SiD Collaboration Meeting Highlights

Tom Markiewicz/SLAC

ILC BDS Meeting

24 April 2007

General Impressions

- Meeting was considered “the best yet” of 3 mtgs.
- All political talks (Brau, Grannis, Odone, Weerts, Jaros...) are in synch:
  - **Detectors need their EDR ~ 2011 at ~same time as ILC**
  - **Concept down-select from 4 to 2 by end of 2008**
  - **Home Run of LHC Physics & Project readiness the only (slim) hope**
  - **Start time of 2012 more important than 2025 end time**

How Should SiD Respond to WWS Roadmap?

An uncertain world! What should SiD do?

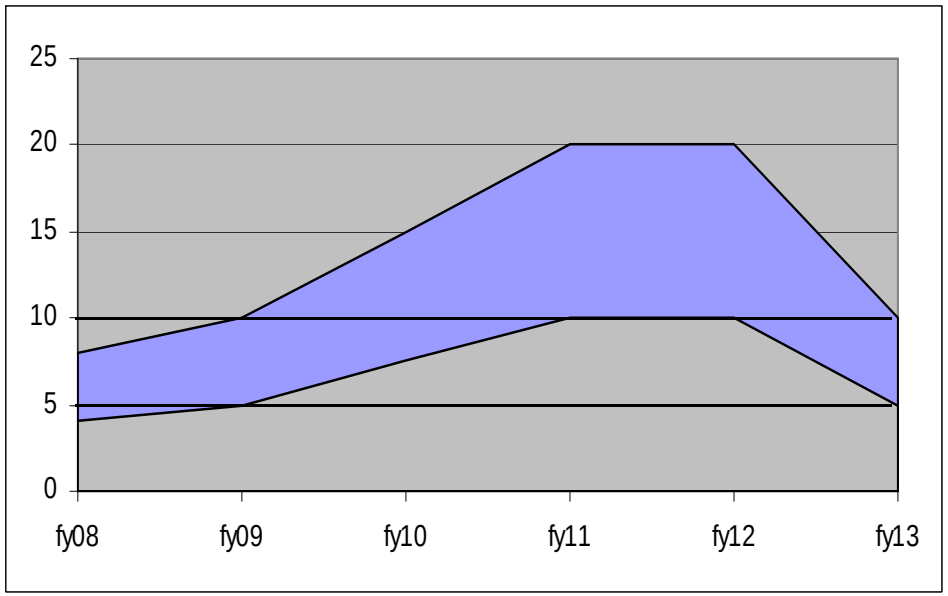
- **Play Ball.**
  Participate in WWS Roadmap Process, the Inter-Concept Jet Reconstruction Working Group, and the ongoing subsystem R&D reviews.

- **Internationalize SiD**
  Recruit new collaborators, especially Asian and Europeans, to help with optimizing the SiD design.

- **Get moving on the SiD Conceptual Design Report**
  We need to understand, optimize, and complete our design.

Reality/DoE views are sinking in

Just an example of problems ahead…….. External to SiD



DOE detector R&D funding profile

This does not support a detector EDR by FY11……

Not quite know what to do with this…….except

That we should respond/pursue our path towards becoming one of the two ILC detectors.

Technical Issues

- PFA work proceeding but more slowly than desirable
  - **implication for design-freeze in preparation for shoot-out?**
  - **Is excellent calorimetry without PF good enough for Physics?**
    - See Ron Cassell talk:
      - Studying HCAL technologies from first principles without recourse to fancy PFA can help
- SiD sees itself as a well integrated detector (the whole more valuable than any part)
  - **TWM's impression is that SiD is skeptical of "Globalized" approach symbolized by C. Damerell committee**

Draft Report from Tracking Review was received in "utter disbelief "

A one-sentence summary of our recommendations: *Form a Tracking Coordination Group to coordinate the completion of the R&D programme, so that the community will be able to finalise the choice of tracking technologies for ILC detectors on the basis of these results.*

6.1.3. LP2 (2010-2011)

Here we can hope to see the prototype that will convince the ILC community to use a TPC tracker.

6.4. SiD

This collaboration is pursuing an R&D programme that is focused on an all-silicon tracking system for ILC. While this approach is likely to satisfy the requirements of homogeneous tracking quality over the full solid angle range, there is the risk that its performance might be uniformly *sub-standard*. Such concerns arise because of the phenomenal high magnetic field. Minor stresses could distort the assembly, and the hammering at 5 Hz due to the Lorentz forces could induce vibrations of unacceptable amplitude. The minor gale of gas used for cooling could also induce vibrations of micron amplitude, and perhaps very much larger. Fortunately, their FSI alignment system will respond to

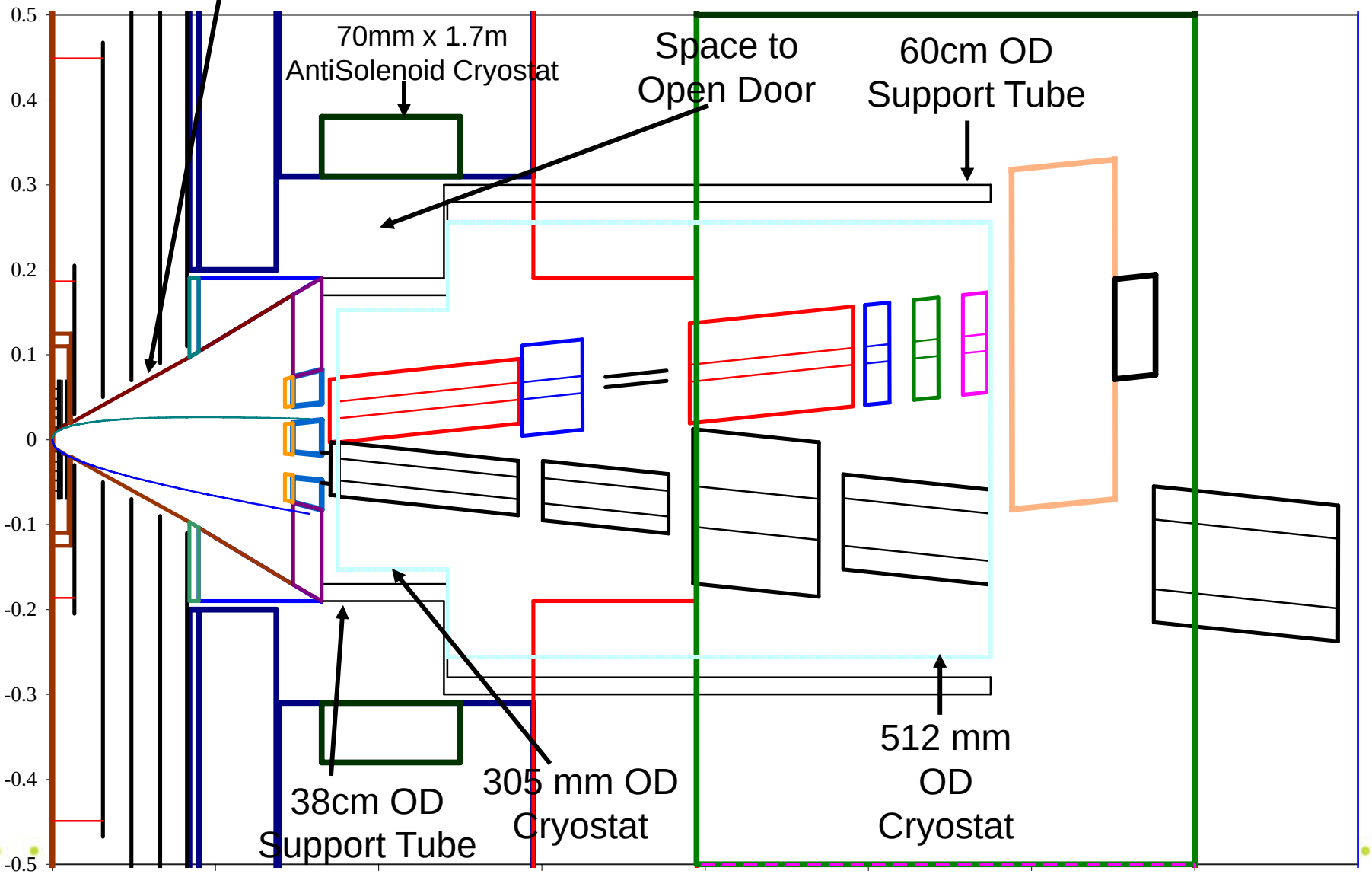
SiD MDI Issues

Tom Markiewicz/SLAC

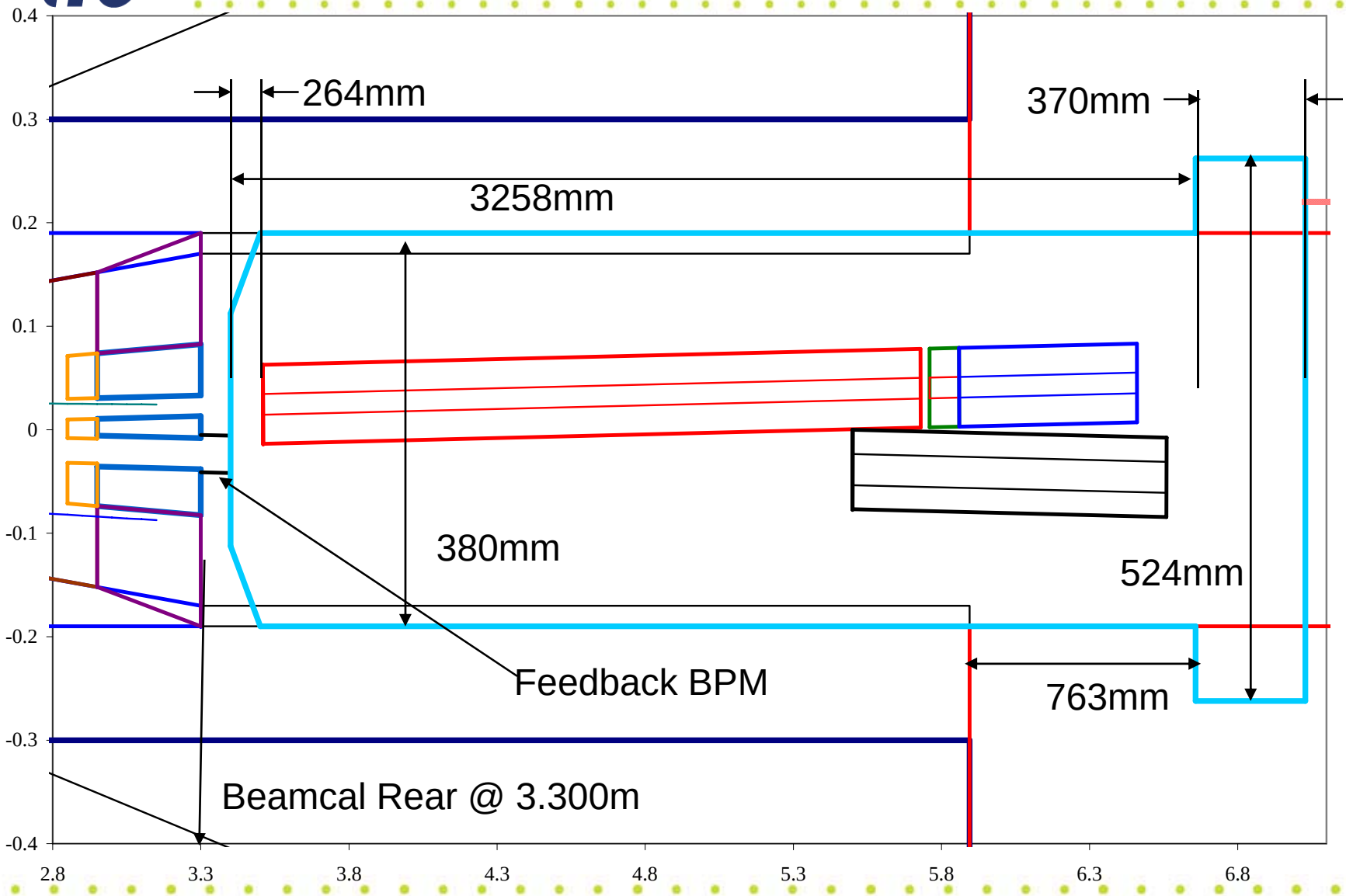
SiD Collaboration Meeting

09 April 2007

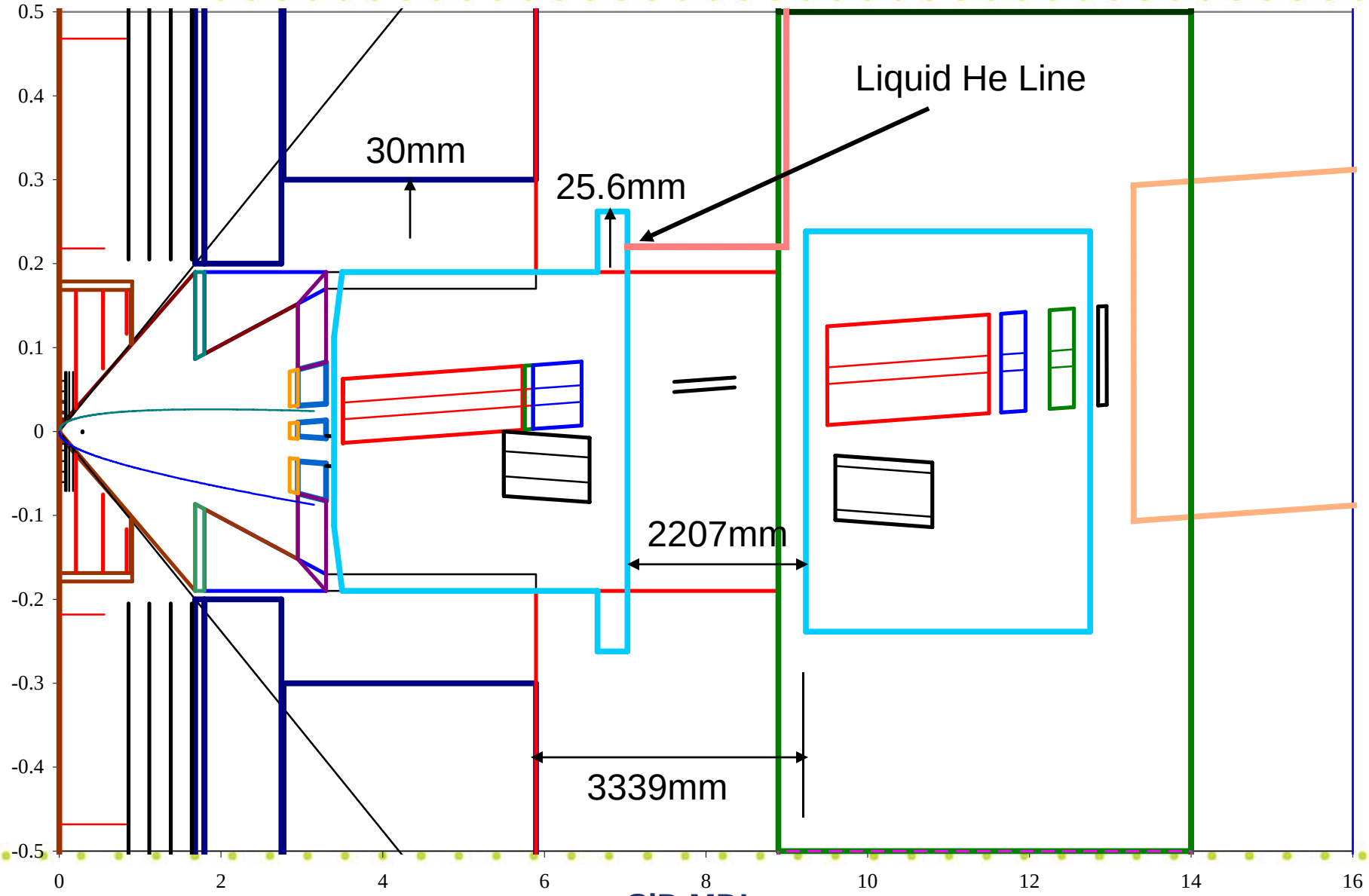
2006-05-07 BNL Discussion



QD0 Cryostat in SiD @ L*=3.664m



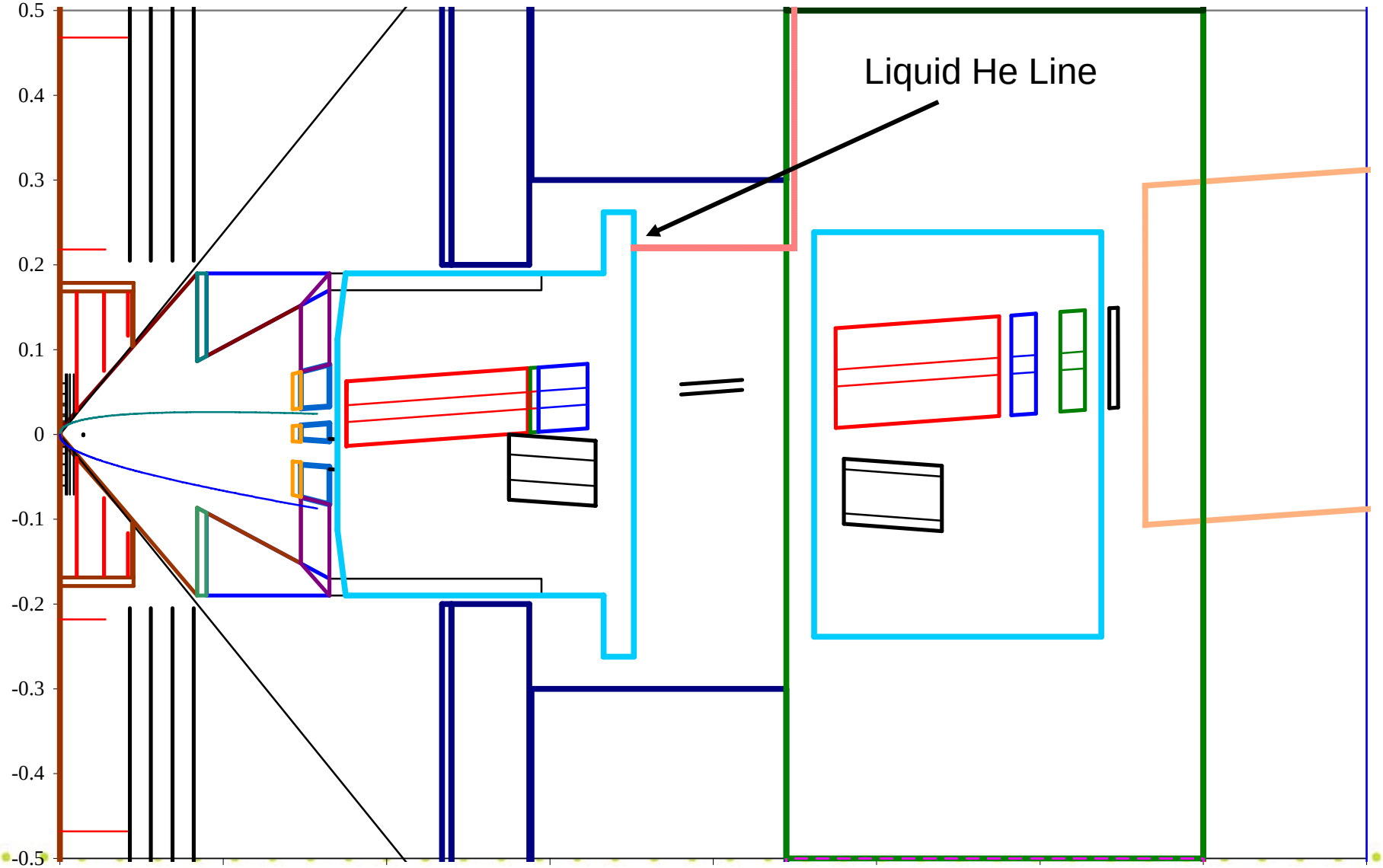
SiD r<50cm, L*=3.664m, 14mrad, Push-Pull, QF@9.5m, Door Closed



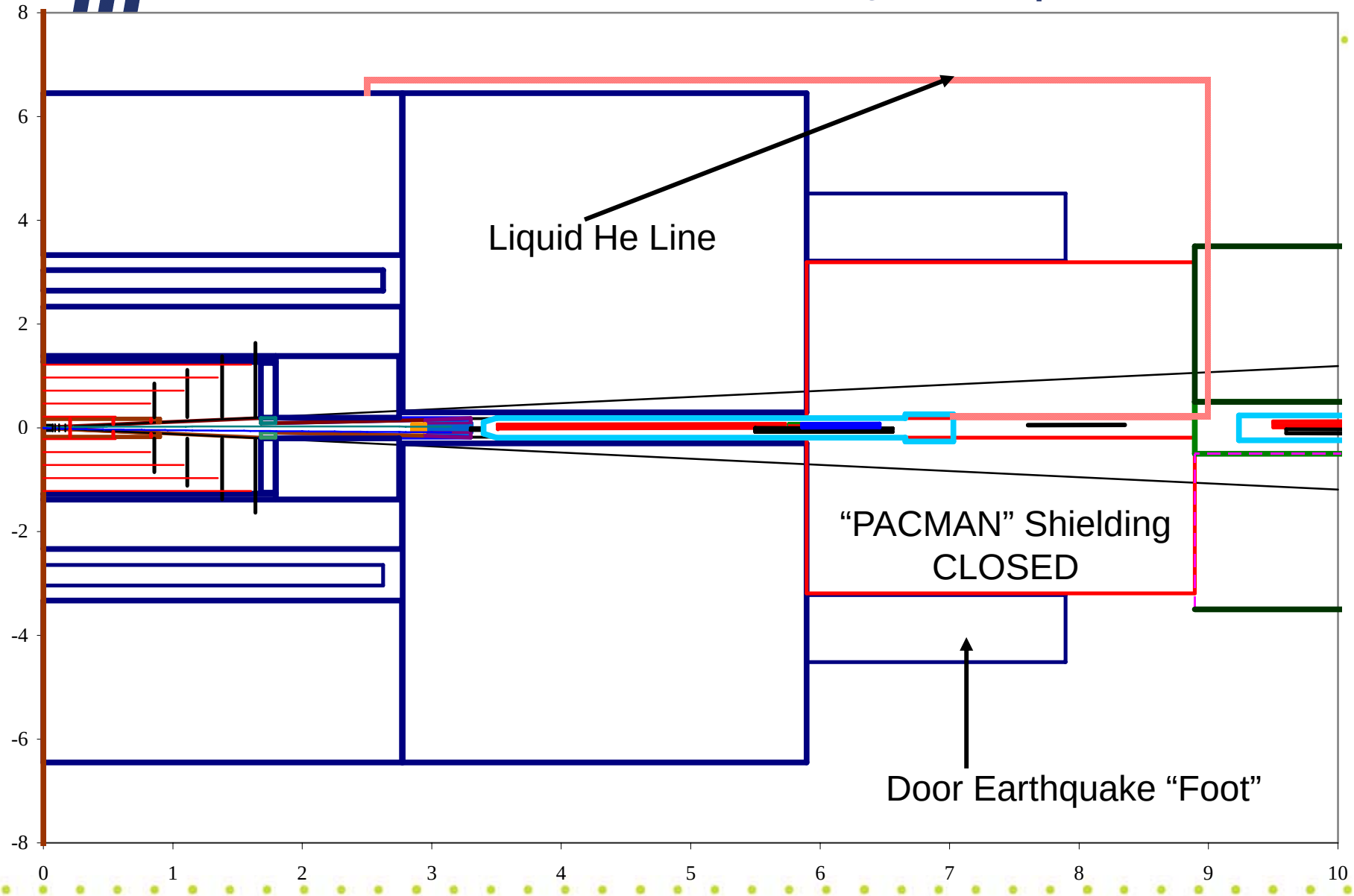
SiD Final Doublet Support and Access Plan with Push Pull @ 14mrad Crossing angle, L*=3.664m

- Three concepts
  - **Permanent liquid He feed line from barrel to QD0 with loop large enough to allow 3m door opening**
  - **10cm (?) radial cutback in endcap iron yoke to allow it to pass over back end of QD0 cryostat**
  - **Drop idea of cantilevered support tube**
    - QD cryostat and FCAL package **supported off rails in endcap doors**
    - Rails incorporate **telescoping "rail extensions"** to support cryostat and FCAL when door is open
    - Is this compatible with "cutback"?

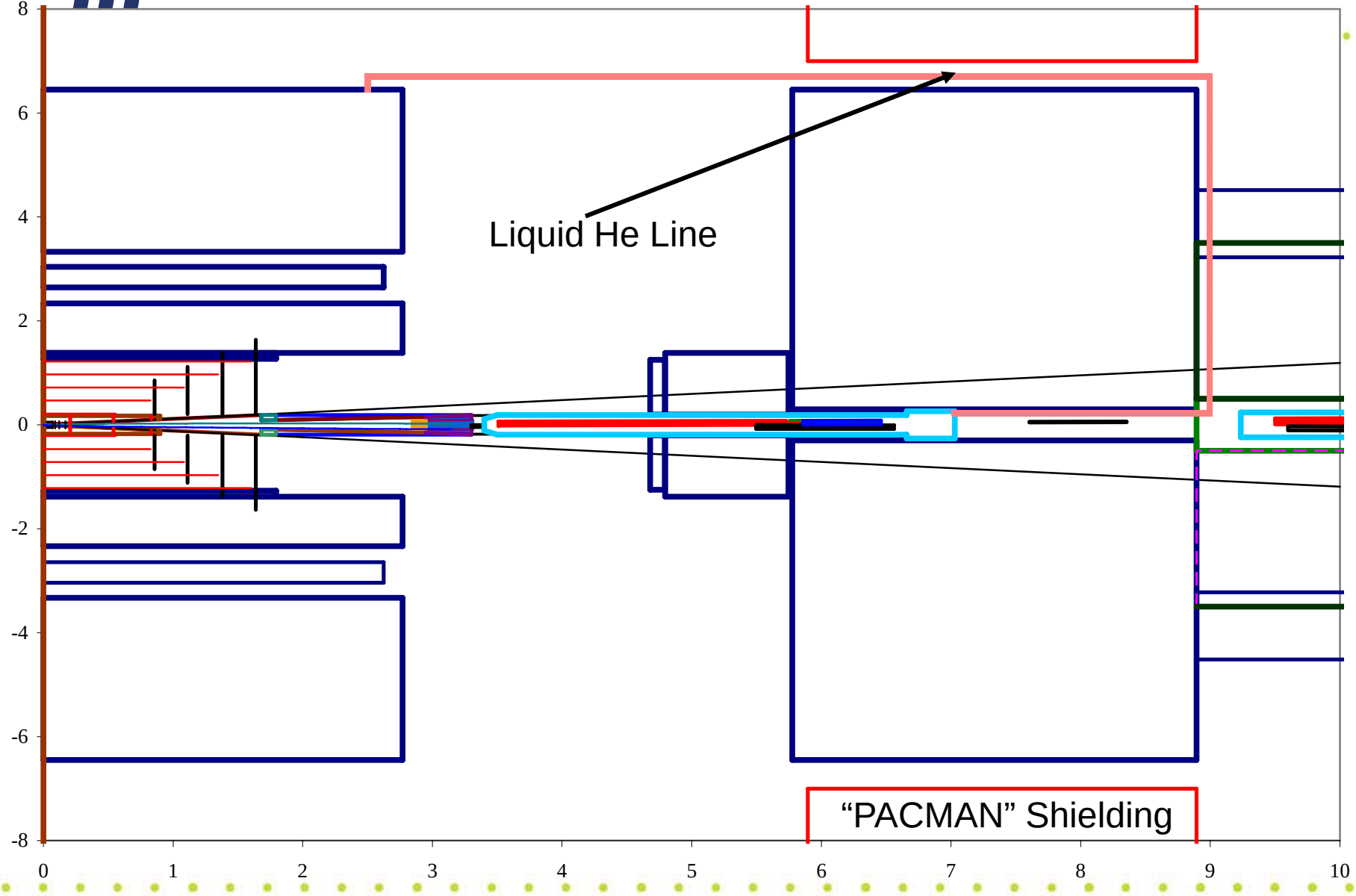
SiD r<50cm, L*=3.664, 14mrad Crossing Angle, Push-Pull, Door **Open**



Door Closed, Permanent QD0 Liquid He Line

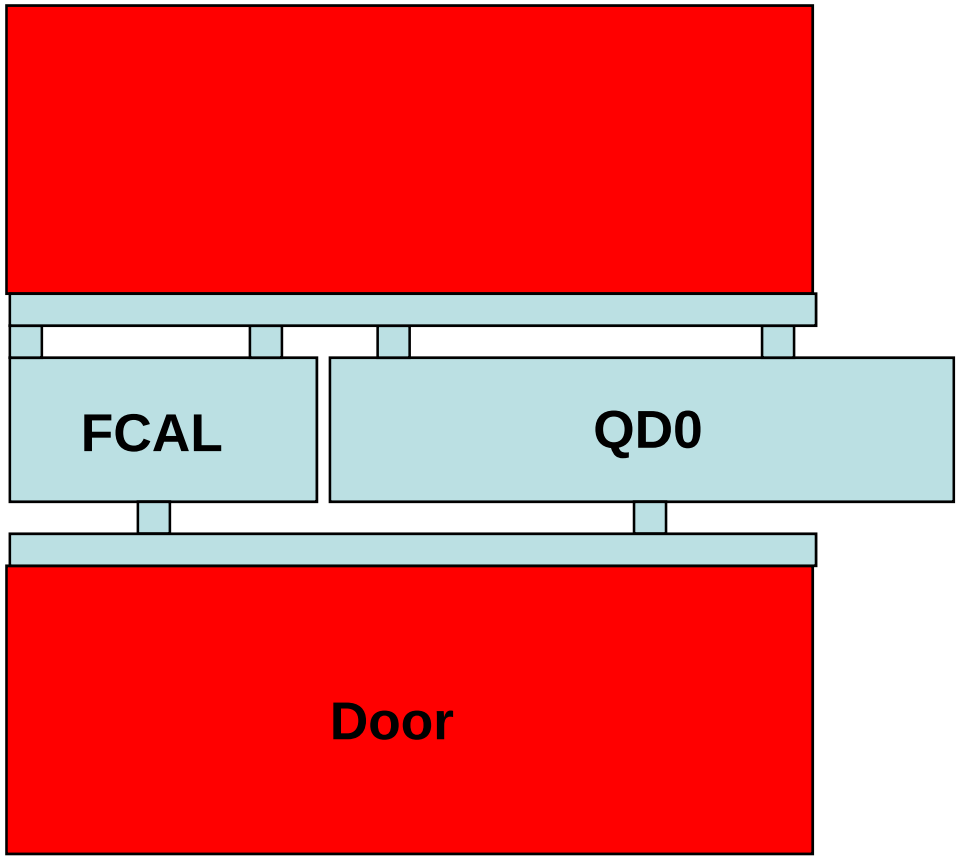


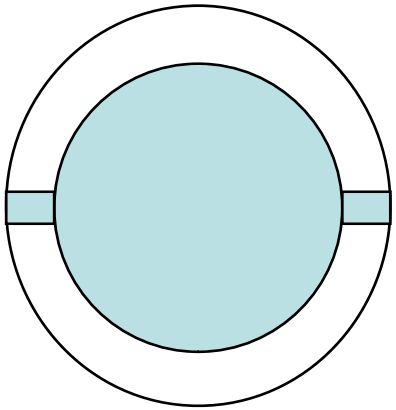
Door Open, Permanent QD0 Liquid He Line



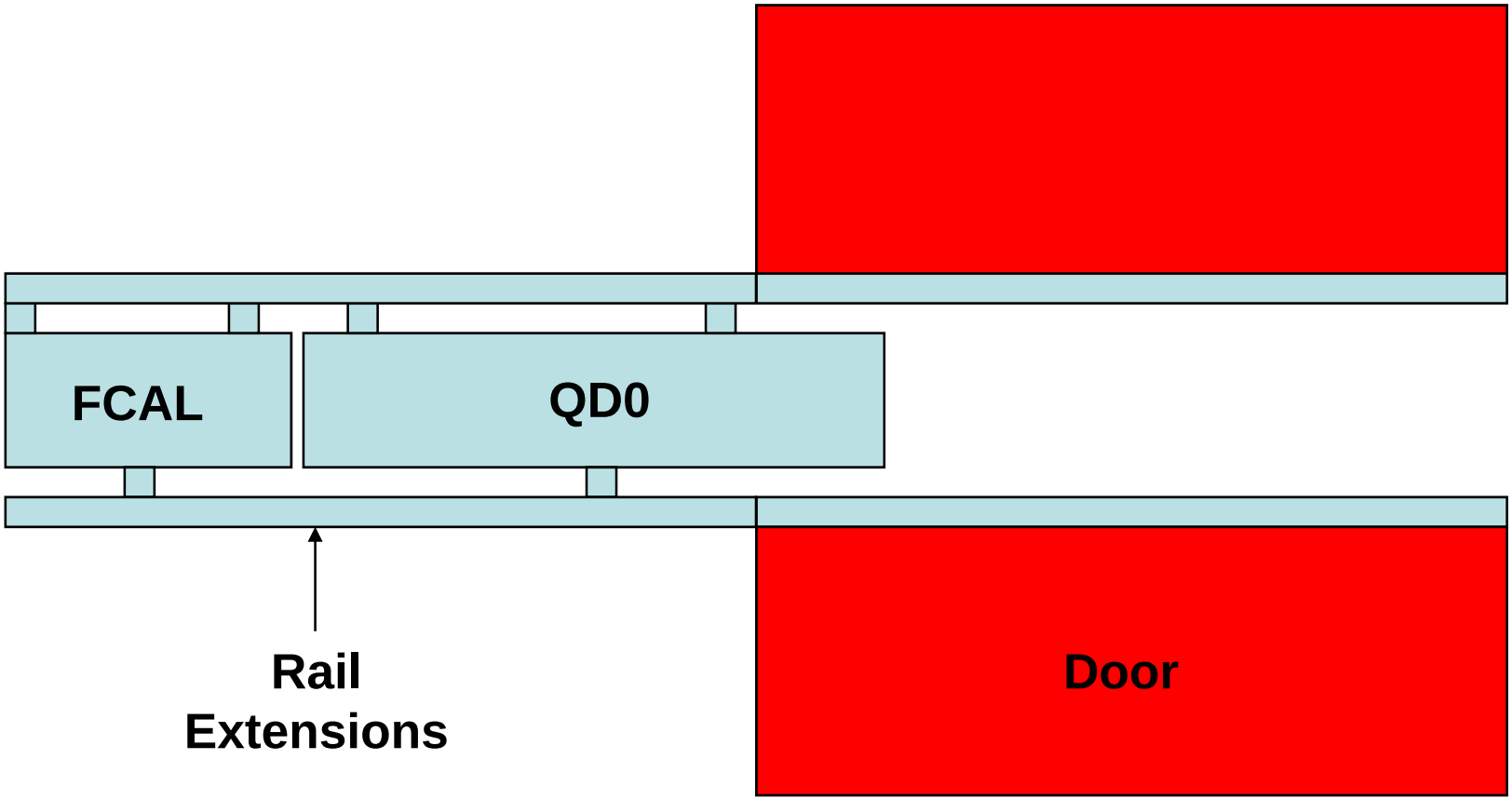
Plan & Elevation View of FCAL/QD0 Support

Ignore for the moment fact that I have drawn endcap ECAL/HCAL down to r=20cm and yoke at 30cm





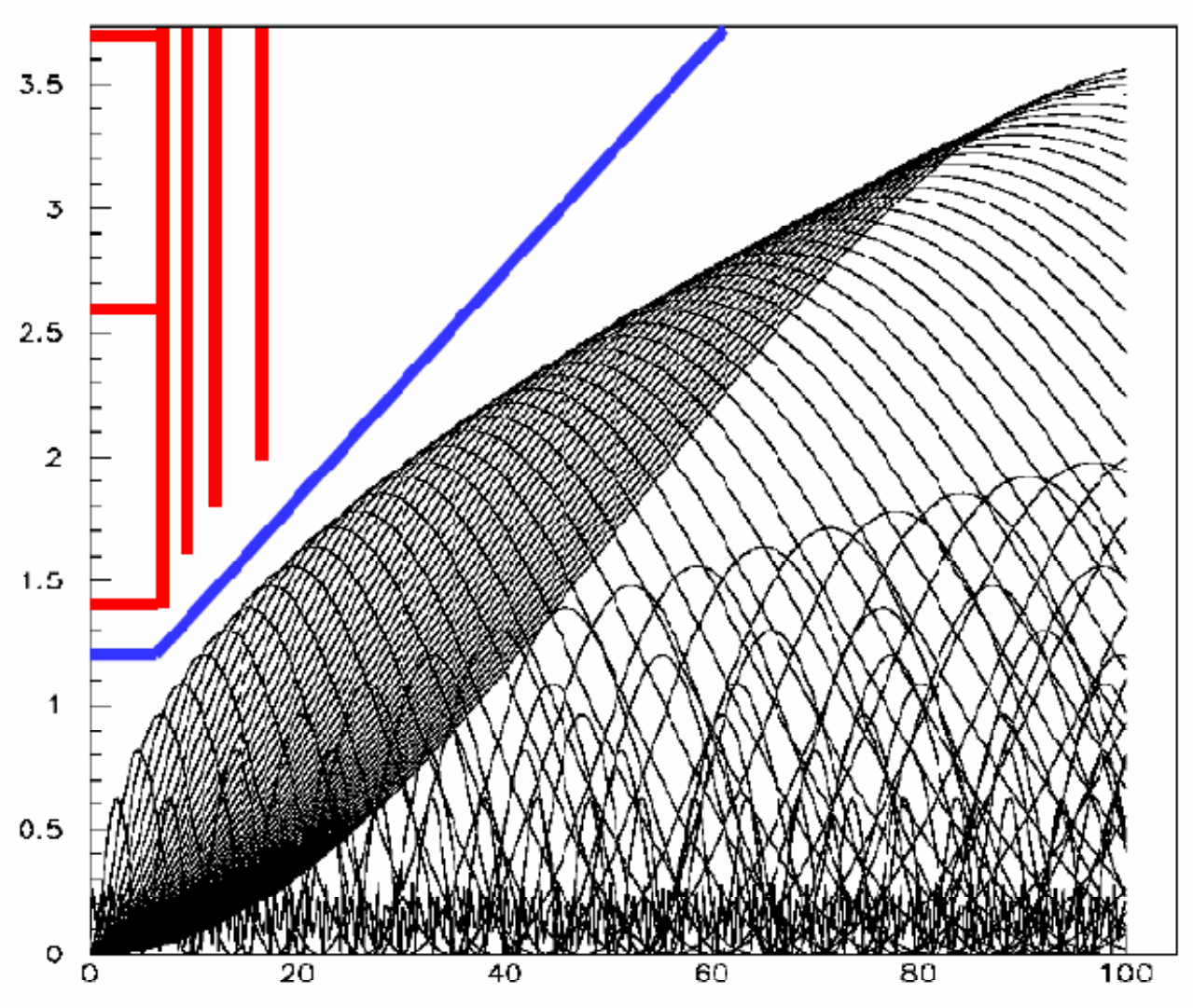
FCAL/QD0 Supported with Door Open



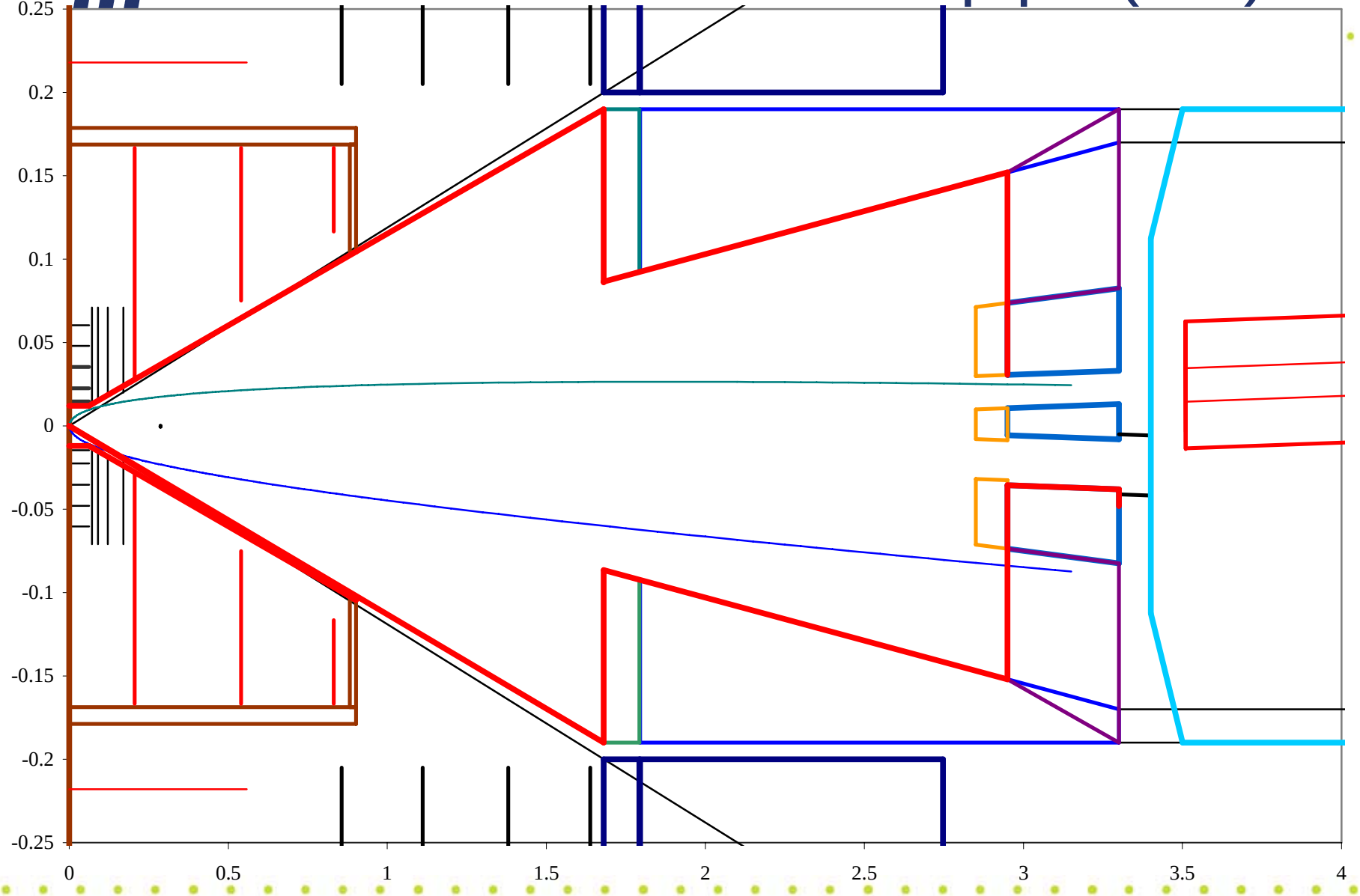
Three beampipe shapes have been considered over time for SiD

- Flat at 12mm for VXD, flared to O.D. of Lumical (190mm) @ z_{min} = 1.68m of endcap ECAL
- Flat at 12mm for VXD, flared to I.D. of Lumical (86.5mm) @ z_{min} = 1.68m of endcap ECAL
- Flat at 12mm for VXD, flared rapidly to clear pair stay free until r=86.5mm (r_{min} of Lumical @ z_{min} = 1.68m), then cylindrical
- In all cases, beam pipe then becomes conic and follows inner surface of mask until beampipe

12mm Beam Pipe and VXD Detail



Detail of current beampipe (red)

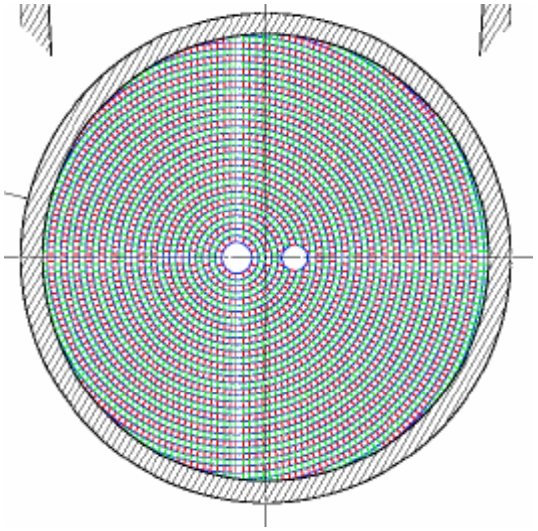


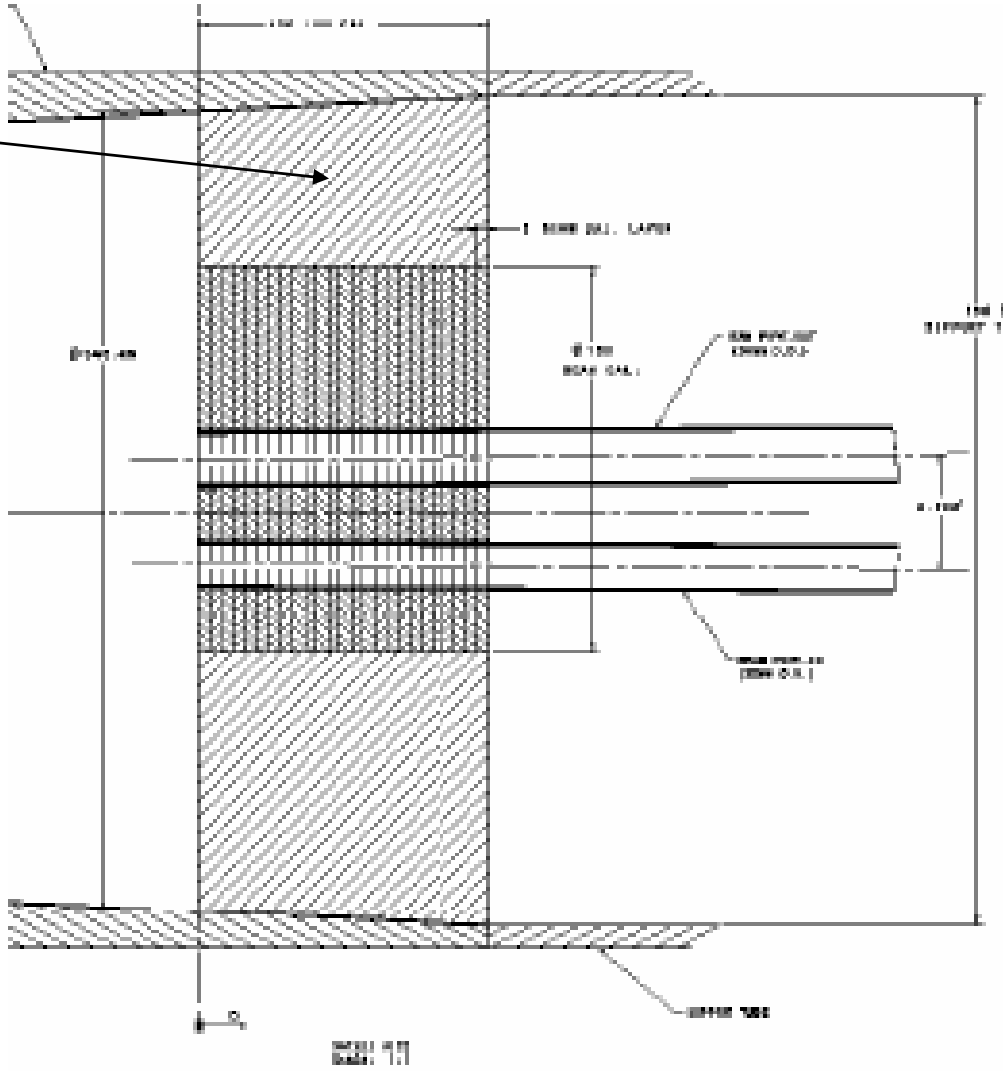
Often forgotten points that need discussion

- There are **TWO** parts to “LumiCAL” whose relative importance has yet to be studied
  - **Low radius extension of endcap ECAL=Lumi1**
  - **Large radius part of “Beamcal” beyond region where pairs hit= Lumi2**
- The very heavy forward detector and masking system (Lum1, Mask (instrumented as HCAL or not?), Lum2+Beamcal package must **NOT** be cantilevered off QD0 cryostat **EXCEPT** when the door is open

Elevation & Plan Views of Far-Lumi/BeamCal from SiD DOD

Has any thought been given to details of the Far Luminosity Monitor?



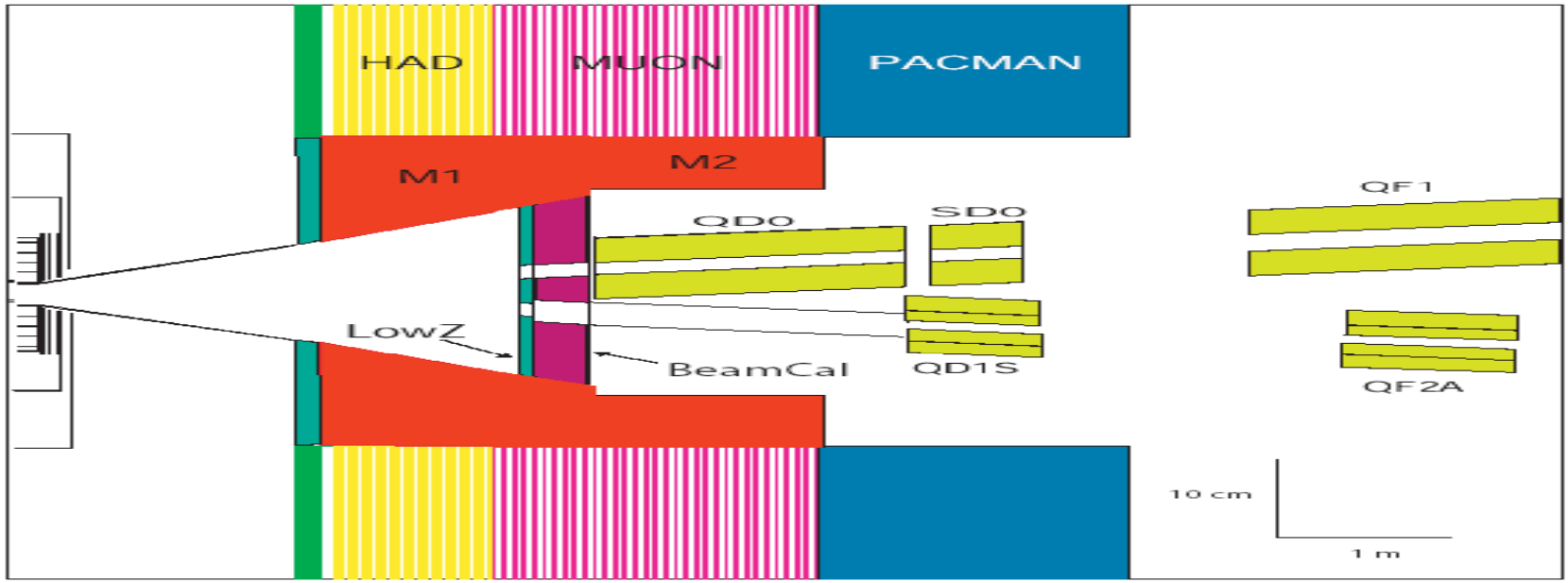


Conceptual Solution for R20 Mechanics is Needed

- Support points
- Bellows
- Flanges
- Alignment and adjustment features
- Vacuum features (if any) at z<7m (end of QD0 cryostat)
- Cable & Gas service routing
- Rethinking of access requirements in PUSH-PULL
  - **On-beamline access for rapid repair**
  - **Off-beamline access for VXD or TRACKER replacement**

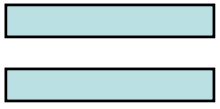
T. Maruyama Recalculation of ALL Backgrounds for Current Layout 03 April 2007 (see BDS)

14 mrad crossing geometry in Geant 3 and FLUKA



Apertures:

QD0

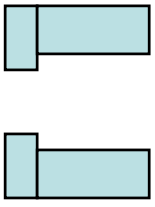


R=1.0 cm@z=-3.51 m

Beampipe@IP

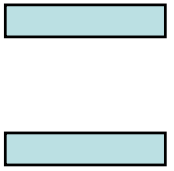
1.2 cm@0.0m

Low Z



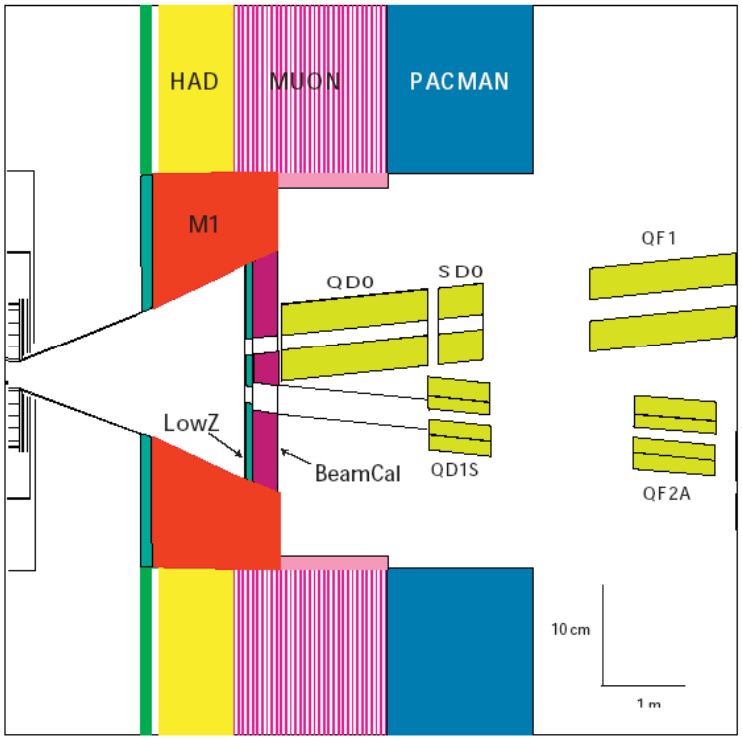
1.35 cm
@2.85-2.95m

QD1S

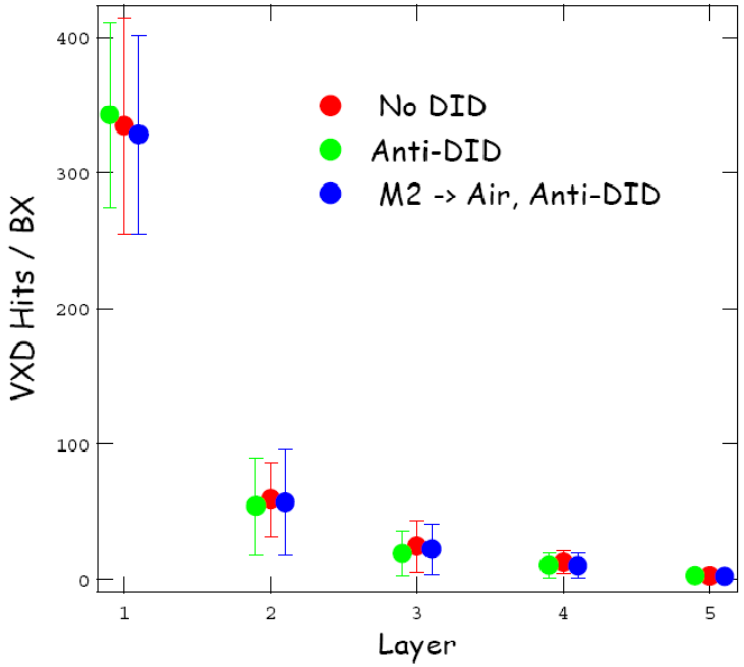


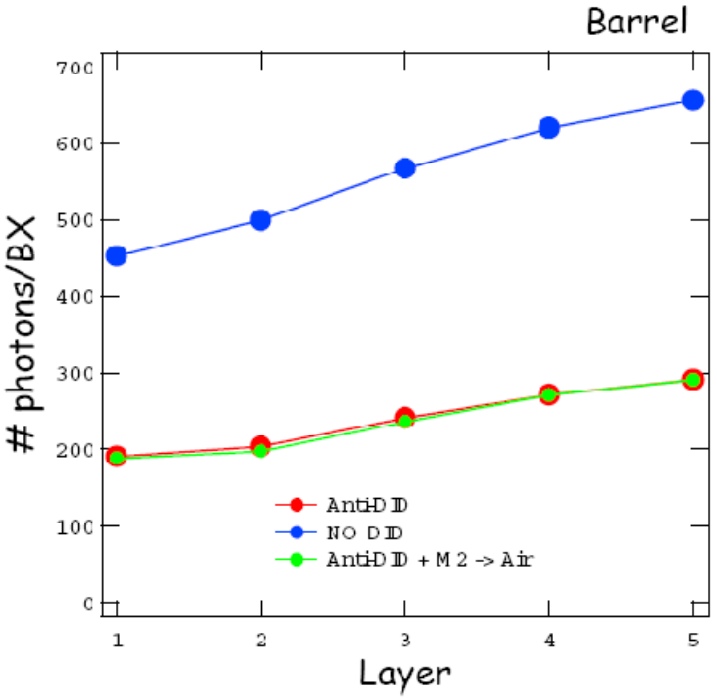
1.5 cm
@5.5-6.56m

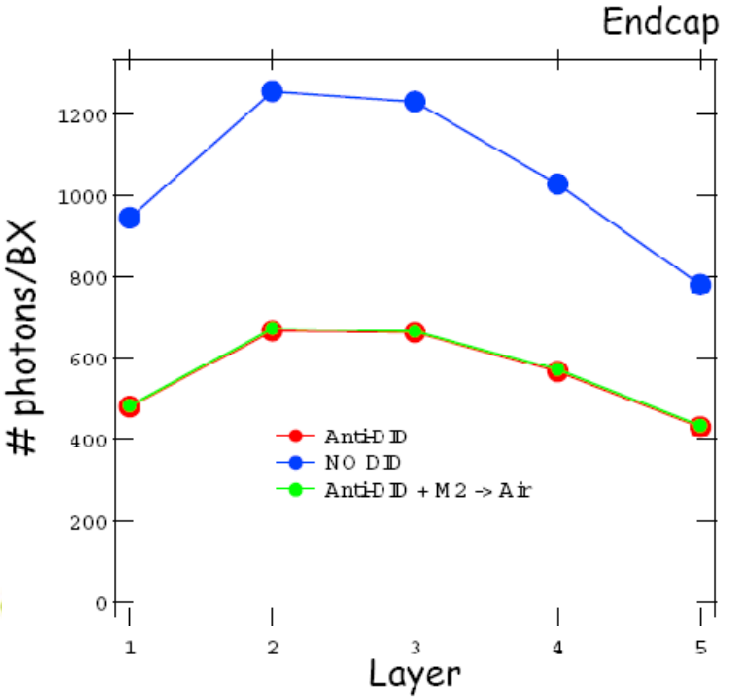
Is M2 NEEDED or NOT????



No M2 Mask Needed







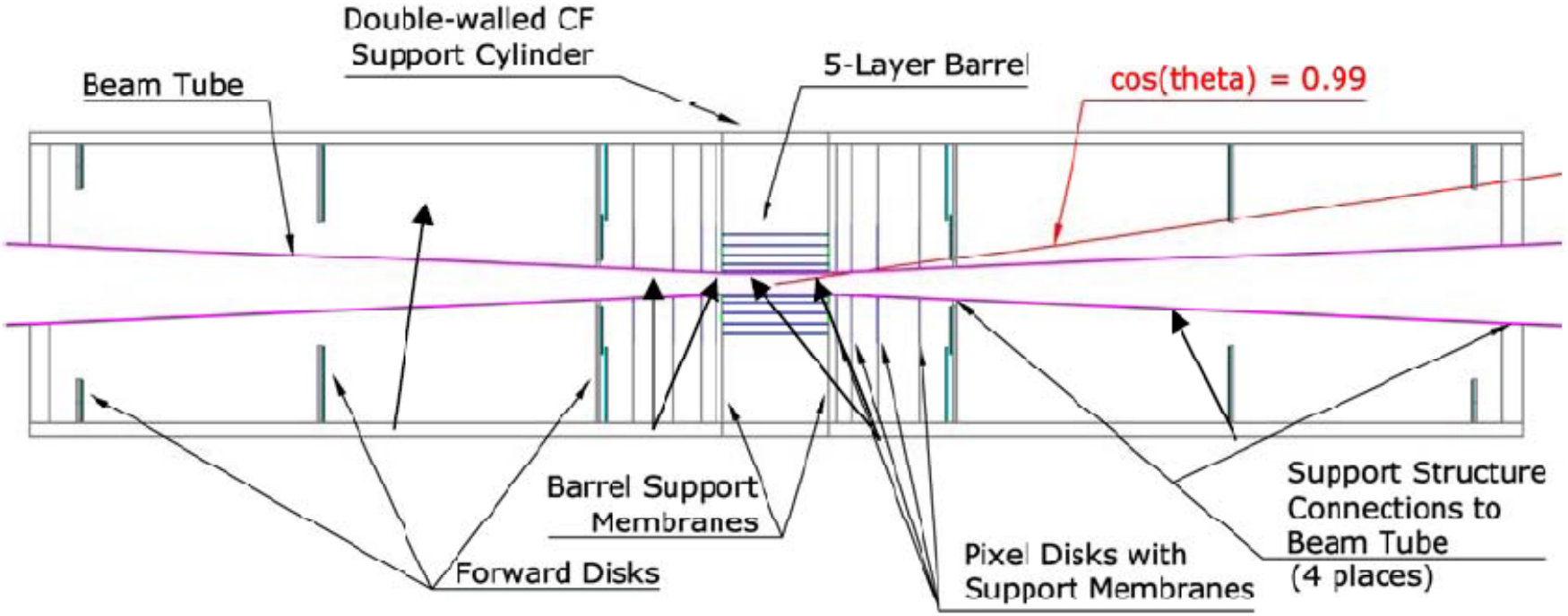
Bonus Material Follows

Pair Radius in cm at Z=168 cm

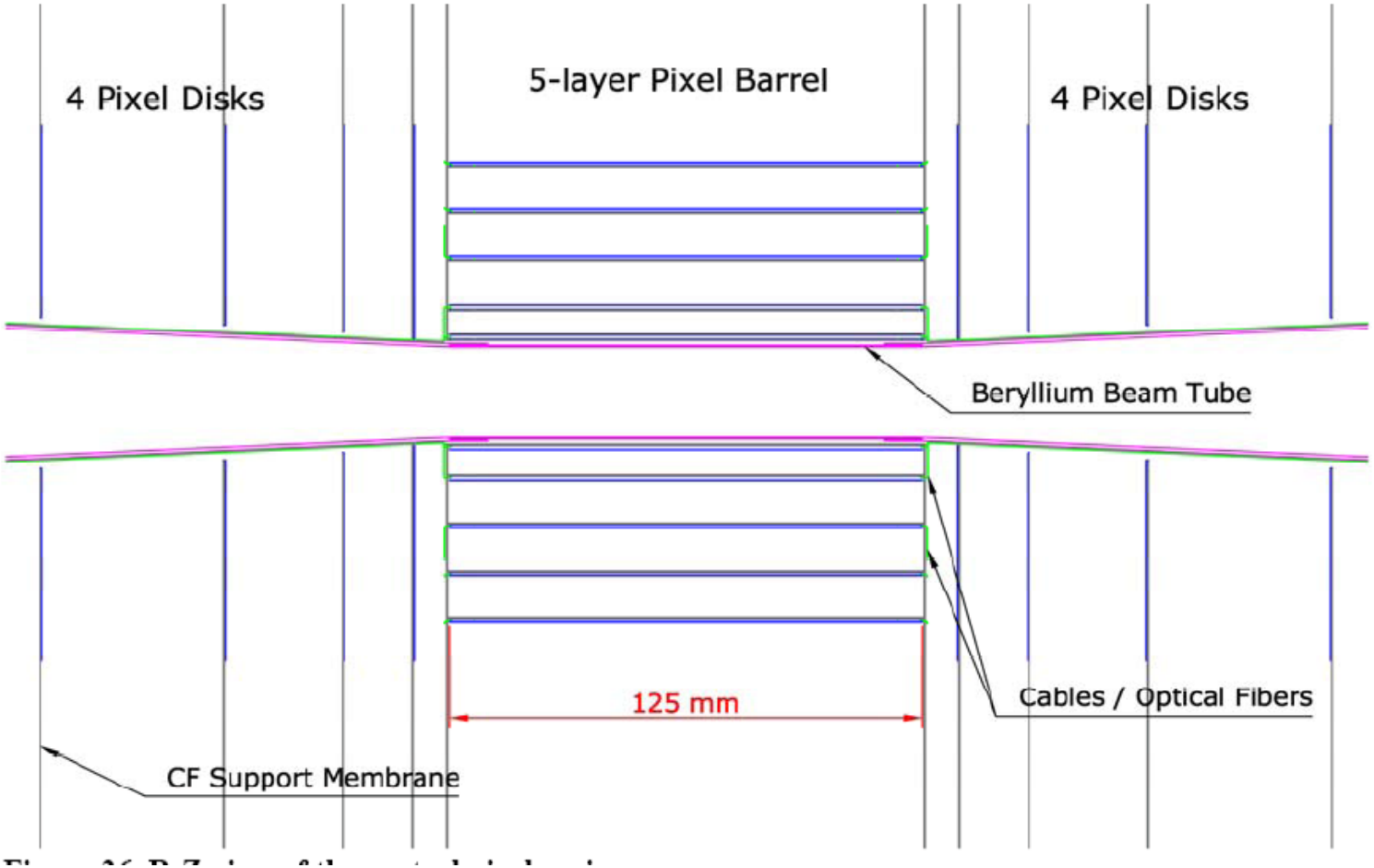
	4 Tesla			5 Tesla		
	ANTI-DID	NO DID	DID	ANTI-DID	NO DID	DID
N	5.2 / 4.7	5.1 / 5.5	5.8 / 6.5	4.7 / 4.1	4.4 / 5.1	5.3 / 6.1
Q	4.7 / 4.2	4.4 / 5.1	5.3 / 6.0	4.2 / 3.8	3.8 / 4.6	4.8 / 5.6
Y	4.6 / 4.2	4.6 / 5.1	5.5 / 6.0	4.3 / 3.9	4.1 / 4.6	4.9 / 5.7
P	6.3 / 6.0	6.2 / 6.8	6.8 / 7.6	5.7 / 5.3	5.5 / 6.1	6.4 / 7.0
H	7.0 / 6.6	6.8 / 7.3	7.4 / 8.2	6.2 / 5.9	6.1 / 6.7	6.7 / 7.5

Radius in black is measured from solenoid axis (x,y) = (0., 0.).
Radius in red is measured from extraction line (x,y) = (-1.176 cm, 0.)

VXD and Support Structures



R-Z View of the Pixel VXD



SiD Open for Access to the VXD Region

What Opening is Required for Access ON Beamline?