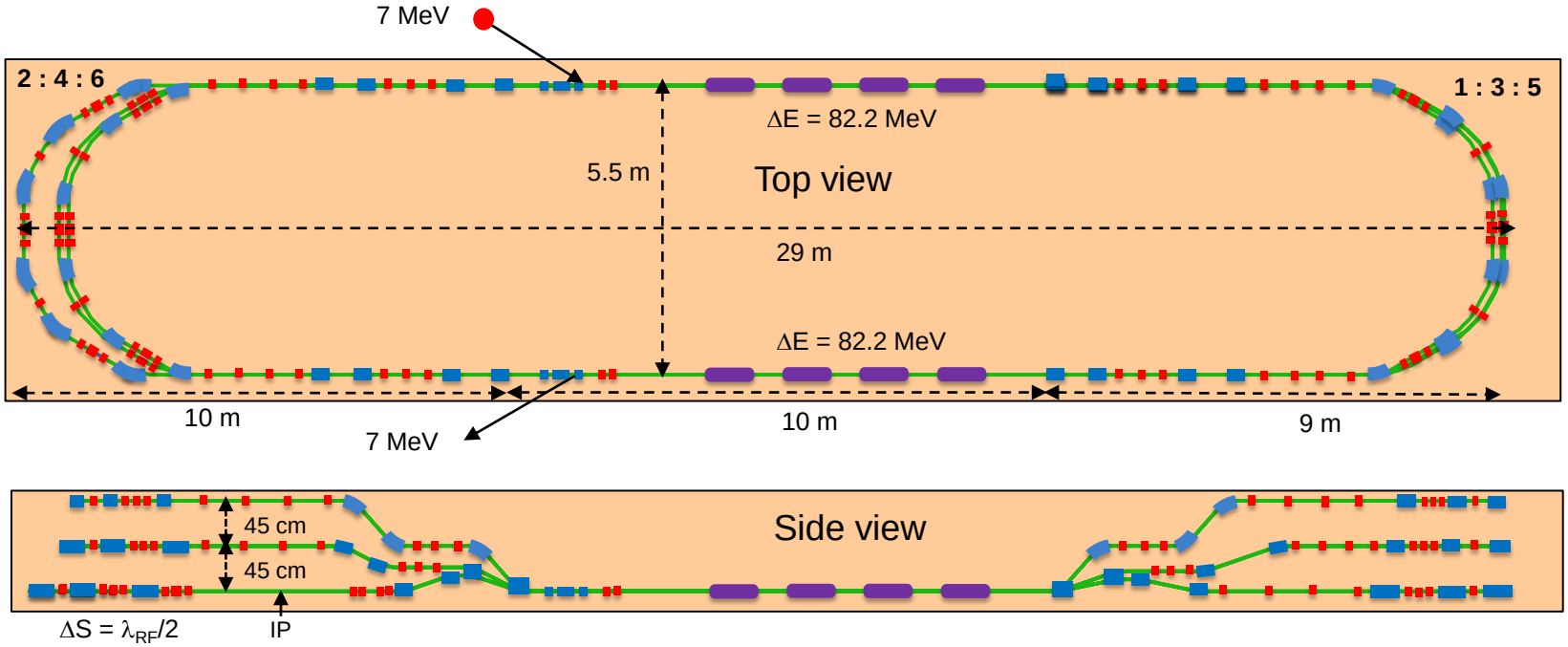
B-com Magnet for PERLE

Alex Bogacz

PERLE (500 MeV) – Baseline Layout

Footprint: 29 m × 5.5 m × 0.9 m



Target parameter	Unit	Value
Injection energy	MeV	7
Electron beam energy	MeV	500
Norm. emittance $\gamma\epsilon_{x,y}$	mm·mrad	6
Average beam current	mA	20
Bunch charge	pC	500
Bunch length	mm	3
Bunch spacing	ns	25
RF frequency	MHz	801.6
Duty factor		CW

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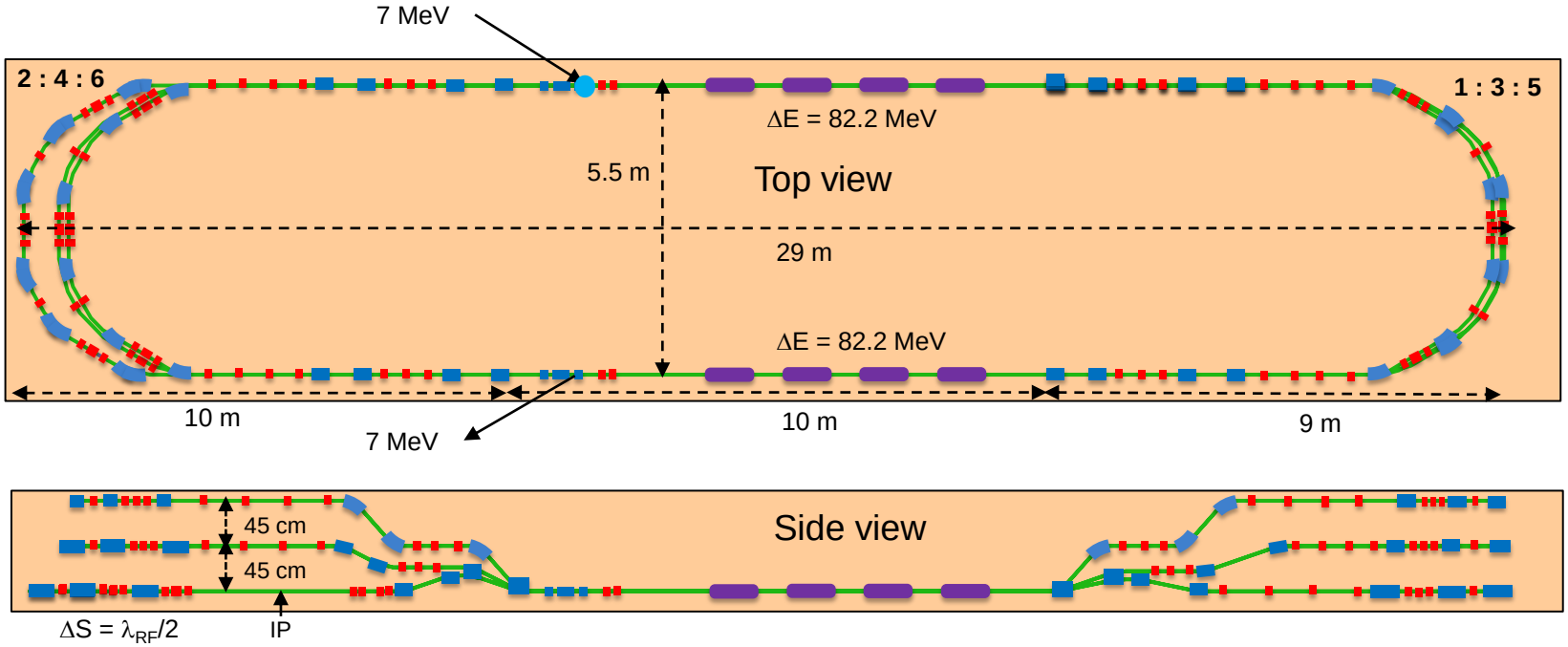

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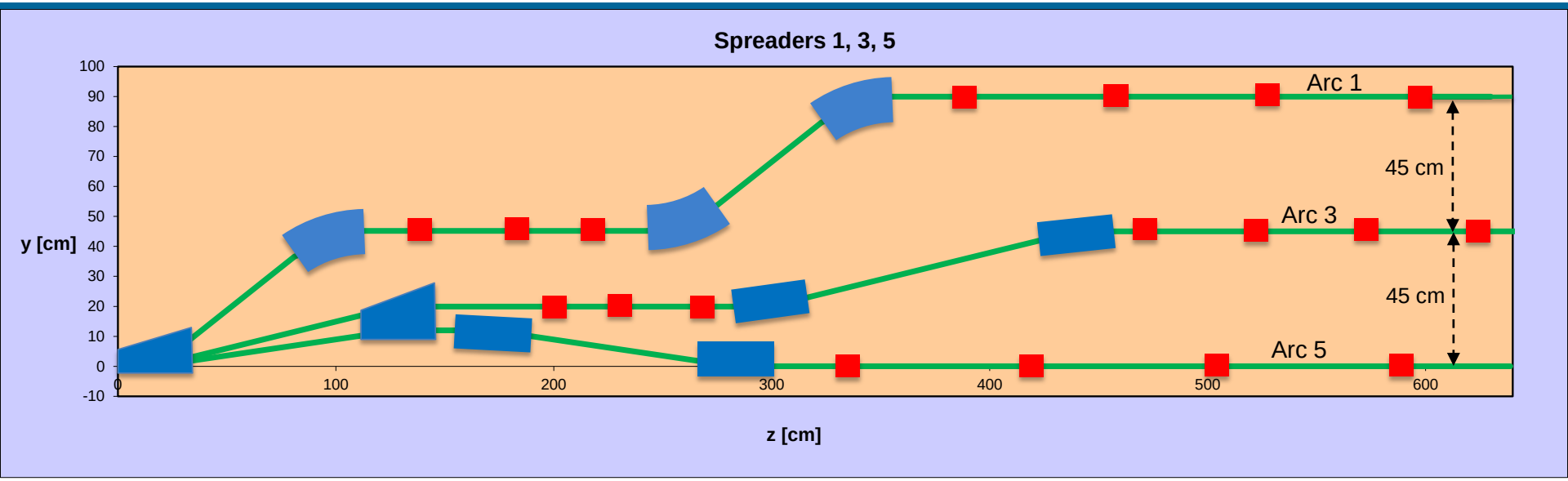
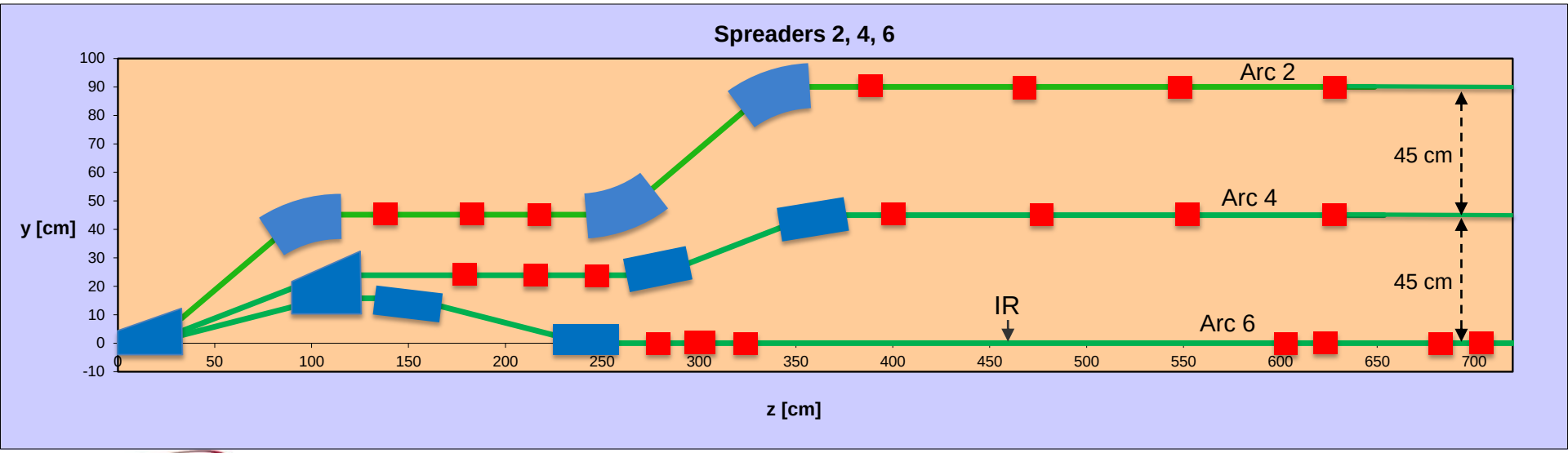
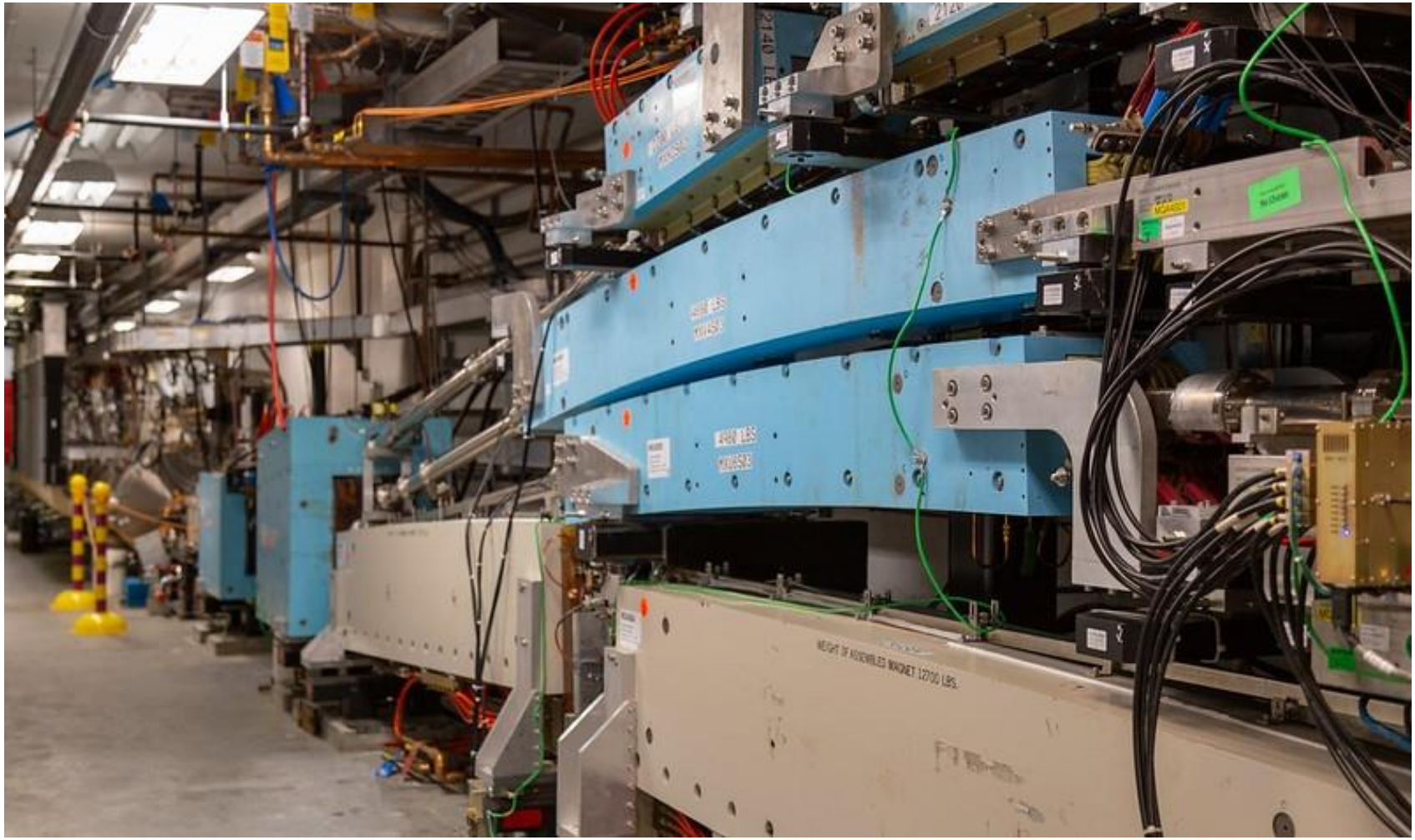
Switchyard Layout with Two B-coms



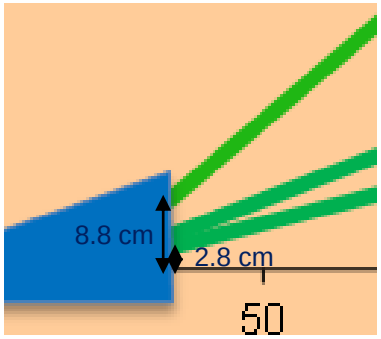


12 GeV CEBAF Switchyard



Initial Design Parameters

- The magnet is meant to split vertically 3 beams at energies (total energy)
  - E2 = 171.333 MeV
  - E4 = 335.667 MeV
  - E6 = 500.000 MeV



- The bend is L = 33 cm long (in z), it bends by 30 deg. at the lowest energy, so its nominal field is: B = 0.866 Tesla, with a pathlength through the magnet of: $L_{path} = L \times \phi / \sin(\phi)$ => 34.5575 cm
- A half-gap of 2 cm is assumed
- The lowest energy (E2) beam is lifted by 8.842 cm, while the highest energy (E6) beam by 2.848 cm