



# Vacuum rf 6D Cooling Notes

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## Notes on talks

- Dave Front End
  - Looks reasonable for 21 bunches (less so for 18)
  - Not simulated with chicane
  - mean momentum looks 280 MeV/c - not 250
  - presume no 4D cooling for collider case
- Cary Charge separation
  - acceptable performance
  - charge separation not yet with coils

- Valeri Rectilinear Cooling

- very good transmission
- only 4 cell types gives easier design and simulation
- rf feeds look ok
- Tiny LiH absorbers a big engineering advantage

But

- uses high gradients than  $17 \sqrt{(f/201)}$
- does not use real input
- may have different or no window irises
- not simulated in same code
- should accept 250/280 MeV/c  
& taper E down in 1A and 1B
- needs to be broken up for merge
- should look at added stage using HTS (for beyond baseline)

- Diktys rectilinear cooling
  - not as good transmissions ??
  - 17 different cell types
  - rf feeds ok for #17
  - And
  - capture from phase rot ??
  - note: mean mom 280 , not 250
- Bob and Yu 6D Merge
  - Yu's G4BL simulation of long cooling part good enough for now
  - Move on to transverse part
  - initially use hard solenoid ends (as Cary does for charge sep.)
  - need to bring in Holger Witte for toroid magnet
  - still a lot of work needed

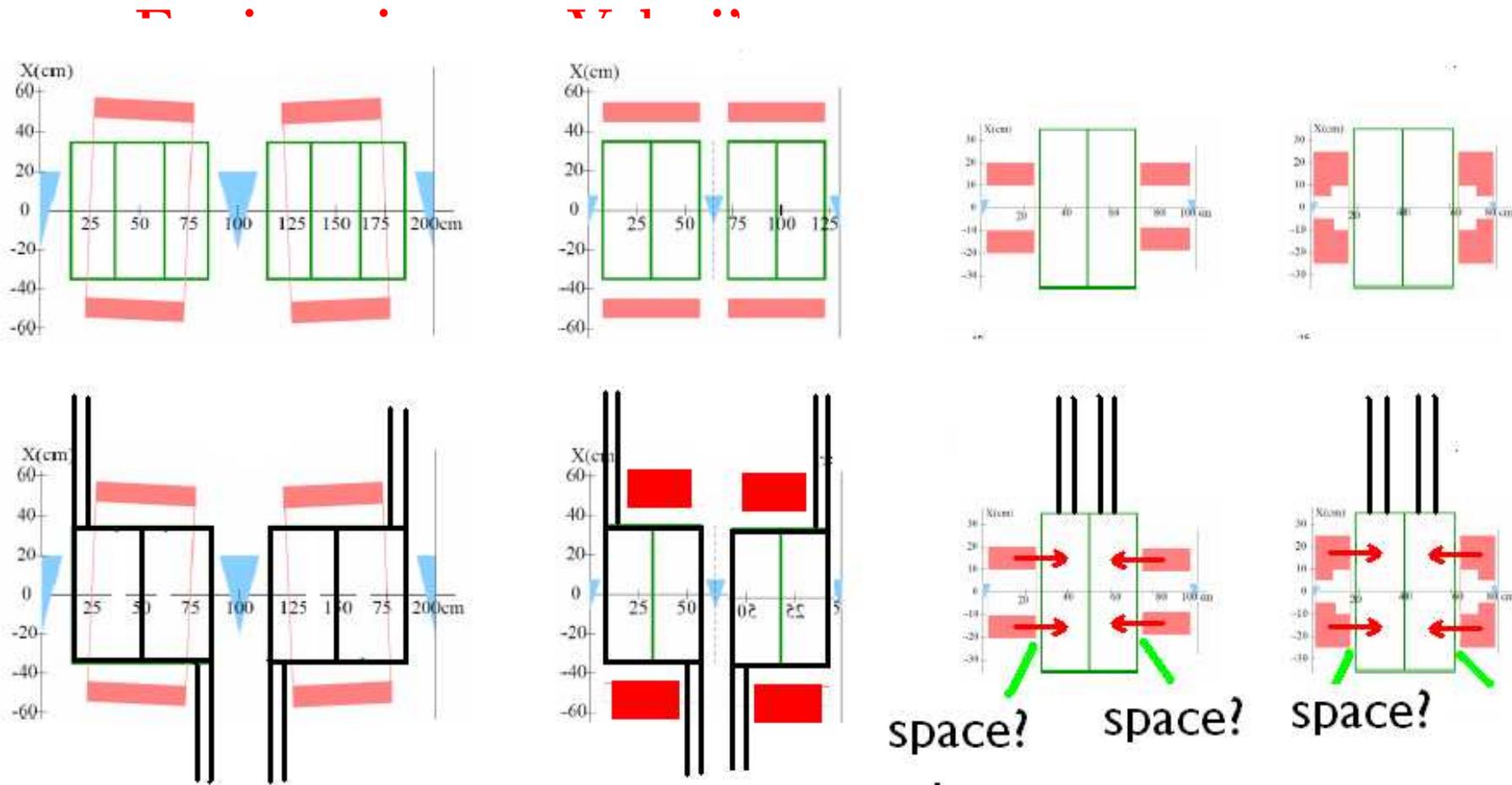
- Dan Bowring

- best lengths 30 cm and 15 cm for 325 and 650

- approx space needed from coil to coil for rf guide:

- 650: .3 (inside) 2x.6 (walls) 2x.5 (thermal) 2x1 (support) = 4.5 cm

- 325: .6 (inside) 2x.8 (walls) 2x.5 (thermal) 2x1 (support) = 6.2 cm



rf feed look ok for all

support for coil outward forces in #3 and #4 probably inadequate

– balanced forces on 1A and 1D symmetric FOFO lattices

– Strong outward forces in 2a and 2b need space for structure

– need 15% space for "other"



- Yokoya on other questions in vac rf
  - space charge gives very high fields 170 MV/m cancelled by image charge?  
field emission ?
  - These effects can be simulated in WARP\*

David cooling parameters

- The advantage of high  $\epsilon/\epsilon_0$  from high balanced by greater  $\sigma_\theta$  giving losses
- The best value of  $\epsilon/\epsilon_0$  may depend on details of simulations

\* no funds now for Grote to worm on WARP

## Decisions

- Use no 4D precool for Collider
- Do not now use snakes - they are not ready for prime time
- Assume Cary charge separator is good

## Priorities to be done

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To decide between Valeri and Palmer/Diktys lattices G4BL/ICOOL of Valeri 'as is'	DS
need match from Cary to start of cooling Valeri's using file from Cary, including match from uniform 2 T	VB or PS
to check that Cary separator is ok Try Charge separation with real coils	CY
To check practicality of rf feeds Need discussion with rf & cryo & engineers	???
Calculate coil forces and space for support Need discussions with magnet, mechanical, & cryo engineering	HW or BW ???

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Need for second meeting in November?