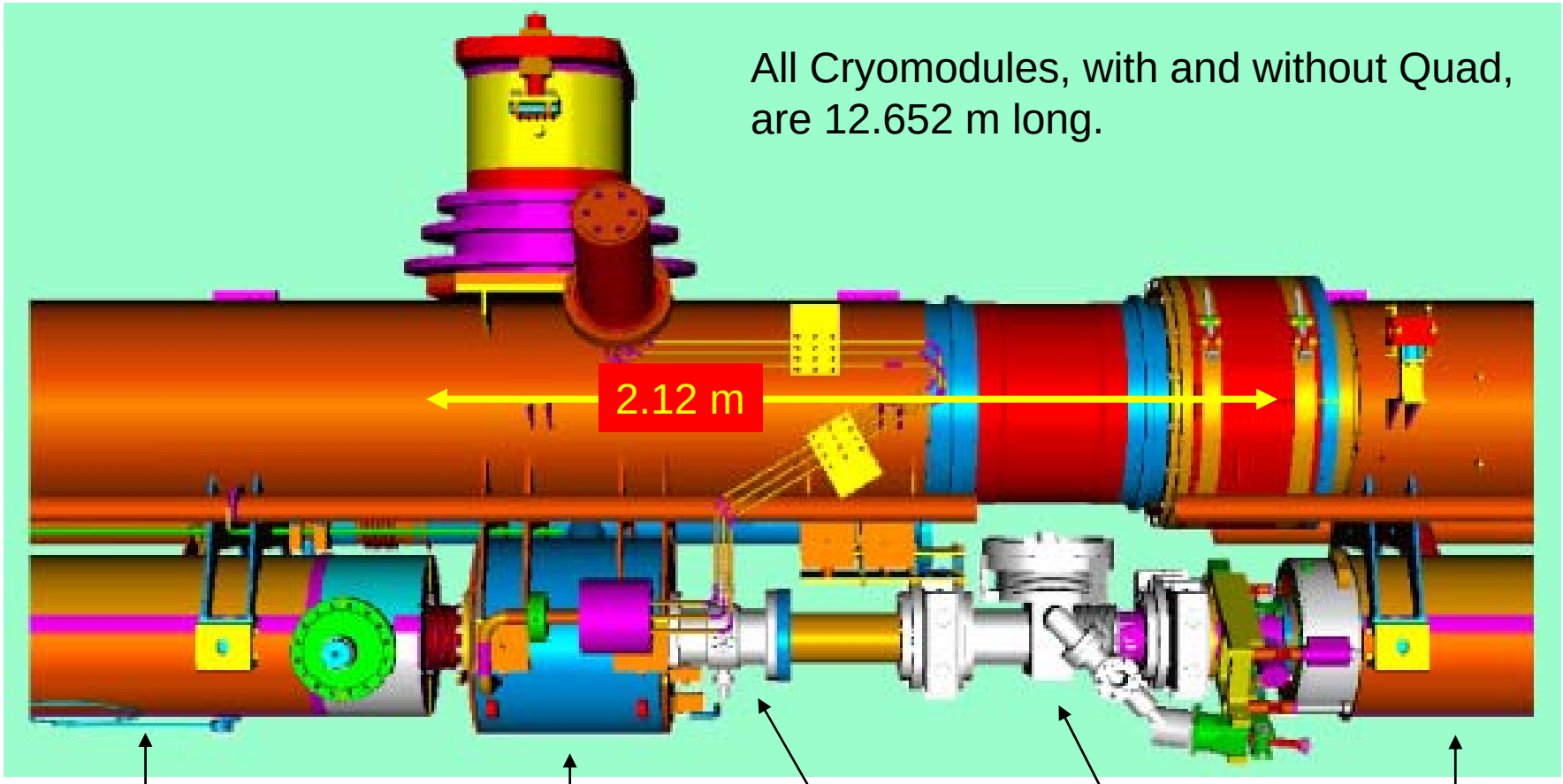
This is from C. Adolphsen sent with following message.

- Attached is a talk I plan to give on Tuesday at the SLAC BD meeting. It outlines four major areas of study, which could be the basis for work packages. Thinking regionally, the US may want to take on the Quad Package Design (mainly FNAL) and Wakefields (mainly SLAC) - how you would you suggest dividing up Static Tuning and Installation/Operation

Overview of Main Linac Beam Dynamics areas that need to be better examined and better documented

Chris Adolphsen Aug 20, 2007

Quad Package in Every Third Cryomodule

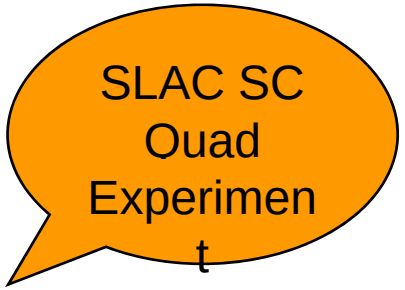


(1) Quad Package Design

- Reexamine Choice of Aperture Size
  - Spoilers to limit damage from beam loss
    - Currently cavity irises are smallest aperture
  - Impact on wakes and cryo heat load
- Finalize bpm design and resolution requirements
- Work with Wakefield group to verify efficiency of HOM absorbers to limit 2K cryo-loading
- Compile specs on quad and correctors (or movers ?) – much work has been done at FNAL

Solyak: Summary of Preliminary Magnet Studies

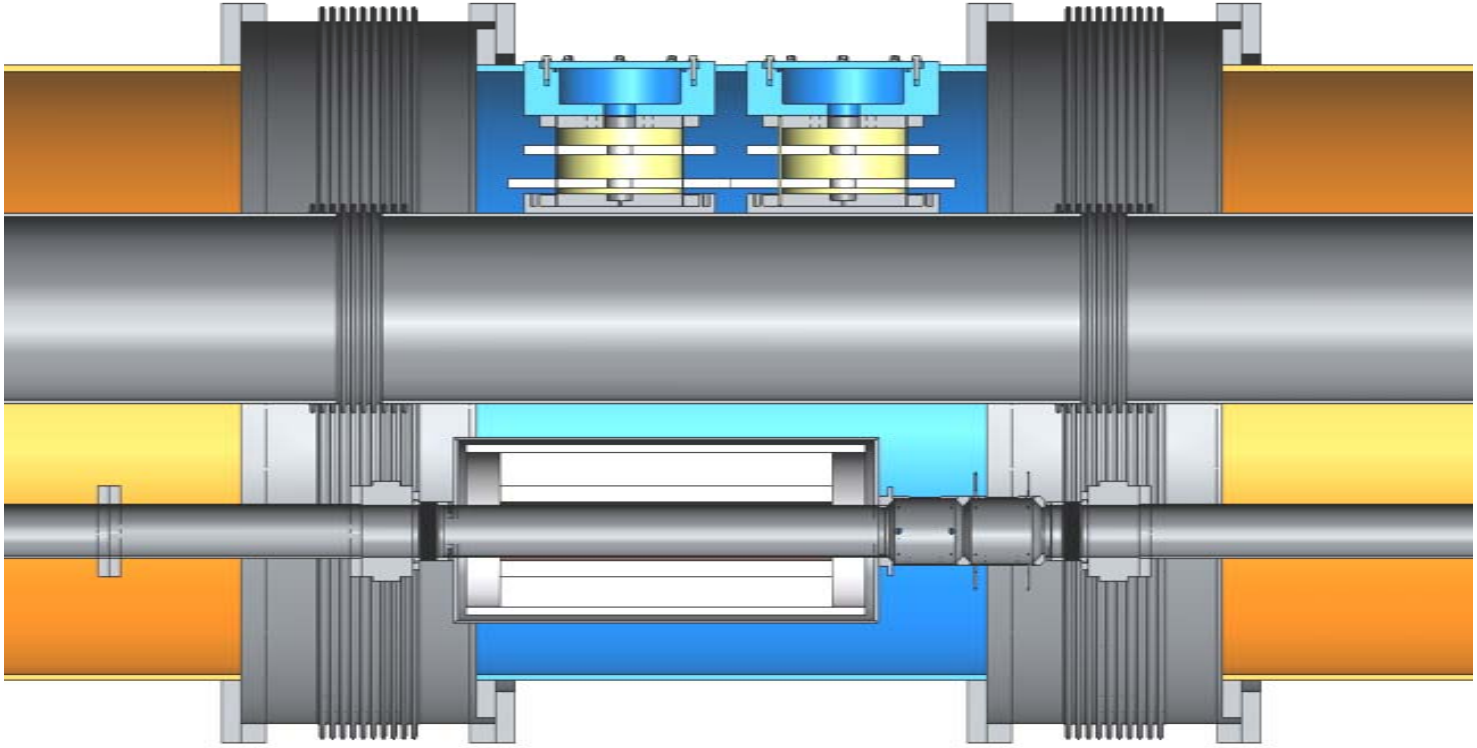
- Linac superconducting magnets are feasible
- Design work started. Magnet design review April 5, 2007.
- R&D and prototyping are needed to confirm the specified performance and efficiency
- *Main issues:*
  - Optimal quadrupole configuration
  - Integrated field range (high:low)
  - Magnetic center stability during –20% field change
  - Combined or stand alone correctors ?
  - Fringing fields in SCRF areas from magnet package
  - Effective current leads



Solyak: Quad Package in Separate Cryostat Option?

Benefits: Independent from CM, better alignment, vibration stability, easy upgrade to 1TeV.

But …Not in RDR baseline design. R&D postponed.



(2) Static Tuning

- Huge effort in this area with many codes developed, but
  - All assume same errors: can these be improved/worsened or offset locally. Need more realistic error length scales.
  - Not clear what limits emittance growth from being reduced further (in theory and practice)
  - Need for tuning ‘bumps’ (last resort of scoundrels)

Error	with respect to	value	$\Delta\gamma\epsilon_y$ [nm]
Cavity offset	module	300 μm	0.2
Cavity tilt	module	300 μradian	< 0.1
BPM offset	module	300 μm	400
Quadrupole offset	module	300 μm	0
Quadrupole roll	module	300 μradian	2.5
Module offset	perfect line	200 μm	148
Module tilt	perfect line	20 μradian	0.7

(3) Installation and Operation

- Long-range alignment
  - Spec for initial linac ‘straightness’ and slow ground motion
- Trajectory control
  - FB and magnet response times based on GM models
- Energy control
  - Measuring the beam energy profile and matching the quad lattice
  - Regulation of energy at the end of the linac
- Emittance monitoring
  - Diagnostics (single laser wires separated by 2.5 km)
- Backgrounds and machine protection
  - Halo, SR, MP, dark currents, spoilers and beam abort

(4) Wakefield/Cavity Topics

- Wake offset due to FPC/HOM antennae intrusions
- HOM absorber versus beam pipe losses
- Simulation of multi-cavity trapped modes
- Simulation of first/second band dipole mode properties and dipole mode data analysis
- Design of a lower R, E field and B field cavity with 60 mm irises
- Multipacting simulations in couplers and HOMs
- Surface magnetic field enhancement due to cell-to-cell misalignments

References

- RDR Chapter 2.8: Emittance Preservation and Luminosity Stabilization
- Main Linac RDR web page
  - http://www.linearcollider.org/wiki/doku.php?id=rdr:rdr_as:main_linac_home
- Accelerator Physics weekly meetings
  - http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=2133
- Accelerator Physics RDR web page
  - http://www.linearcollider.org/wiki/doku.php?id=rdr:rdr_ts:accelerator_physics
- PT's rough cut at Work Packages
  - http://www.slac.stanford.edu/~quarkpt/EDRPlan