

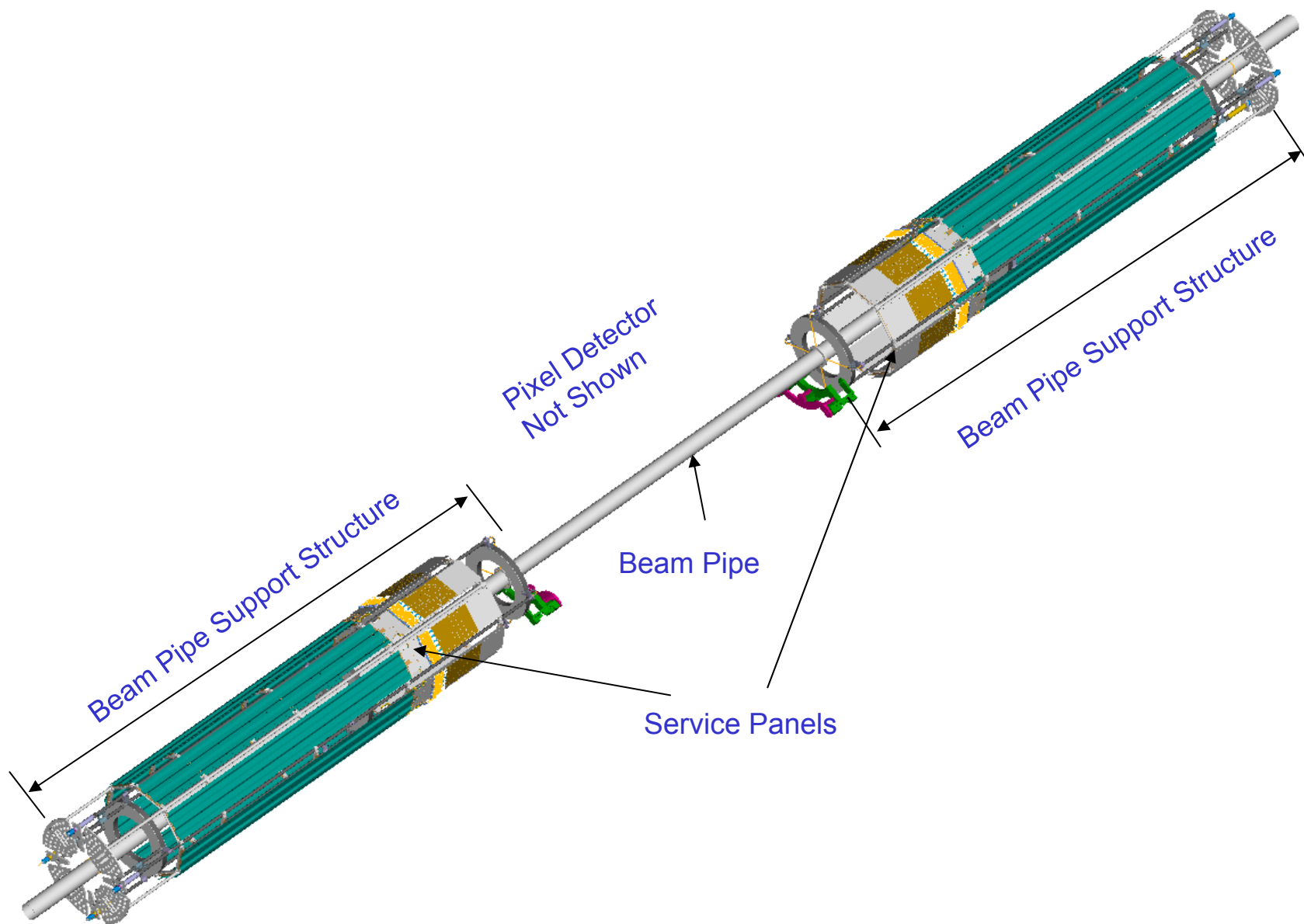
# Beam Pipe Support Structure (BPSS) Interface and Assembly

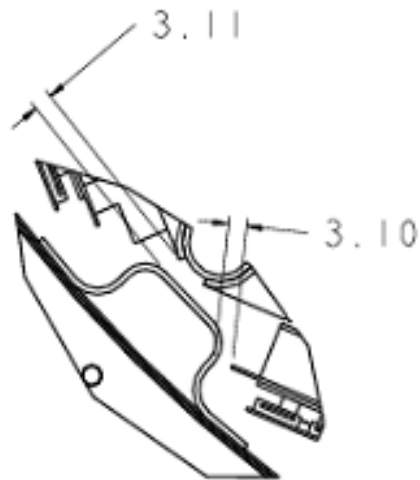
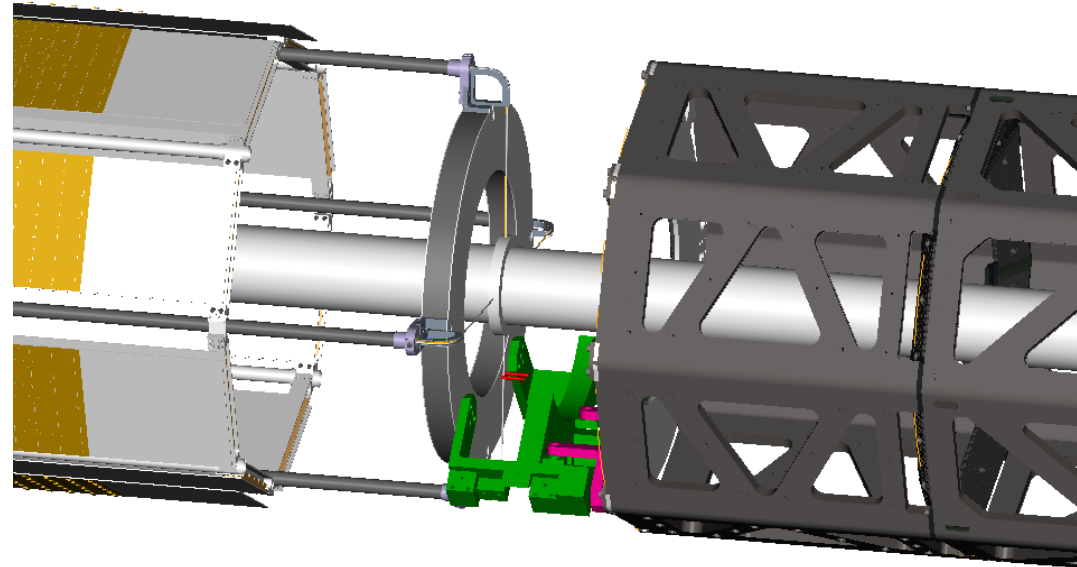
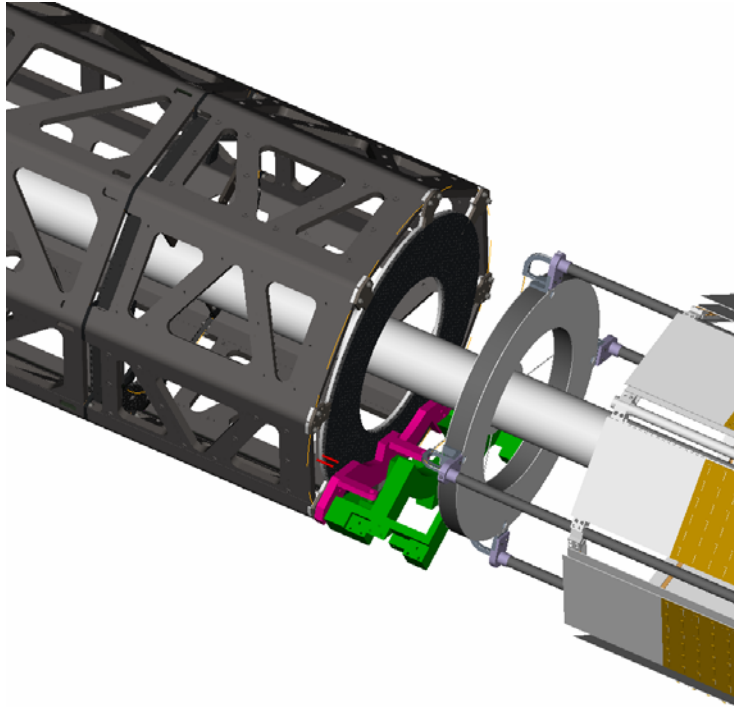
Final Design Review, April 2003  
E. Anderssen, N. Hartman  
LBNL

The diagram illustrates the layout of the ATLAS detector, showing the central Pixel Detector and SCT Barrel, flanked by TRT Forward and Services and Beam Pipe Support Structure. The layout is divided into Side C (left) and Side A (right). The central region is labeled 'Pixel Detector' and 'SCT Barrel'. The outer regions are labeled 'TRT Forward' and 'Services and Beam Pipe Support Structure'. The diagram includes a legend for various components:

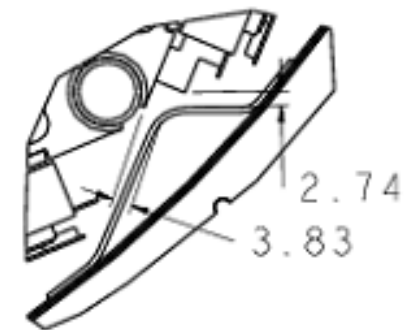
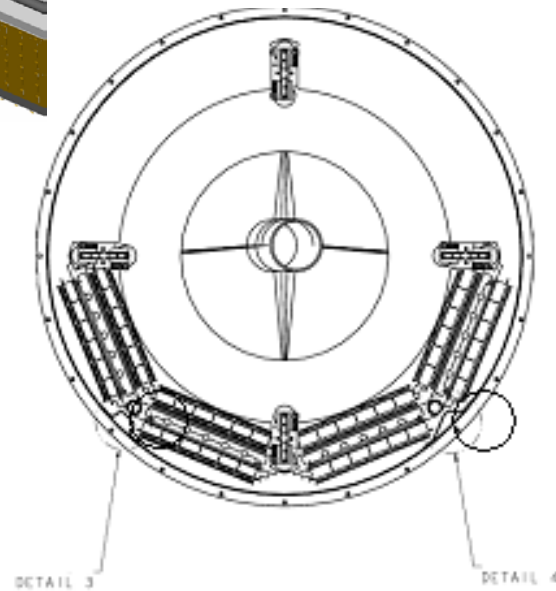
- Beam Pipe Support Wire (Black line)
- ID Endplug (Orange outline)
- PP1 (Pink rectangle)
- PST Support Flexures (Red rectangle)
- Beam Pipe (Grey rectangle)
- Insertion Trolley (Dark red rectangle)
- Pixel Support Tube (Orange rectangle)
- Package Insertion Riders (Yellow circle)
- PP1 Bellows/Temporary Support (Cyan rectangle)

Key vertical positions are marked: Z=3200 – Bellows/Temp. Support, Z=3120 – Adjustors, Z=3092 – PP1, and Z=848 – Wire Support.

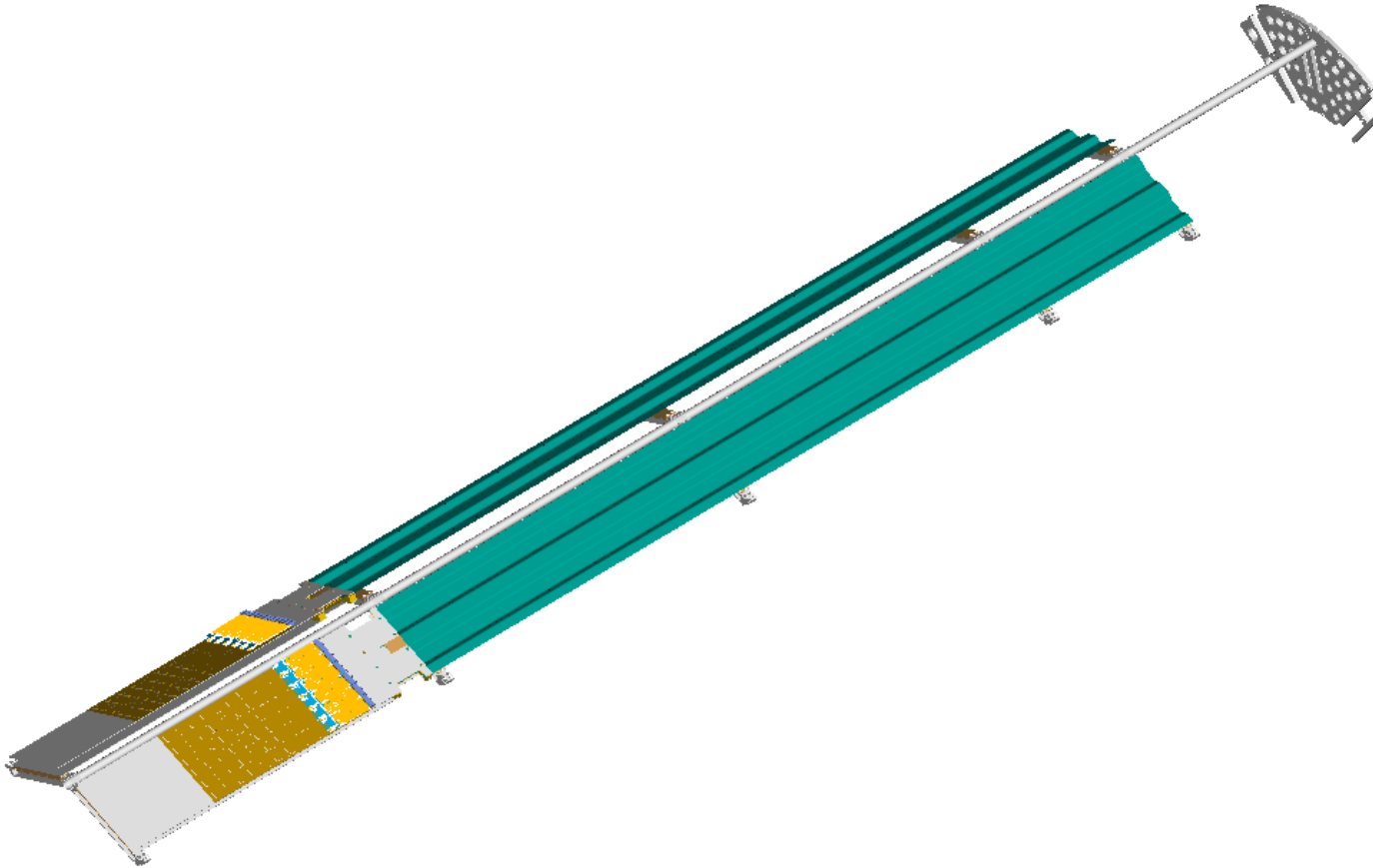




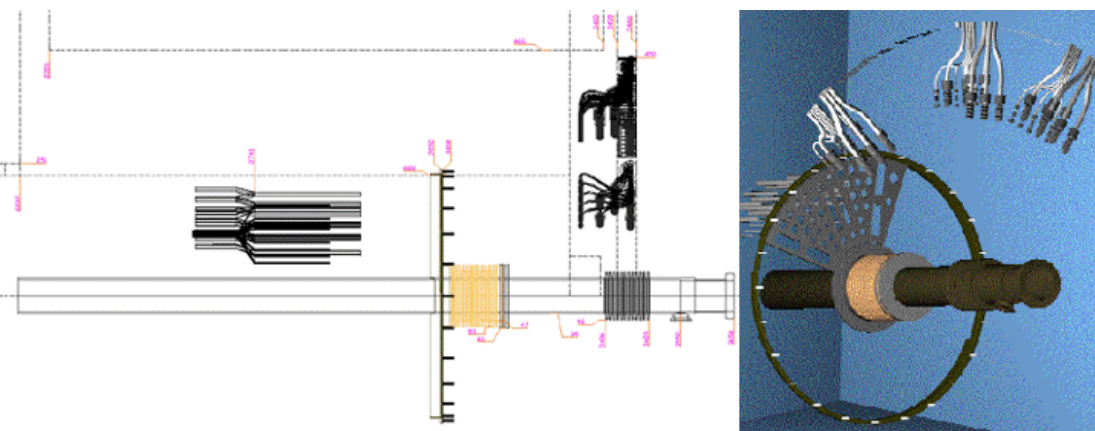
DETAIL V RAIL



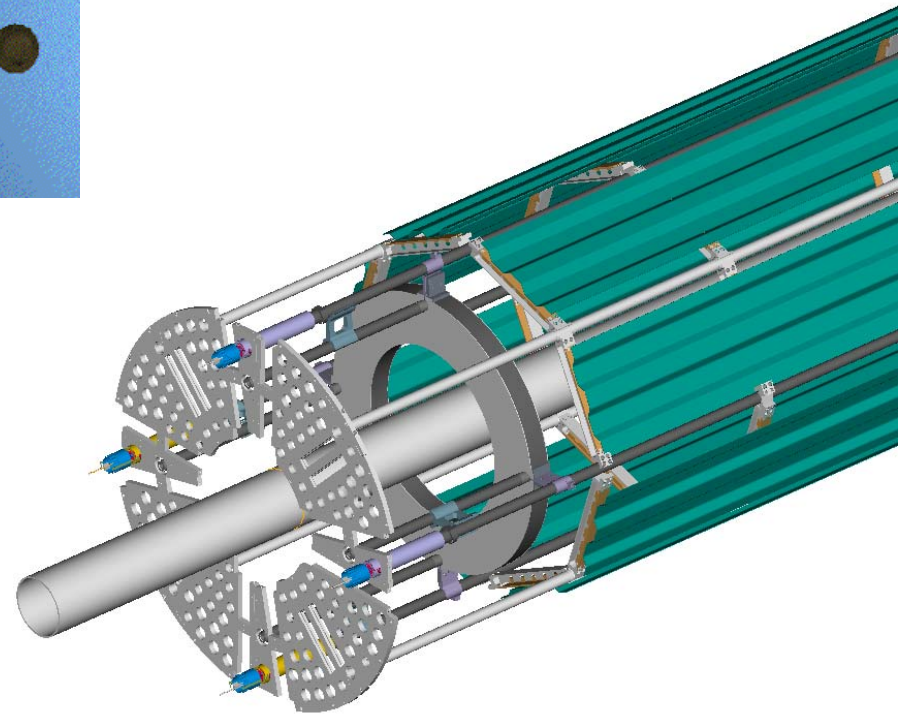
DETAIL FLAT RAIL



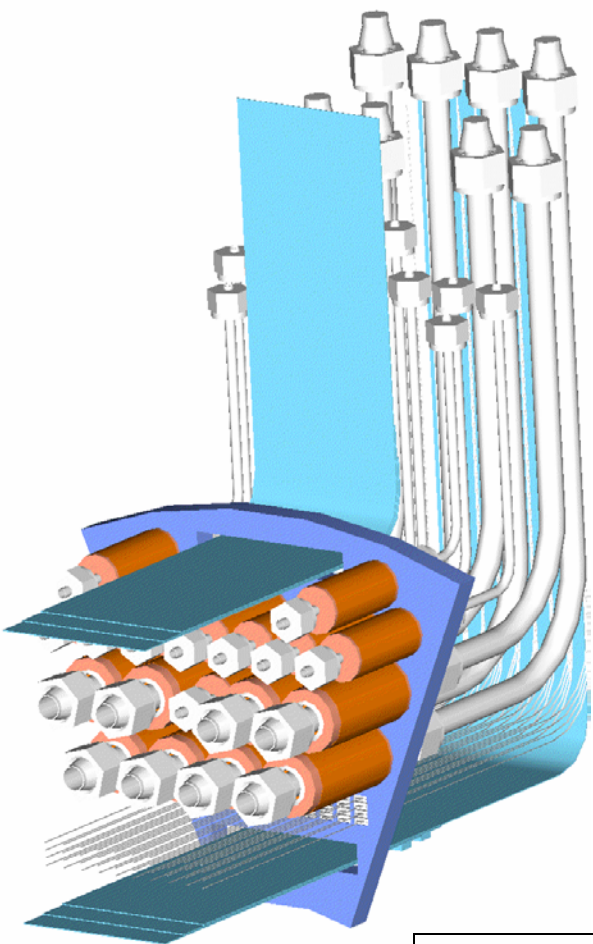
- Service Quarter Panel structure carries Disk and Barrel panels as well as PP1 quarter panel on same structure
- Disk panels not shown—current designs being modified
- Tubes not shown as well—both available at June Review



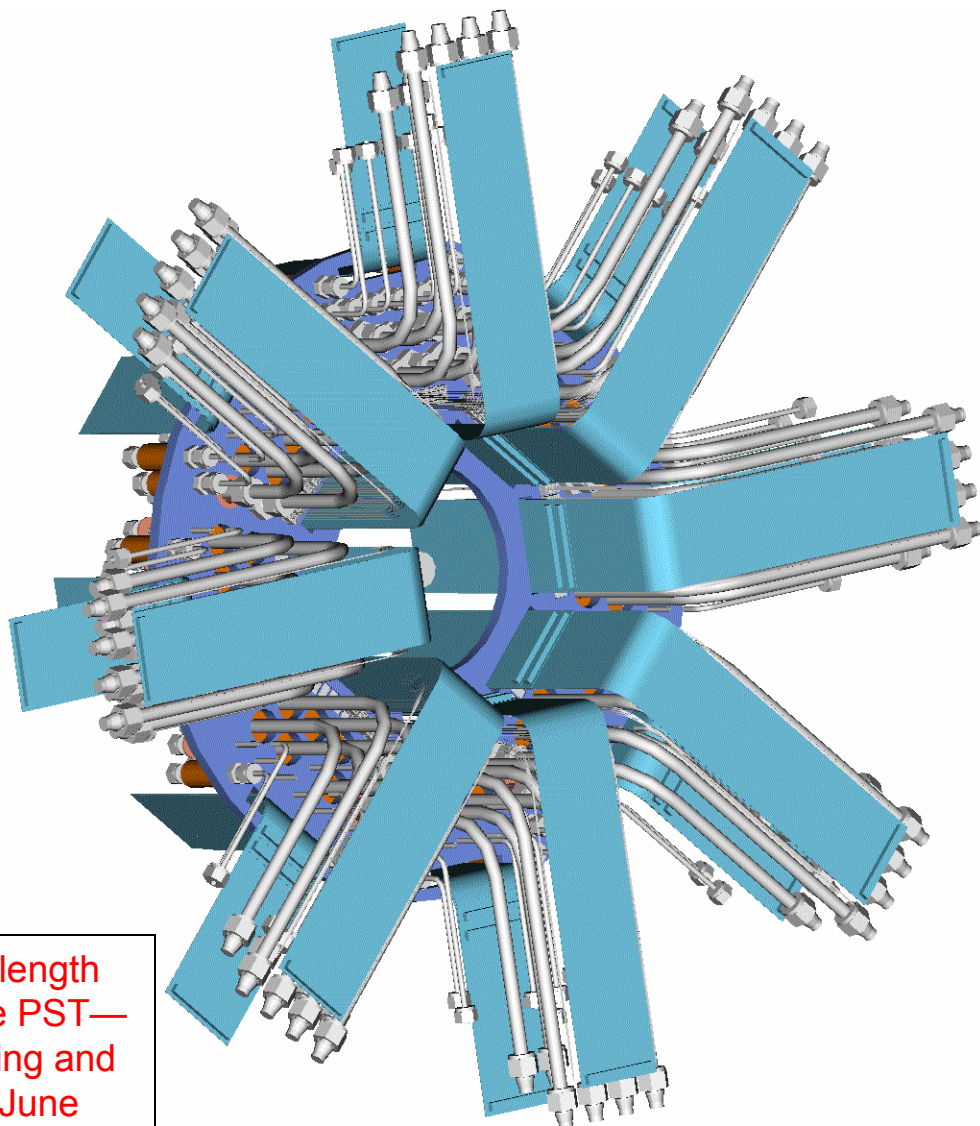
- Routing for PP1 dominates the volume at the end of the Package
- The routing is not complete, but is intended for Review in June
- Bellows design to couple PP1 to Beam Pipe is 'Complete' implies ~73N compressive load on Beam Pipe during Bakeout.
- Uses Large Convolution depth, but relatively short length
- Dimensions open to discussion, based on acceptable loads (can increase length/convolution depth ratios to suit acceptable load and internal clearances)

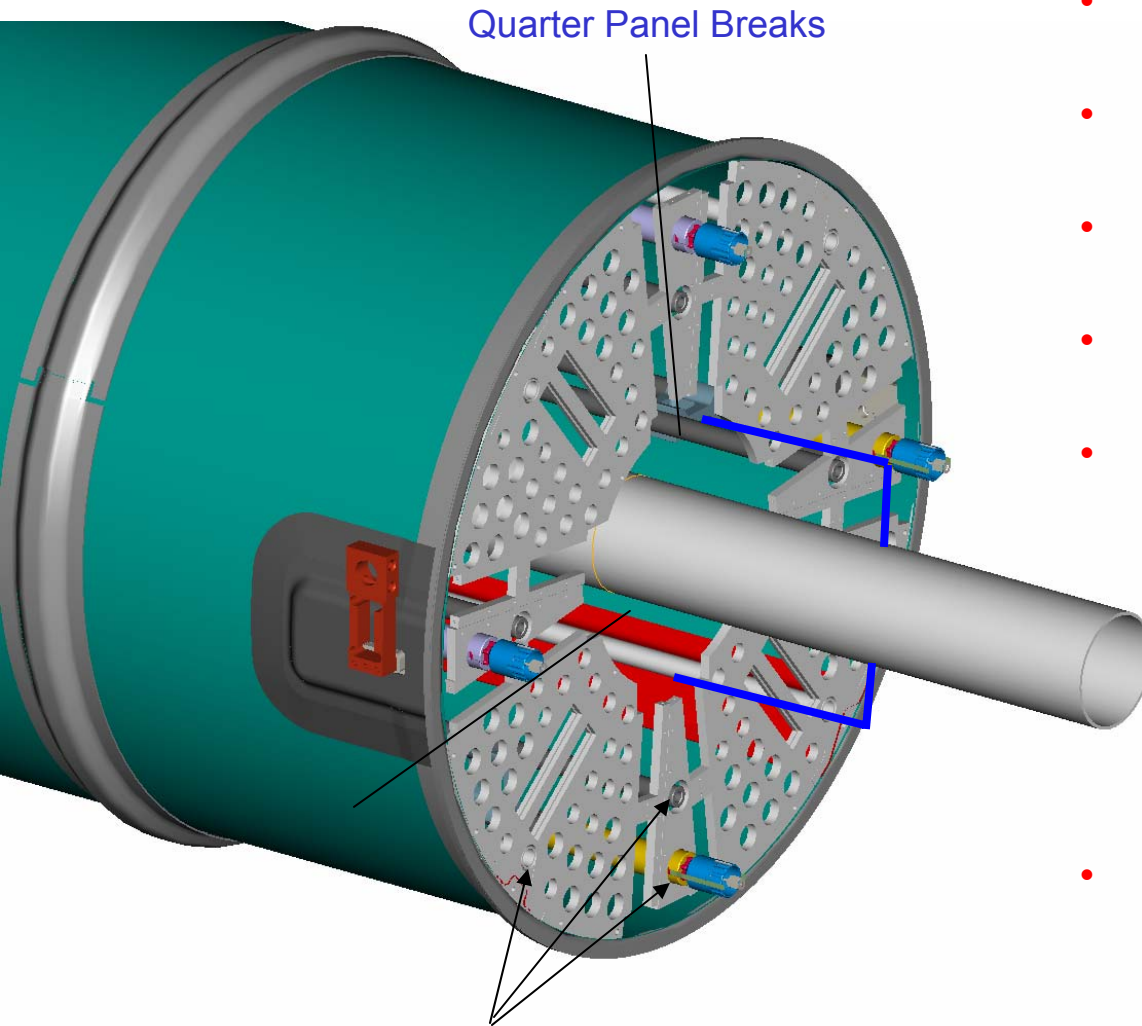






PP1 layout determines final length of the Forward section of the PST—  
Layout of region is progressing and being modelled—in time for June  
(only just)

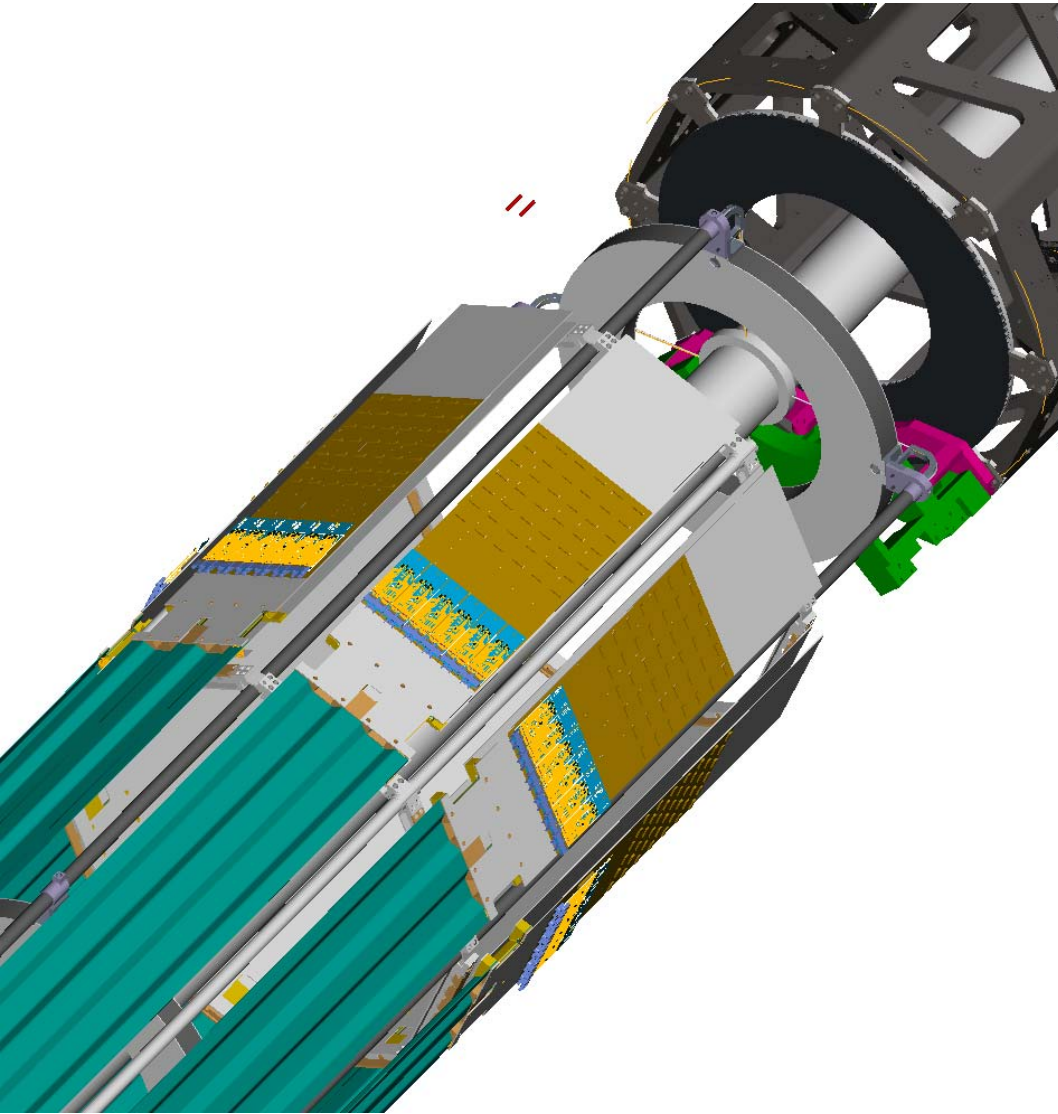




Fixation of service structure to PP1

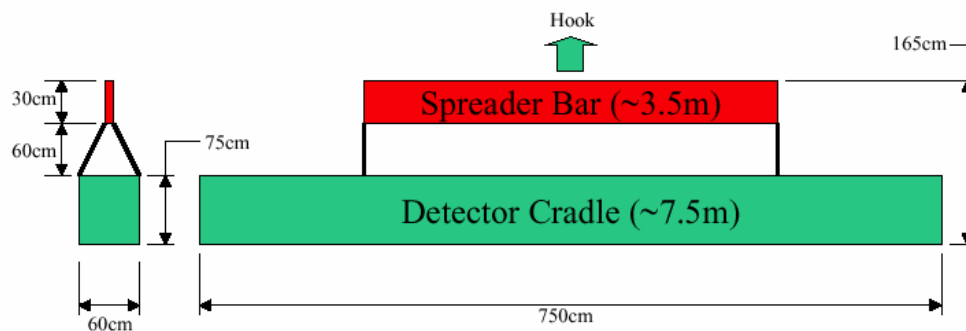
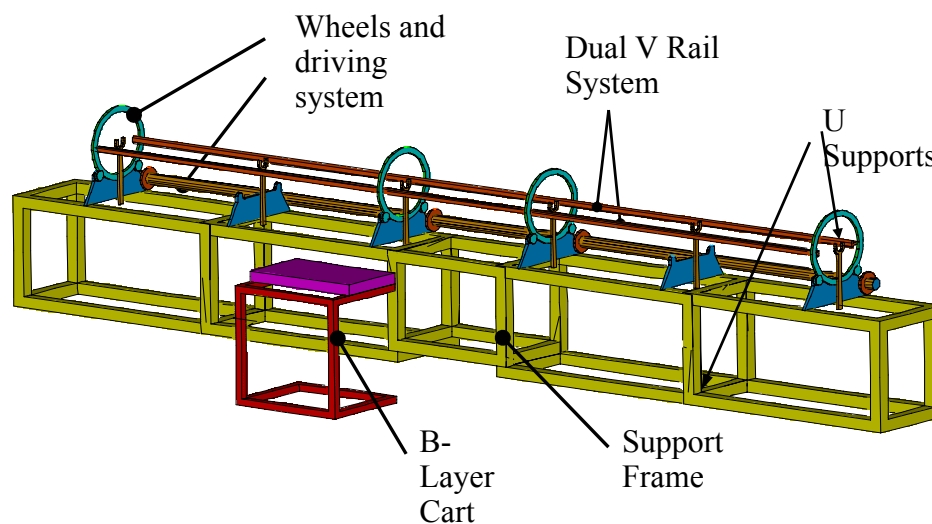
- Survey access is poorly understood now
  - Hope to reduce some occupancy of PP1 fittings
  - Bellows design exists, can be optimized for possible access
  - Internal volume of BPSS is not a limit as will be seen in later slides
  - Non conventional options for survey will likely be needed
- 
- Temporary support of Beam Pipe is from 'Can' installed on inner radius of PP1

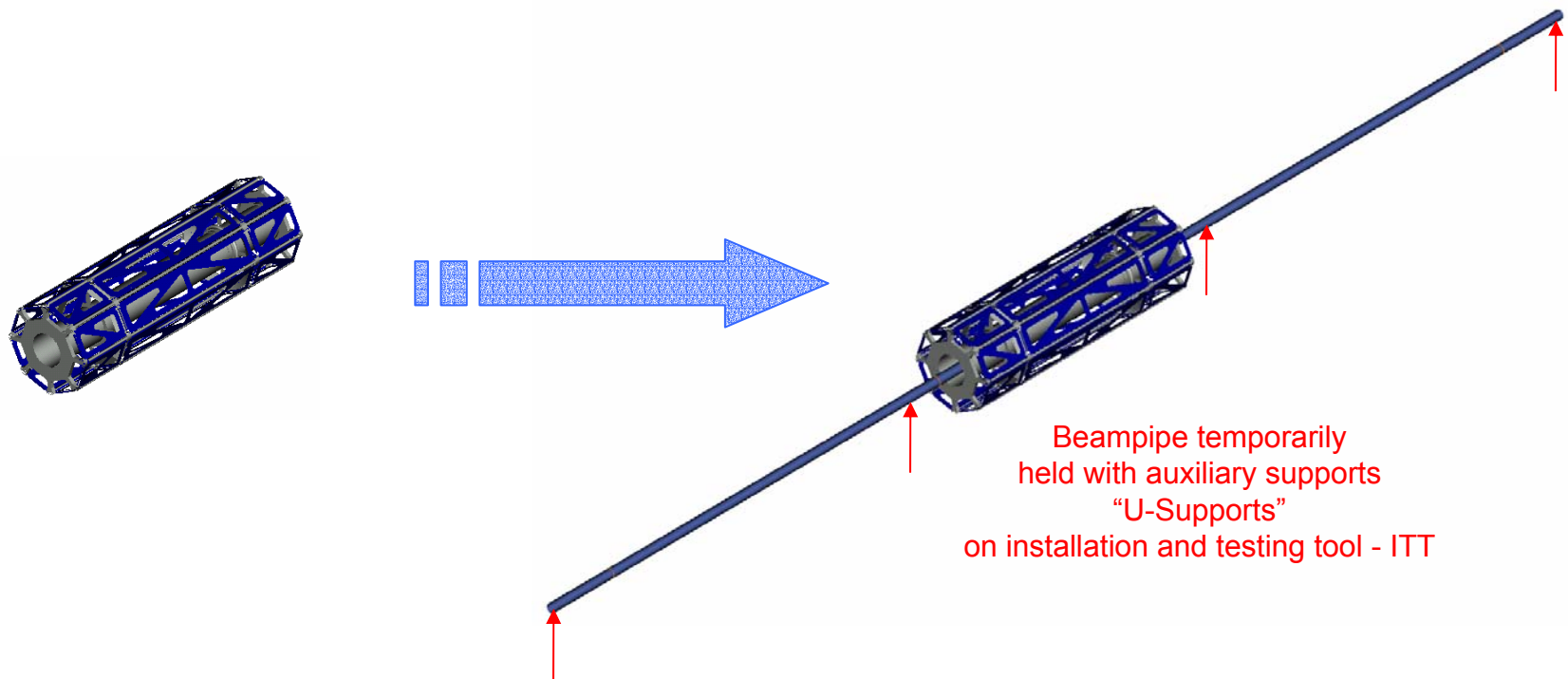


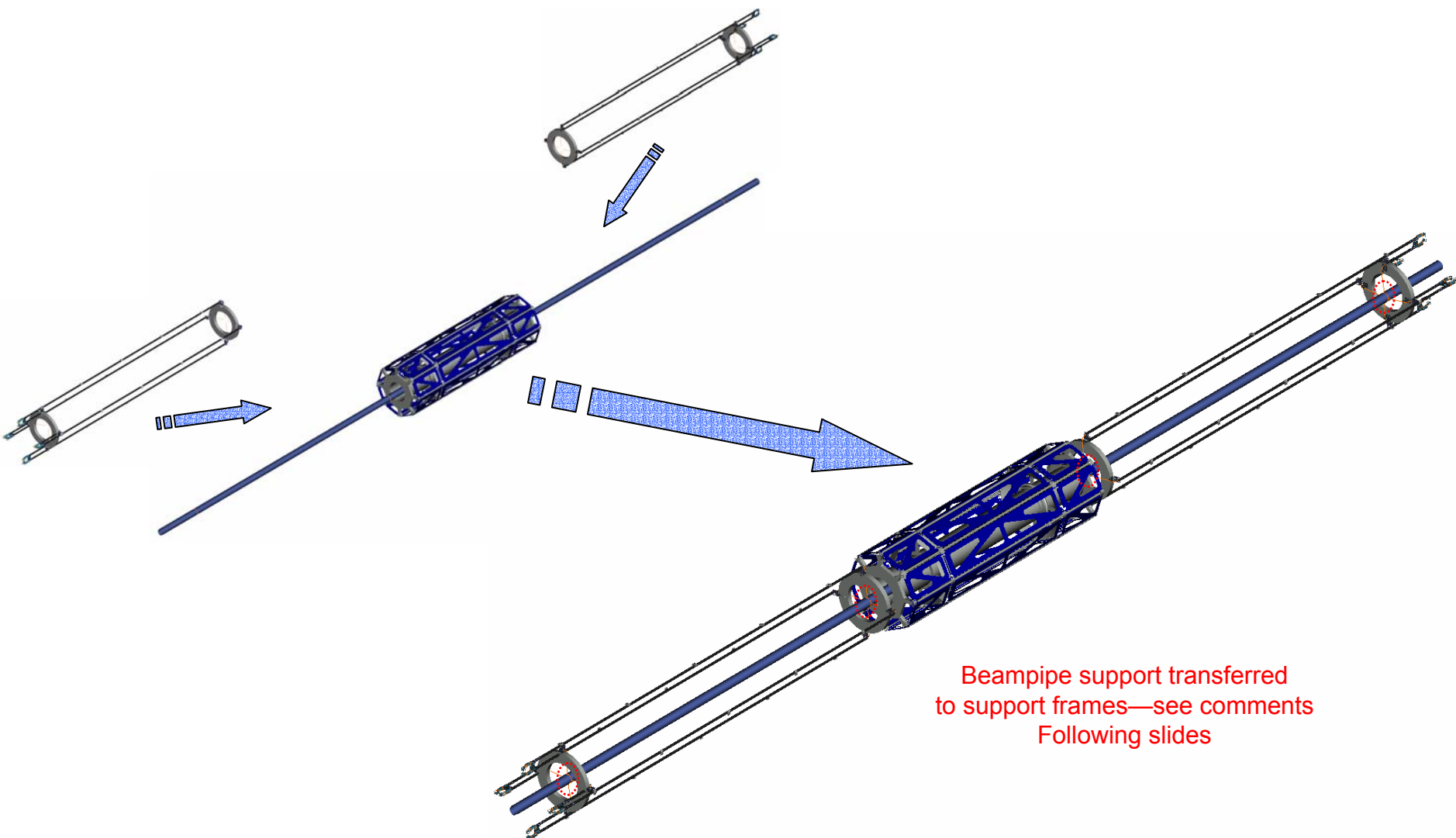


- PP0 is not technically an interface to Beam Pipe but is a critical interface to BPSS
- Disk/B-Layer panels under revision currently—not shown
- Trolley is designed to allow for cooling tubes which are also installed with Service Quarter Panels
- Note—PP1 quarter panels are fixed to the Service Quarter Panels and are installed with them
- This is important at a later stage where PP1 will support the Beam Pipe

- The Pixel package is first integrated on surface into an Integration & Testing Tool (ITT) and then slid into a Dummy Support Tube (DST)
- the DST is then lowered into the pit in a cradle, connected and aligned to the PST and the pixel system is moved to its final position
- The Beampipe is the first article installed in the ITT

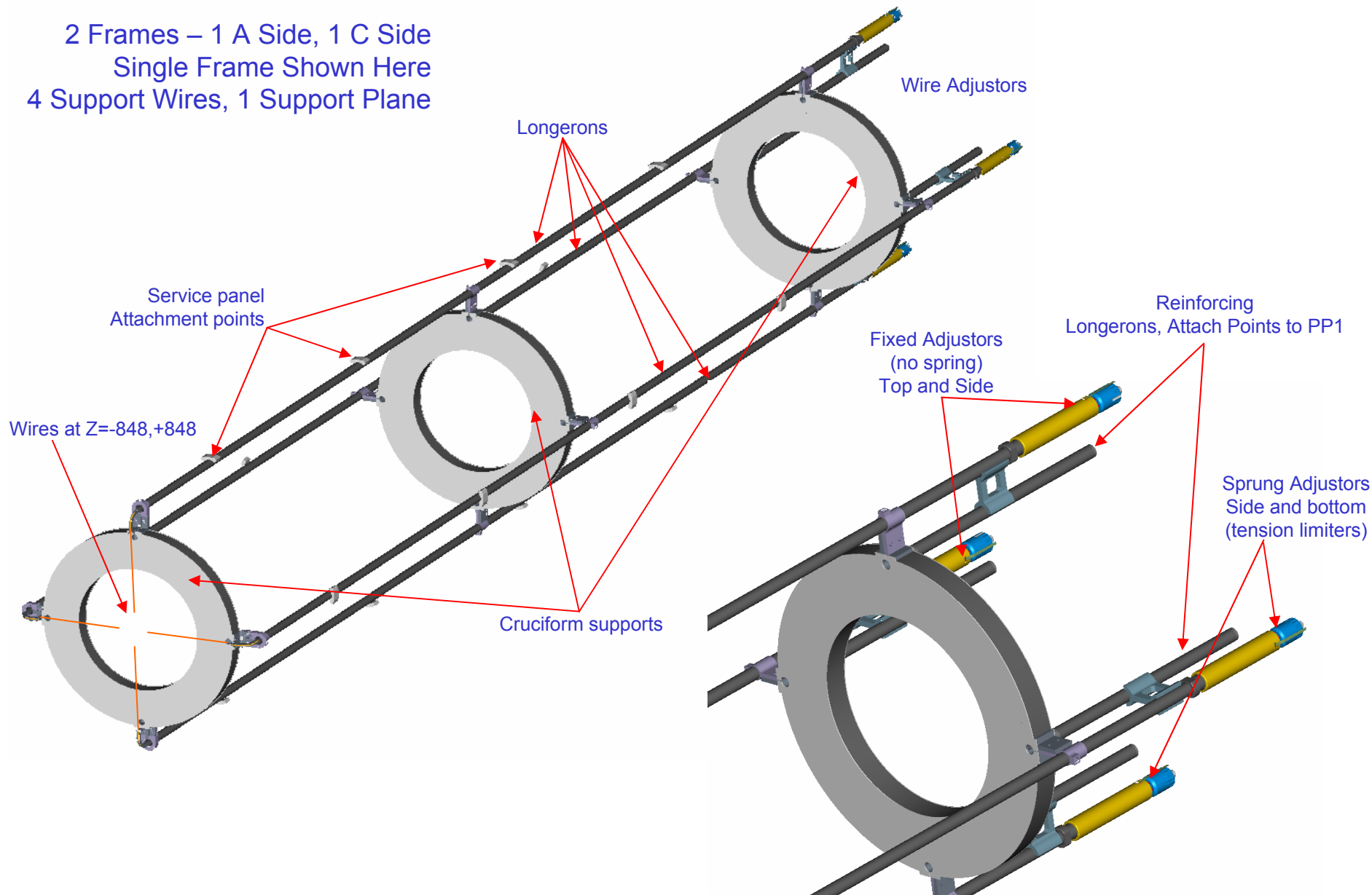




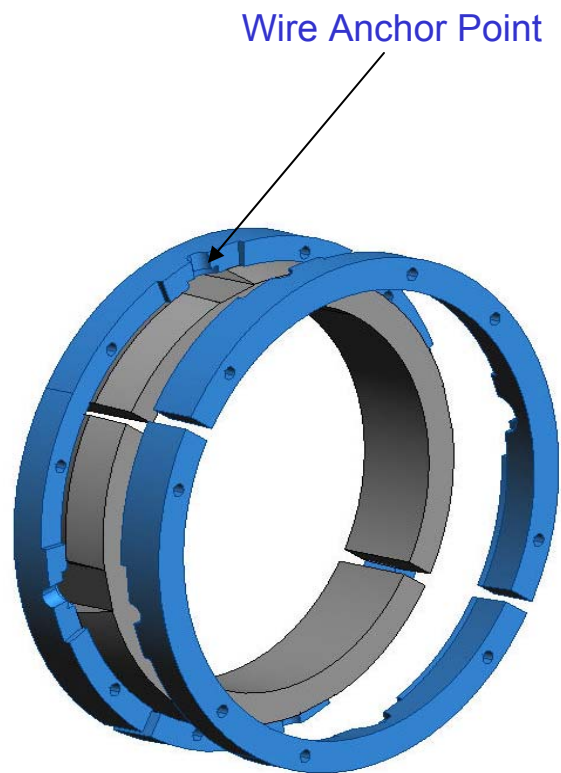


# Beampipe Support Frame

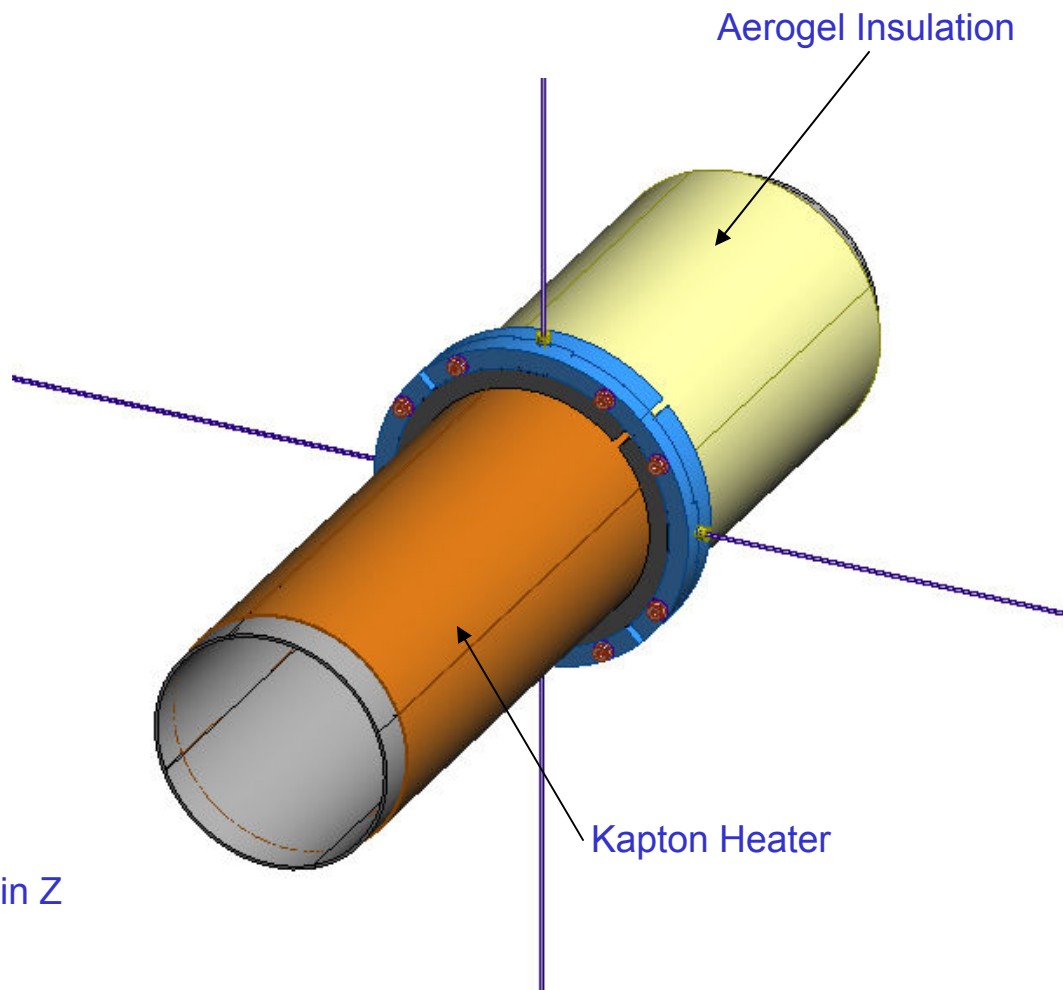
2 Frames – 1 A Side, 1 C Side  
Single Frame Shown Here  
4 Support Wires, 1 Support Plane



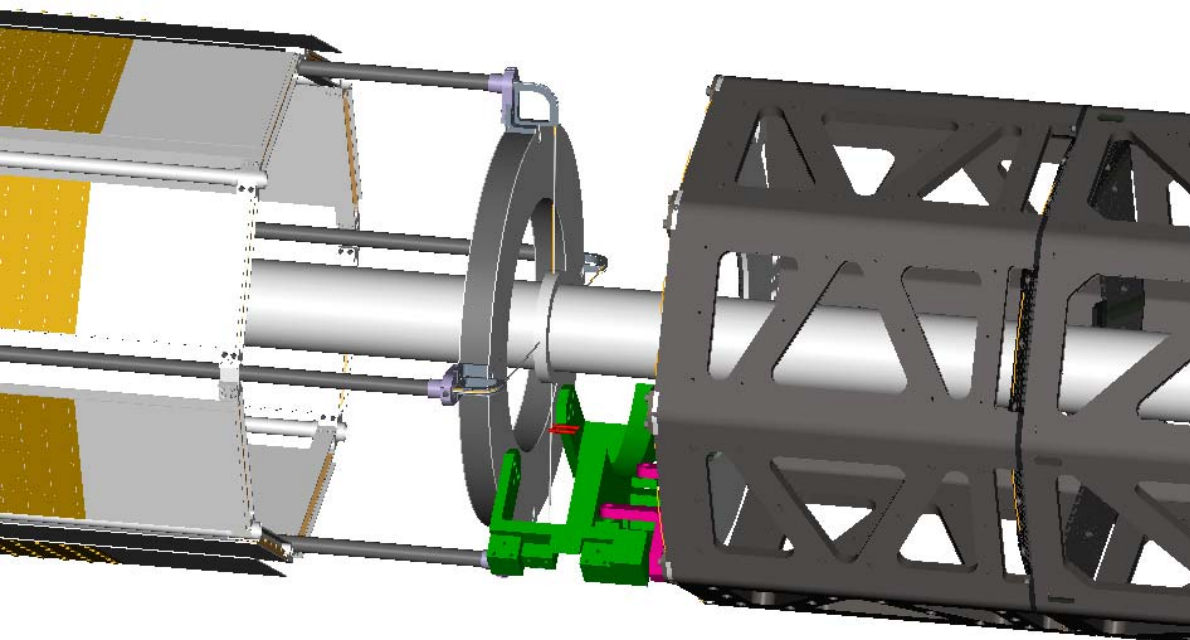
# Beam Pipe Collars



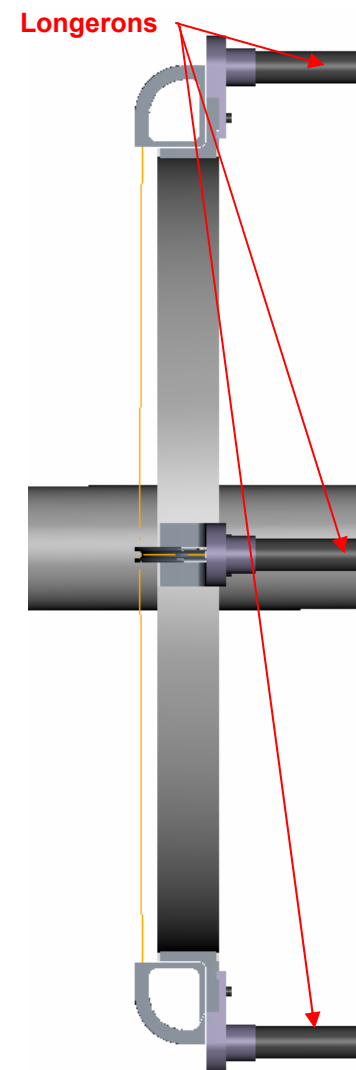
Split Conical Ring Allows Free Placement in Z



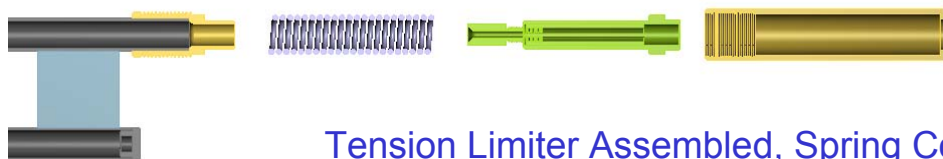




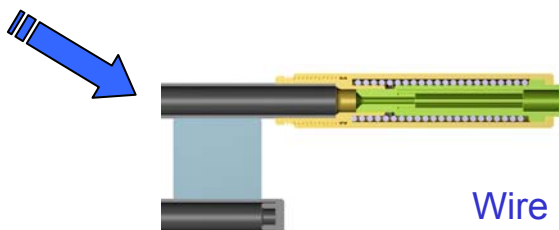
- **Access to wires prior to Service Panel installation is excellent**
- **Service Panels installed after the wires are routed through tubes**
- **Wires then inserted through adjustors at end of longerons**



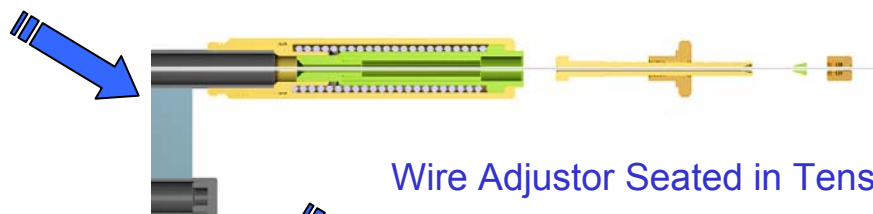
# Assembly of Adjustor/Limiter Unit



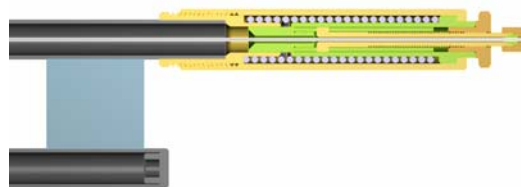
Tension Limiter Assembled, Spring Compressed



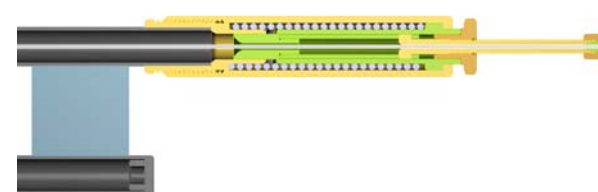
Wire Fed Through, Clamped into Collet



Wire Adjustor Seated in Tension Limiter

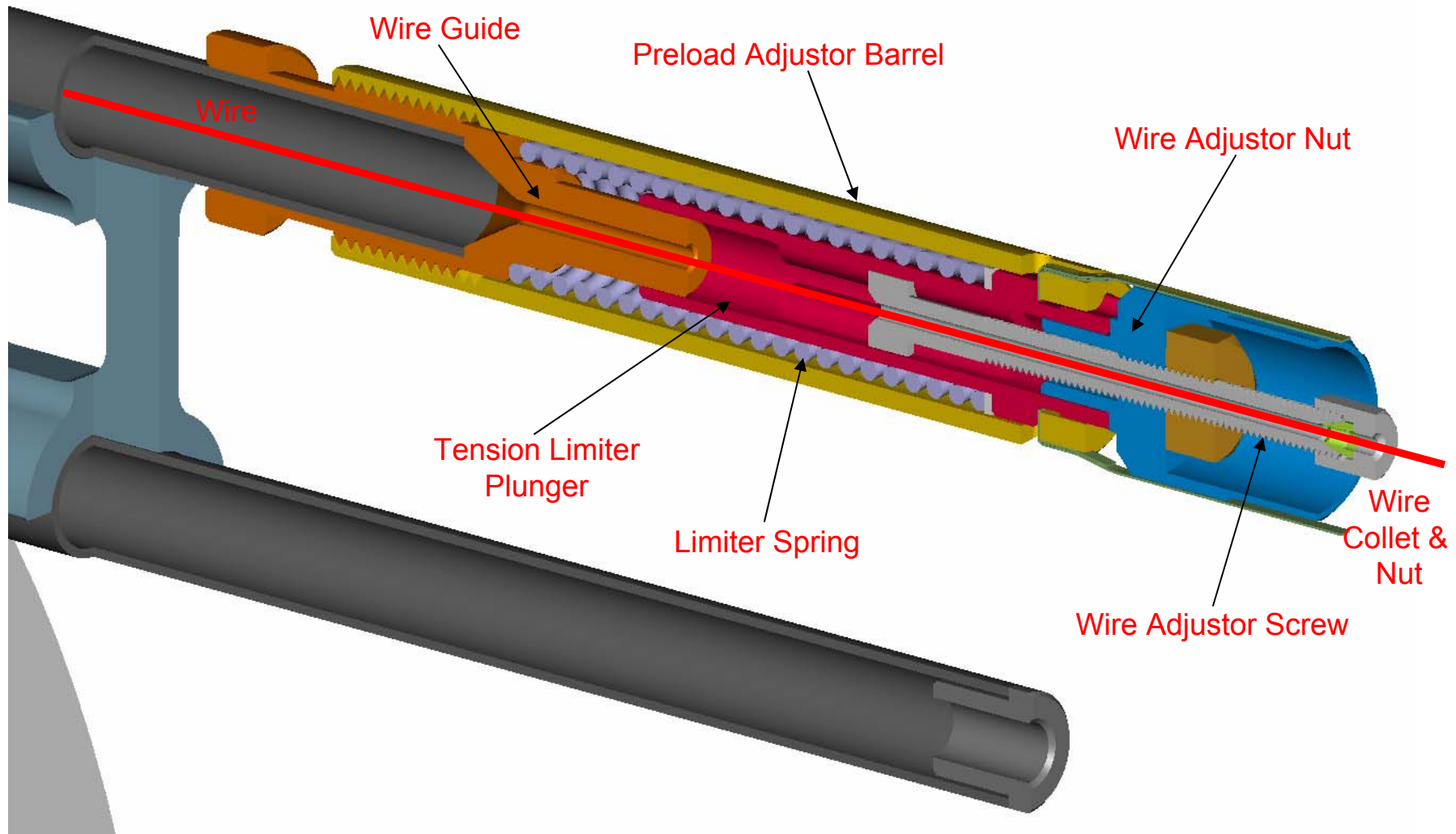


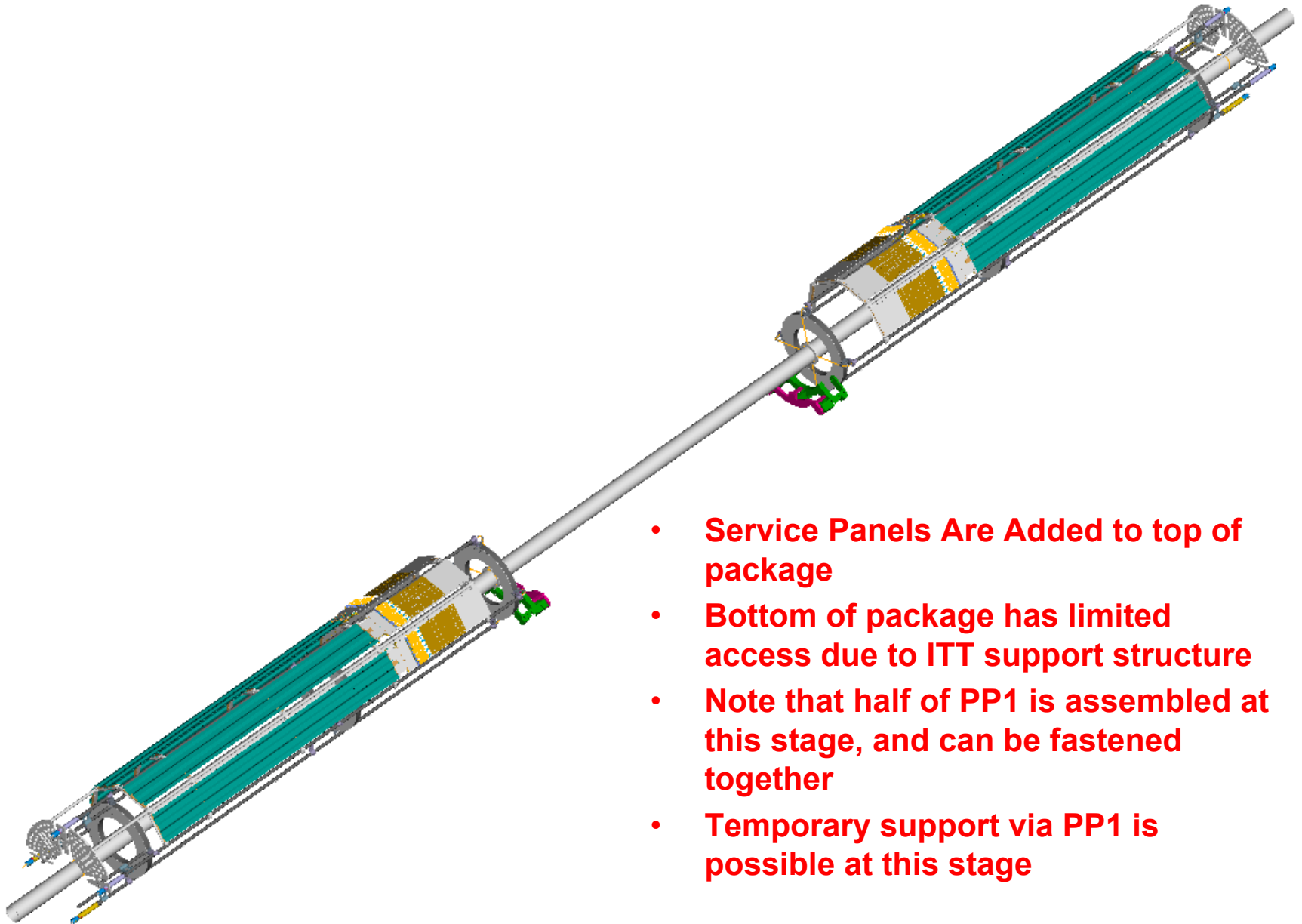
Max "IN" Adjustment



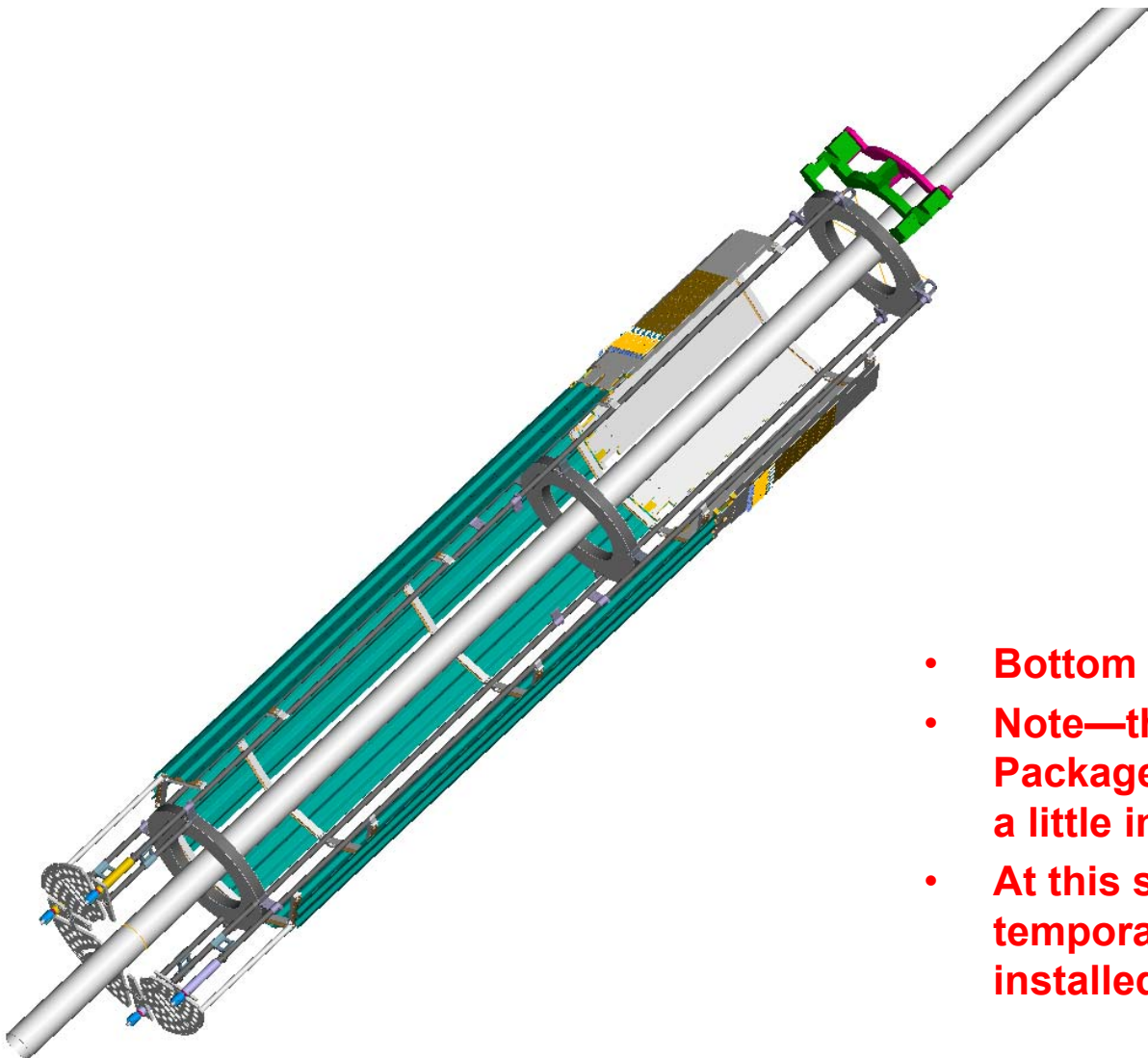
Max "OUT" Adjustment

# Adjustor/Tension Limiter

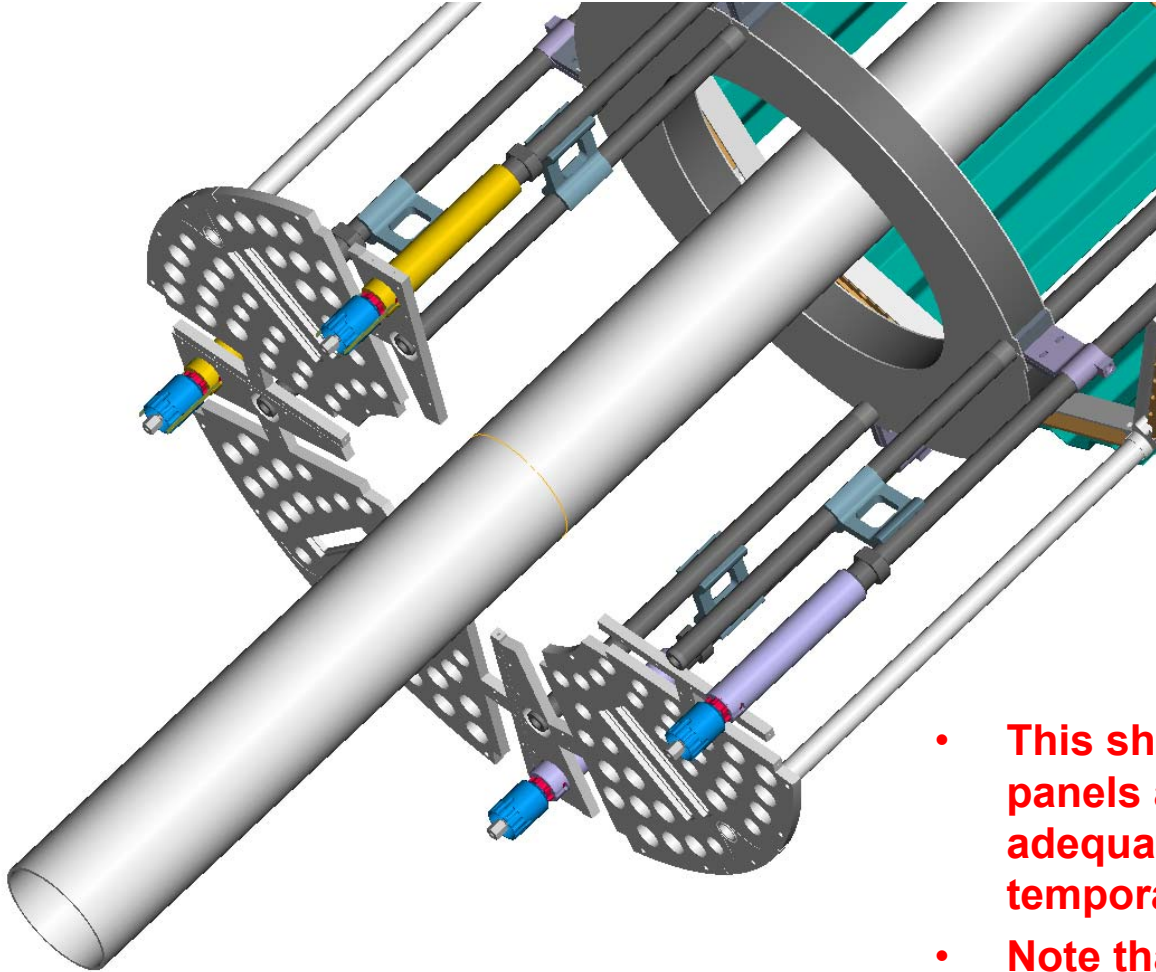




- Service Panels Are Added to top of package
- Bottom of package has limited access due to ITT support structure
- Note that half of PP1 is assembled at this stage, and can be fastened together
- Temporary support via PP1 is possible at this stage



- Bottom services can be installed
- Note—this picture shows direct bottom, Package can rotate only 90 degrees plus a little in the ITT
- At this stage it is required to have temporary supports of Beam Pipe installed to allow for this rotation



- This shows some detail of how panels are supported to provide adequate support for the temporary support
- Note that PP1 is threaded over Adjustors during installation