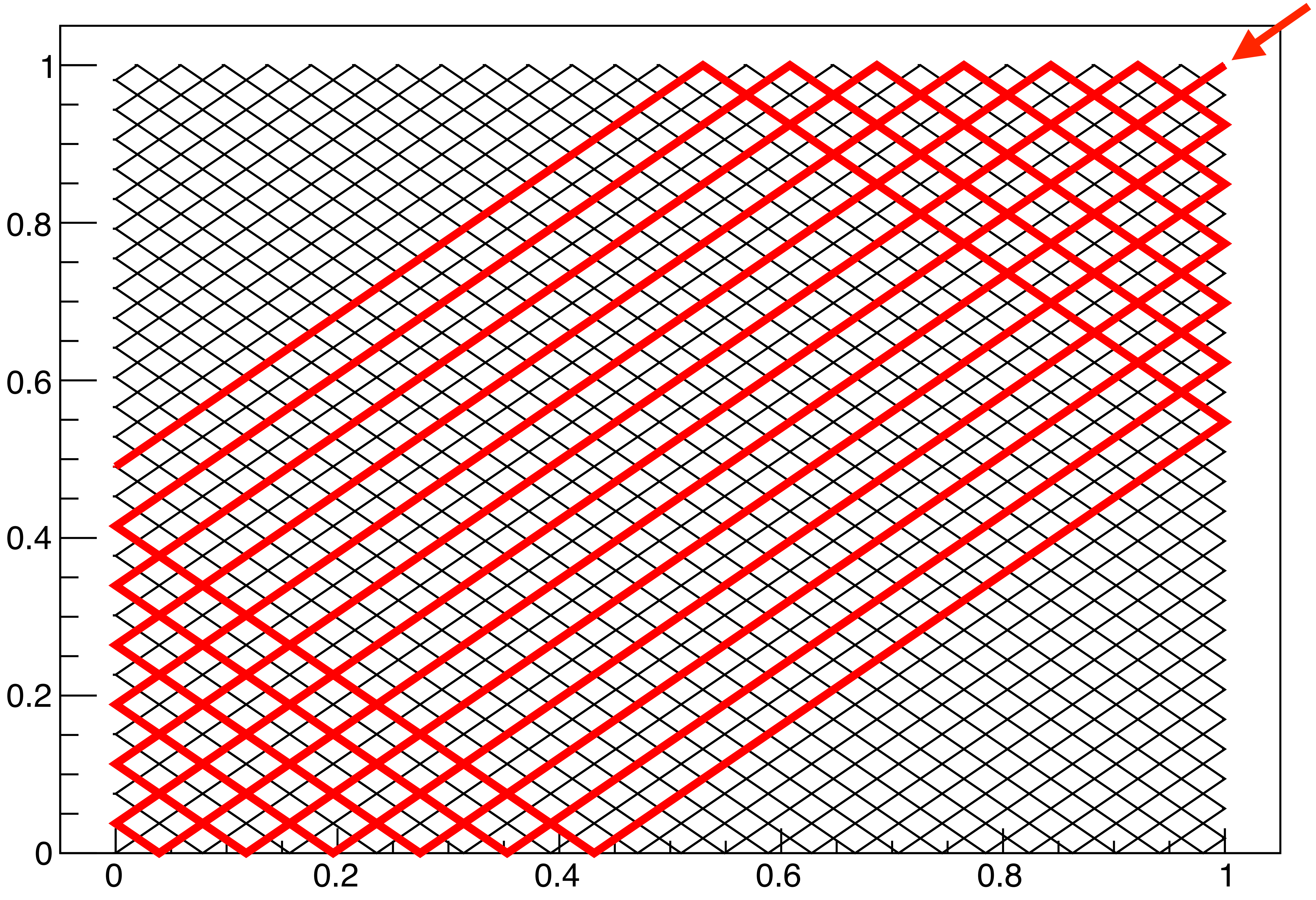
Why raster the beam?

- Spread power deposition (several kW) over larger area on the target
  $\rightarrow$ mitigate temperature increase, density fluctuations, melting
- Modulate beam parameters
  $\rightarrow$ study beam-correlated asymmetries

Raster for JLab Hall A

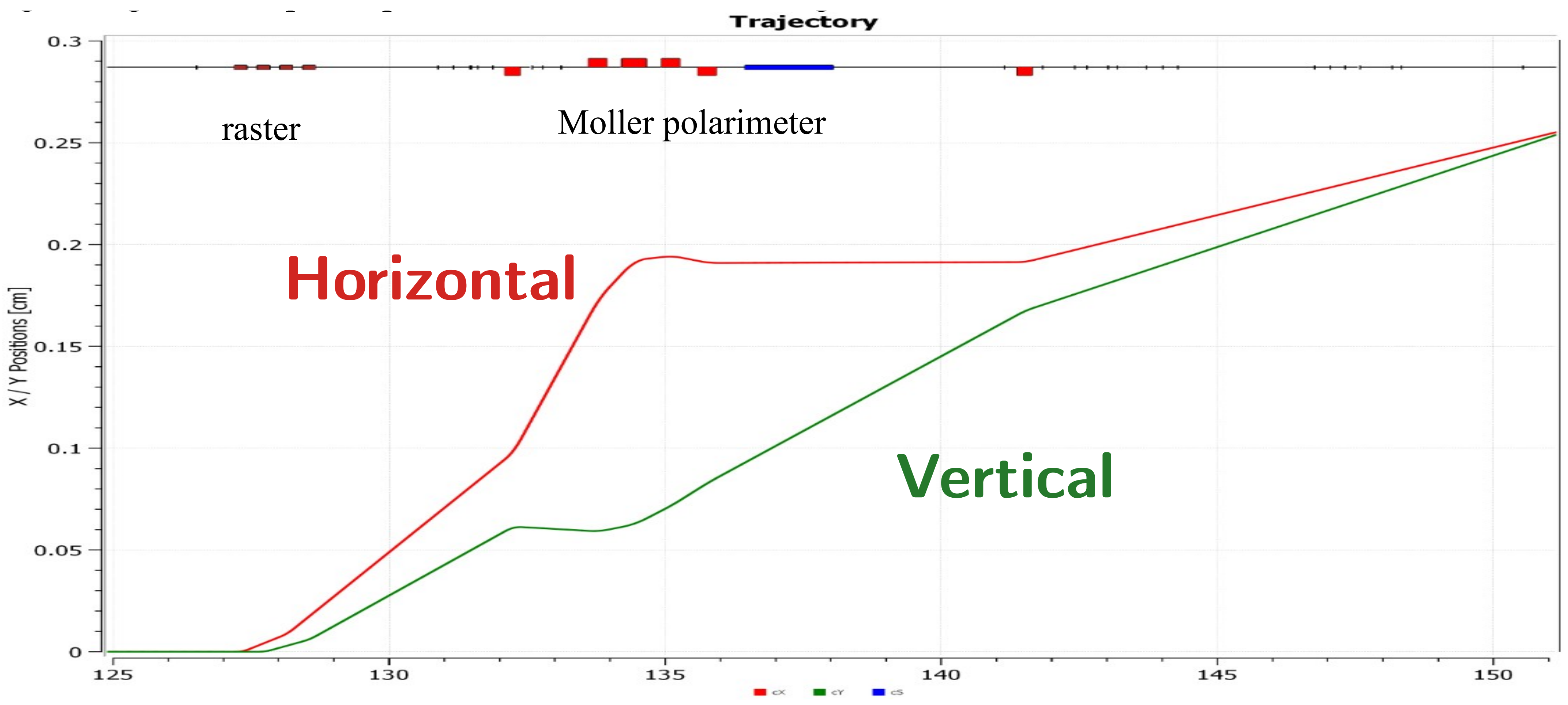
- Pair(s) of raster magnets (vertical and horizontal)
- 5x5 mm^2 on target
- Raster magnet length = 25 cm
- Raster drift length:
    - ≈23 meters (nominal)
    - ≈15 meters (MOLLER)
- Driven by 25 kHz triangle wave



Red illustrates raster path for part of cycle

Black shows full pattern for each helicity state

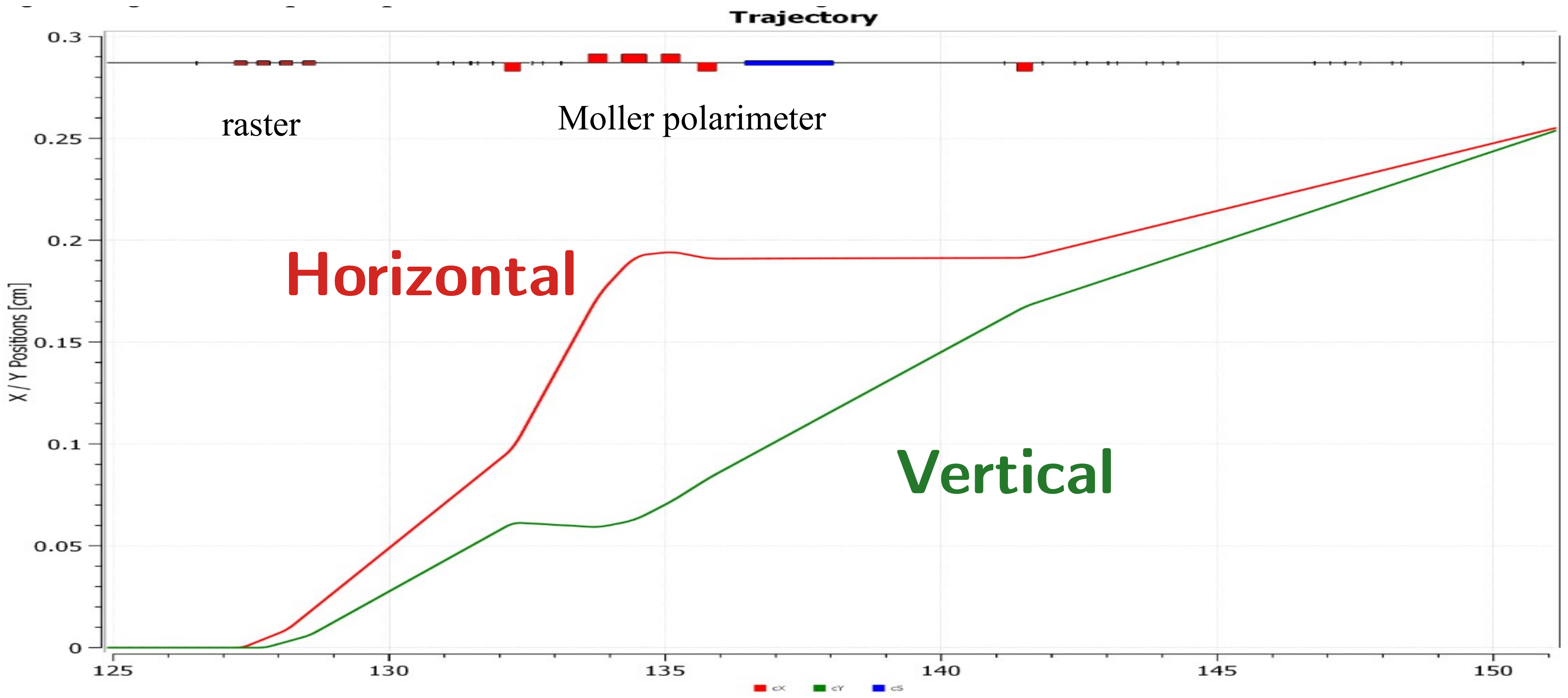
Current required to drive JLab raster

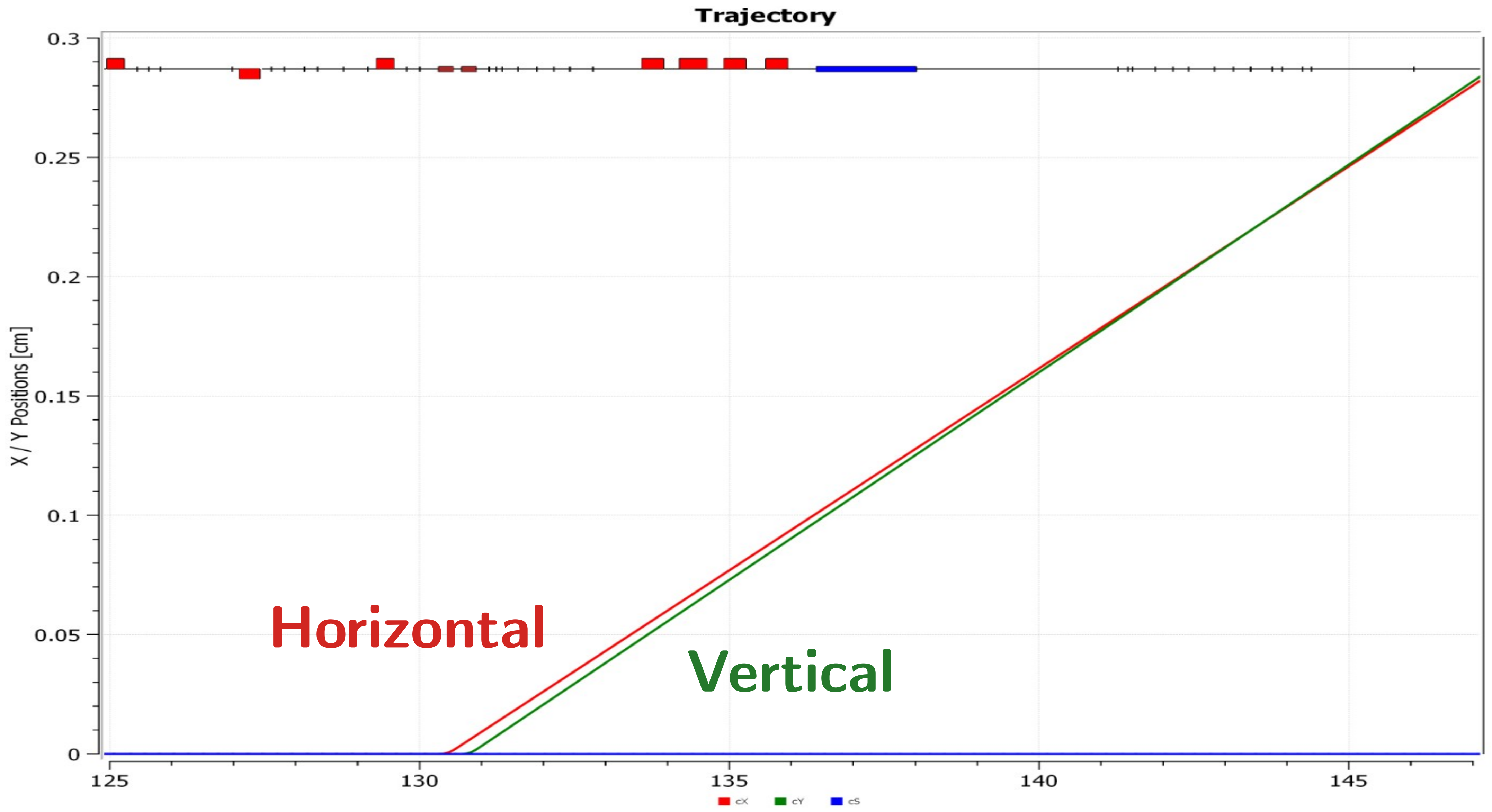


Nominal (≈23 meter "drift")

- Two pairs of raster coils, intermediate quads
- 50 A (horizontal)
- 34 A (vertical)

Current required to drive JLab raster





Nominal (≈23 meter "drift")

- Two pairs of raster coils, intermediate quads
- 50 A (horizontal)
- 34 A (vertical)

MOLLER (≈15 meter drift):

- One pair of raster coils, degaussed quads
- 80 A (horizontal & vertical)
  - Coil temp 64° C (insulation max 130° C)

Considerations for P2 raster

- Same size as MOLLER raster (5x5 mm^2)
  - At target entrance? Center?
- Raster drift length
  - Long segment before P2, but where is last accelerator component?
- Raster magnet length and current
  - Recycle existing magnets? Purchase new ones?
  - P2 momentum only 1.4% of MOLLER momentum
    ...nearly 100x reduction in rigidity