Hybrid Synchrotron Lattice Design

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Advanced Accelerator Group Meeting

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Outline

- Basic design outline
- Previous lattice design (Garren)
- Issues with that design: dispersion size

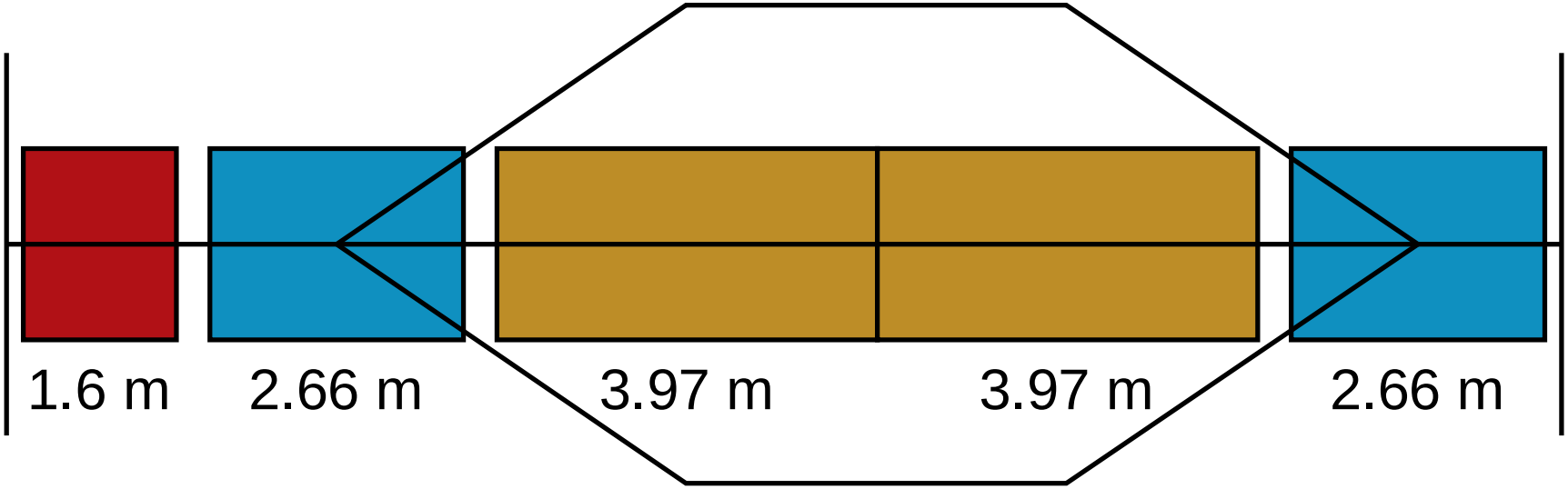
Lattice Design Parameters

- Discussed at April MAP acceleration meeting
- Accelerate from 375 GeV/*c* to 750 GeV/*c*
- FODO lattice cell structure
- 8 superperiods, 3-cell straight sections
- Suppress closed orbit shift and dispersion in straights
- Chromaticity correction
- 8 T cold, 1.8 T warm dipole, 1.3 T warm quad

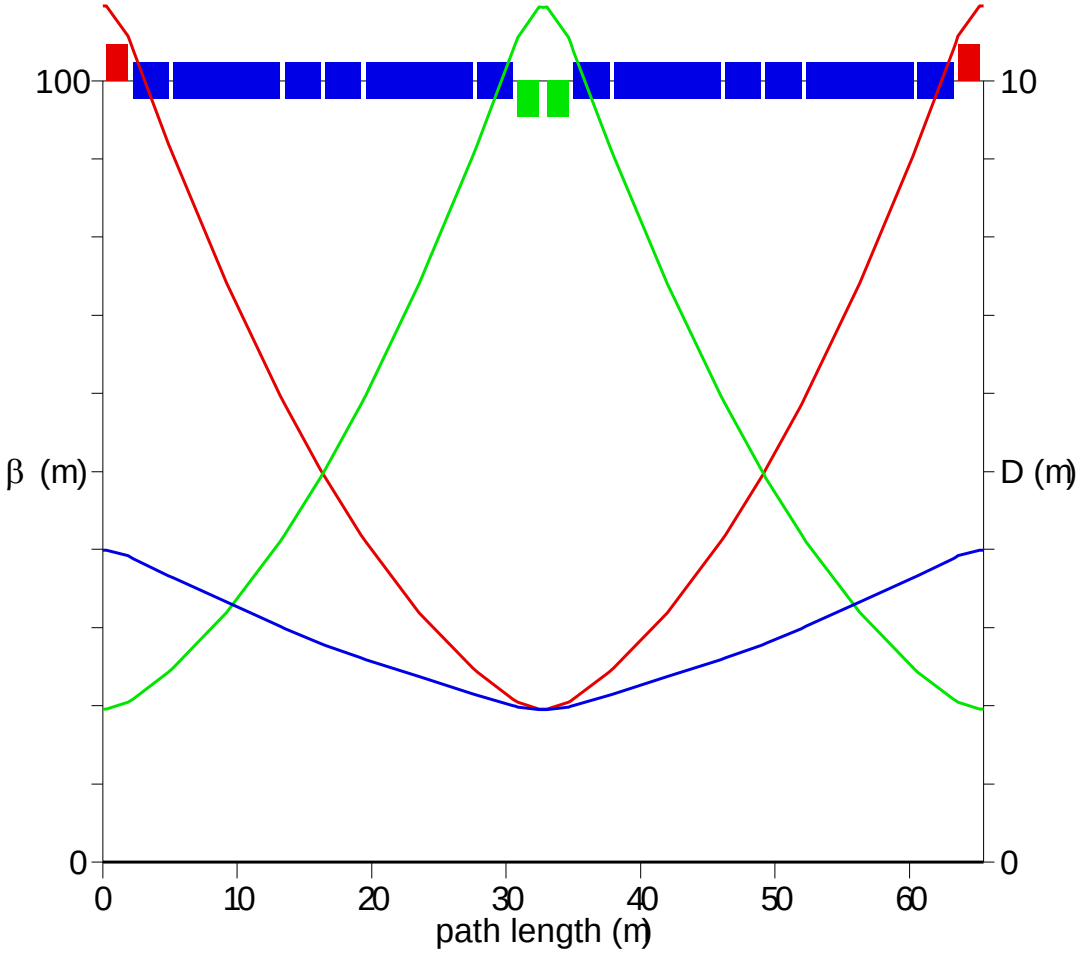
First-Pass Design (Garren)

- 13-cell superperiod: 6 arc cells, 3 straight, 4 dispersion suppression
- 90° phase advance per cell
- 6288 m circumference
- Arc and straight cells same length, dispersion suppression cells shorter
- 5 dipoles per half-cell: CWCWC

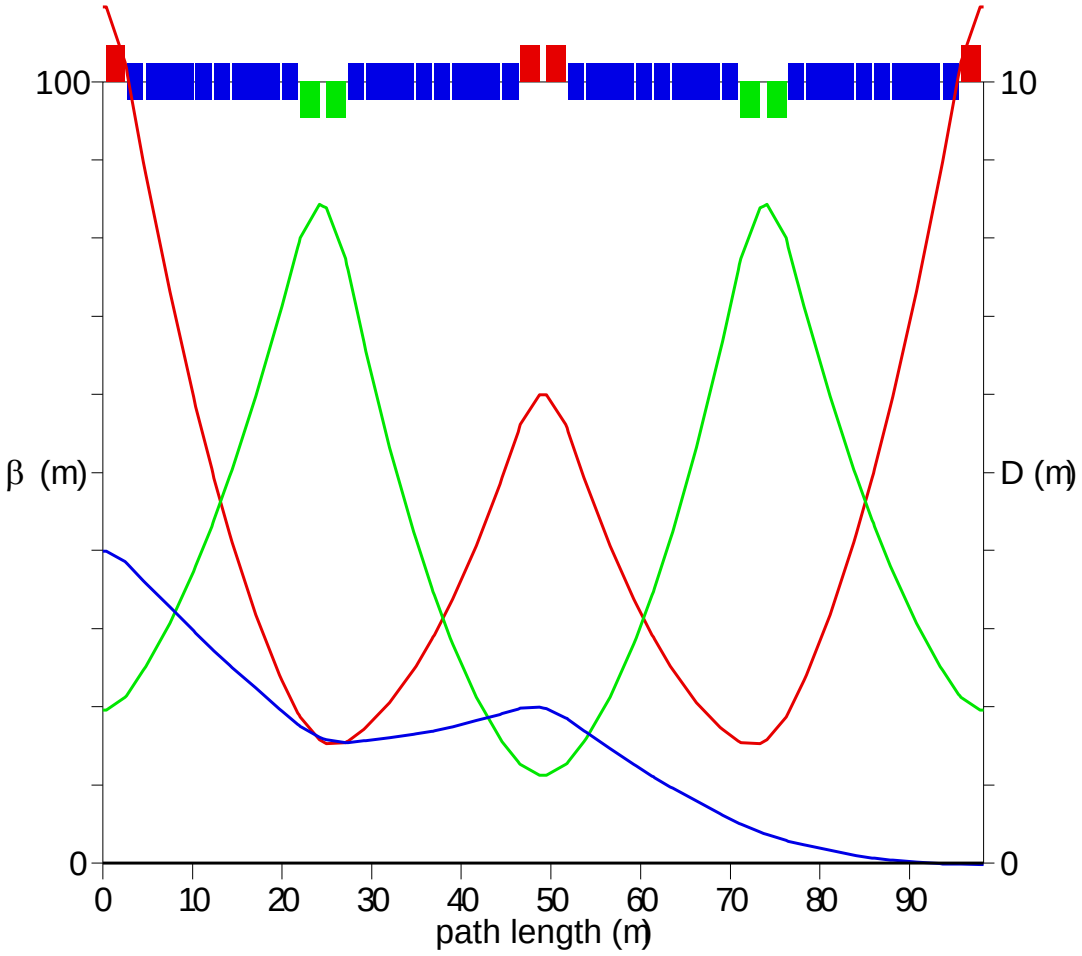
Closed Orbit in Quarter Cell



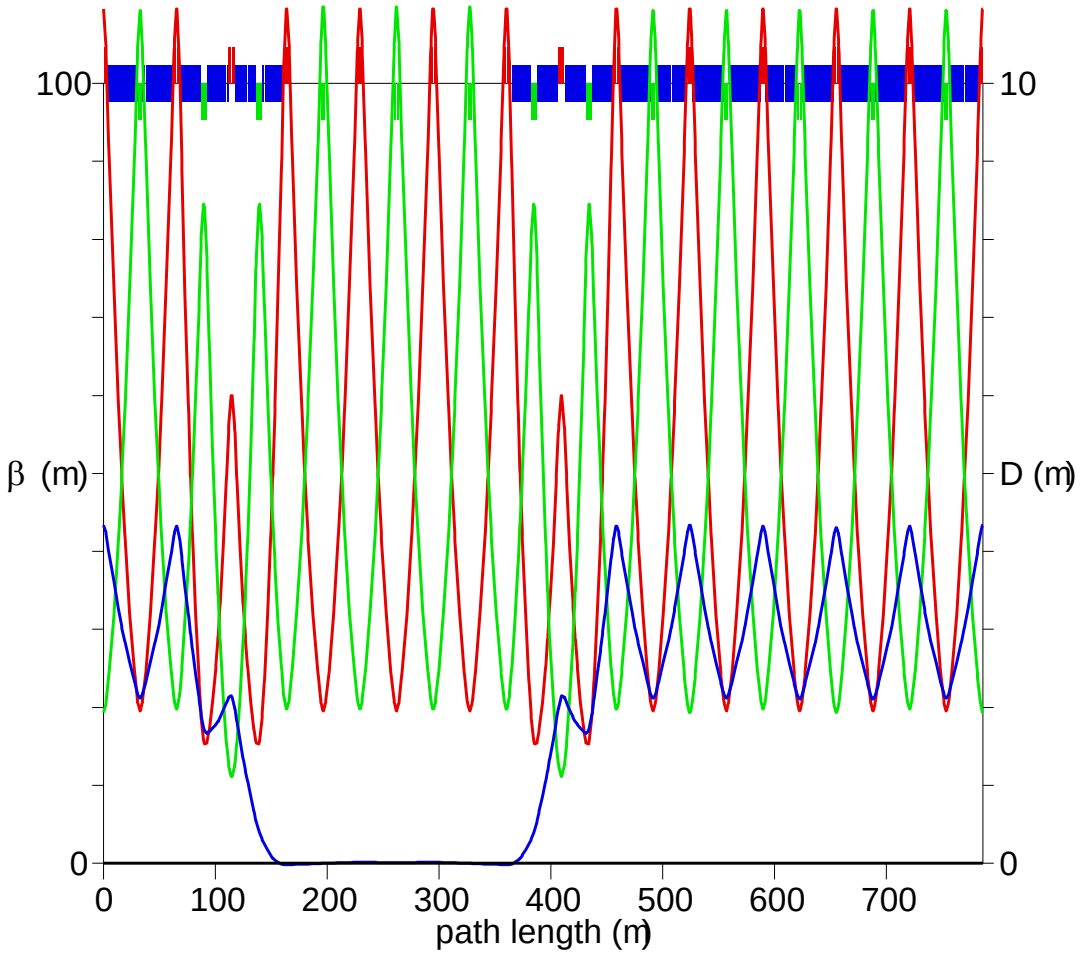
Arc Cell Lattice Functions



Dispersion Suppressor



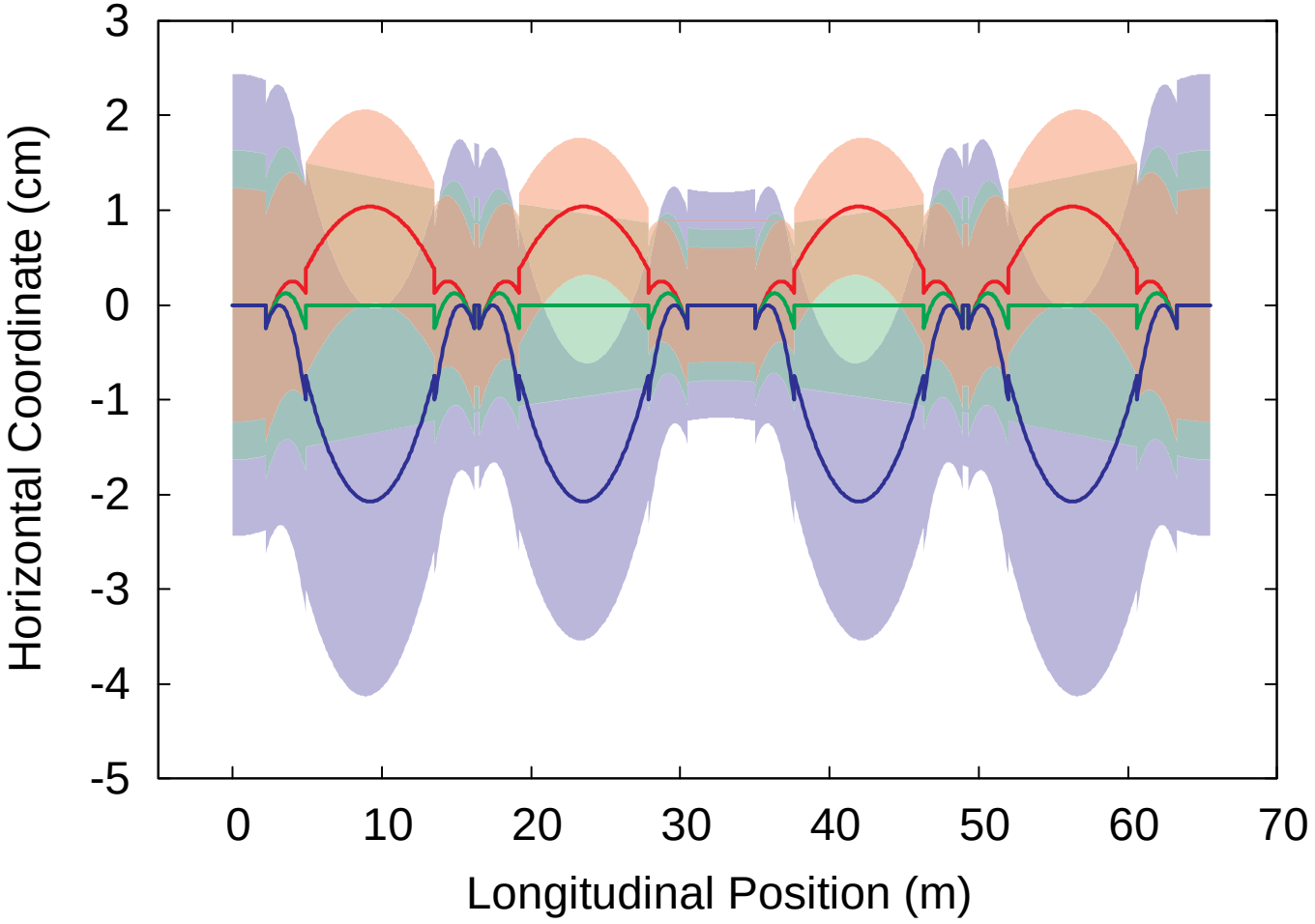
Full Superperiod



Finite Emittance Beam

- Transverse normalized emittance of 25 μm
- Energy spread of 760 MeV
- Dispersion is huge contribution to aperture
  - Emittance size negligible
- Reduce dispersion with
  - Shorter cells
  - Less bend per cell
- Would like lower longitudinal emittance

Finite Emittance Beam



Updated Lattice Design (Garren)

- Al will tell us more…