Luminosity Detector Mechanical Details

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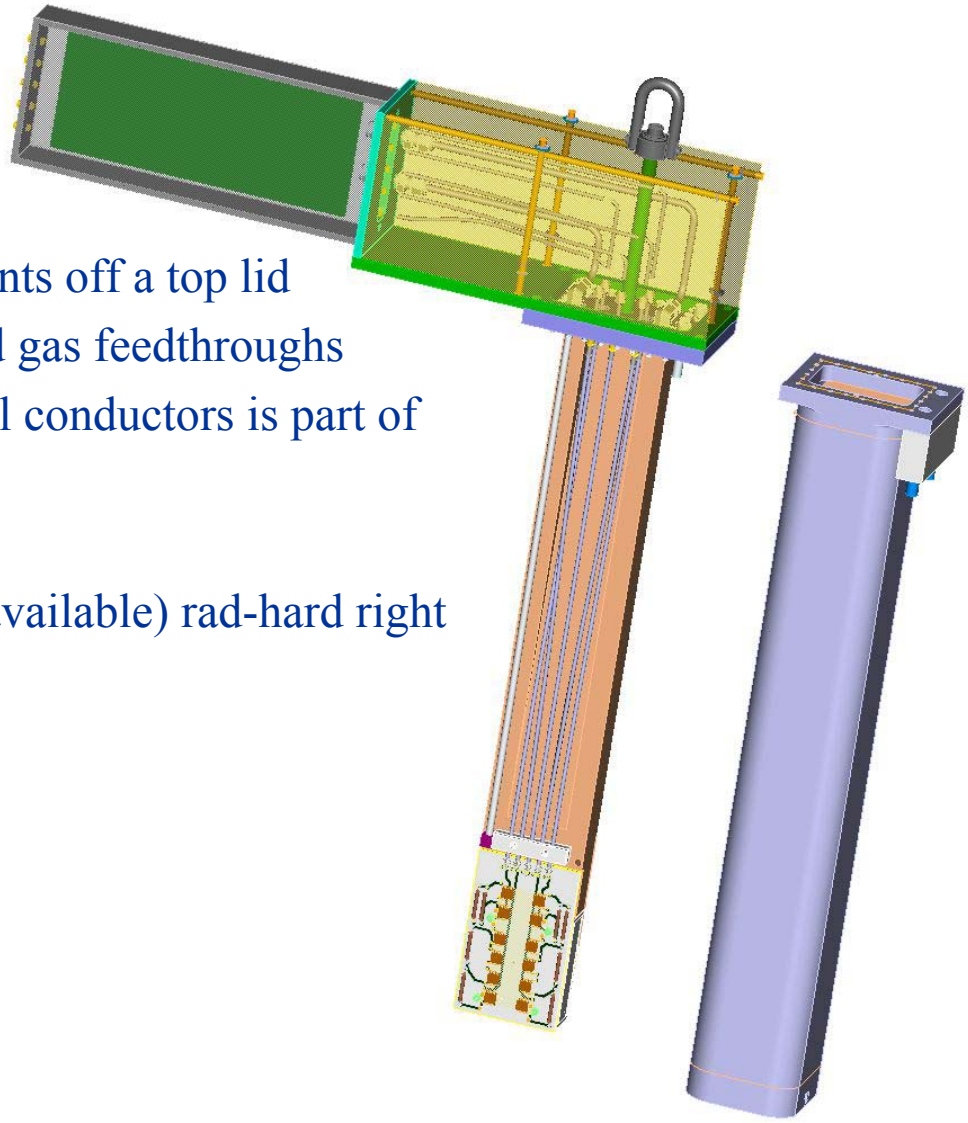
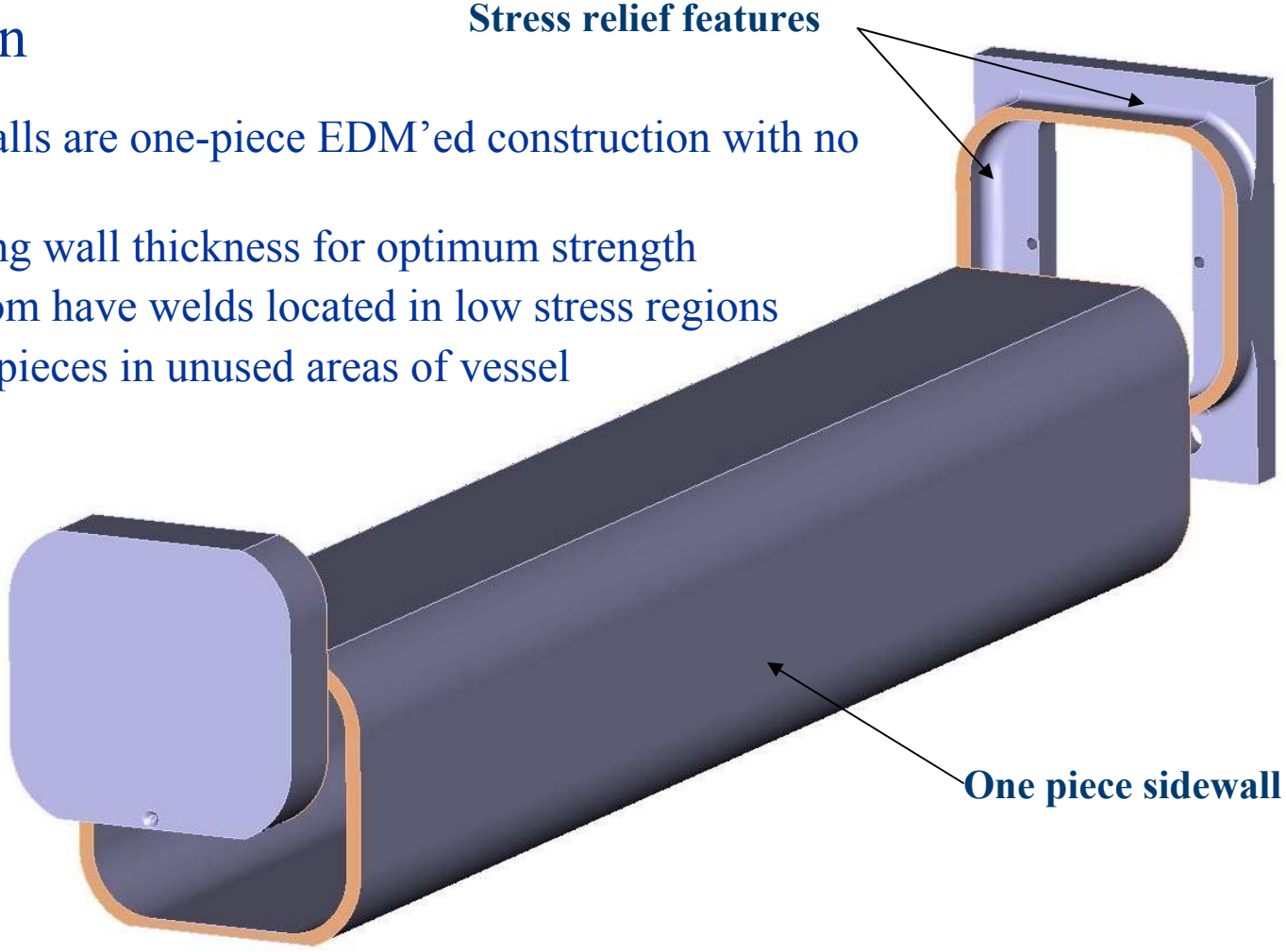
Pressure Vessel Construction



- Redesigned to mount all components off a top lid
- Allows a direct path for signal and gas feedthroughs
- Triaxial feedthroughs for electrical conductors is part of cable
- No breaks in coax signal path
- No bends or complicated (and unavailable) rad-hard right angle adapters
- Simplified construction

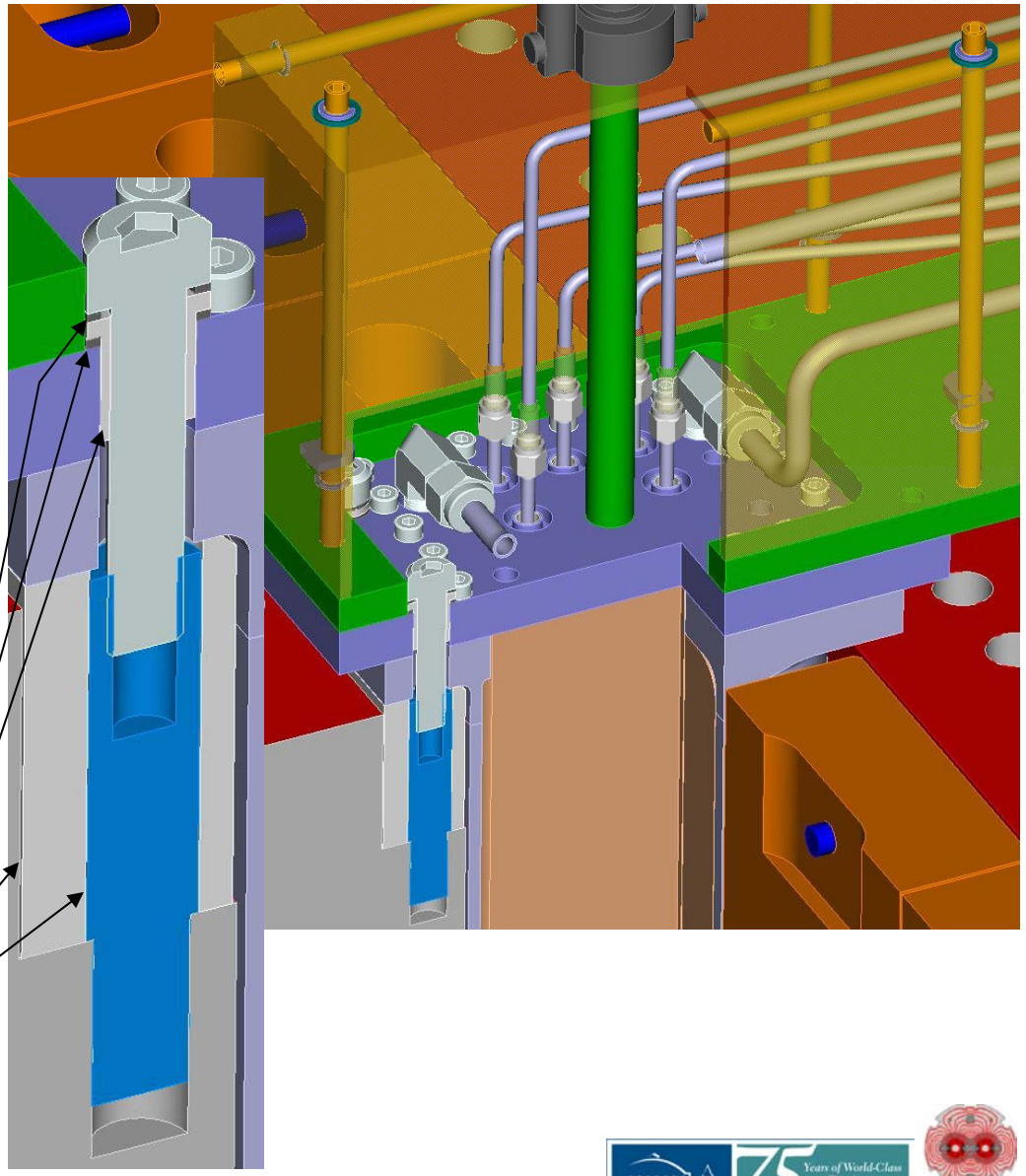
Pressure Case Construction

- Vessel sidewalls are one-piece EDM'ed construction with no seams
- Allows varying wall thickness for optimum strength
- Top and bottom have welds located in low stress regions
- Copper filler pieces in unused areas of vessel



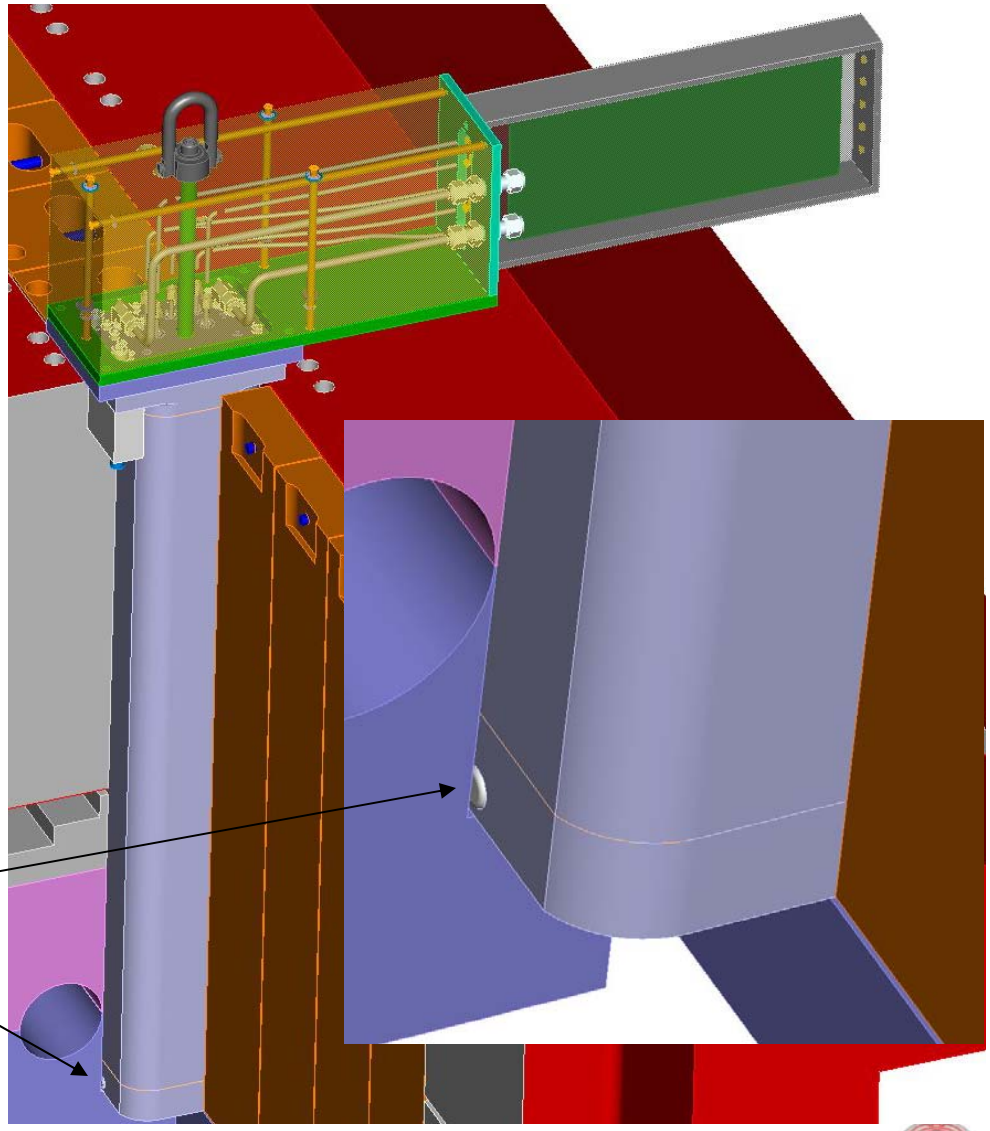
Vessel Isolation

- Vessel flange rests on alumina spacer
- Vessel is secured to Absorber Bar bolt holes via an adapter standoffs
- Isolation is preserved with ceramic tee-washers around the bolts
- Tantalum pads distribute stress from bolts to tee-washers



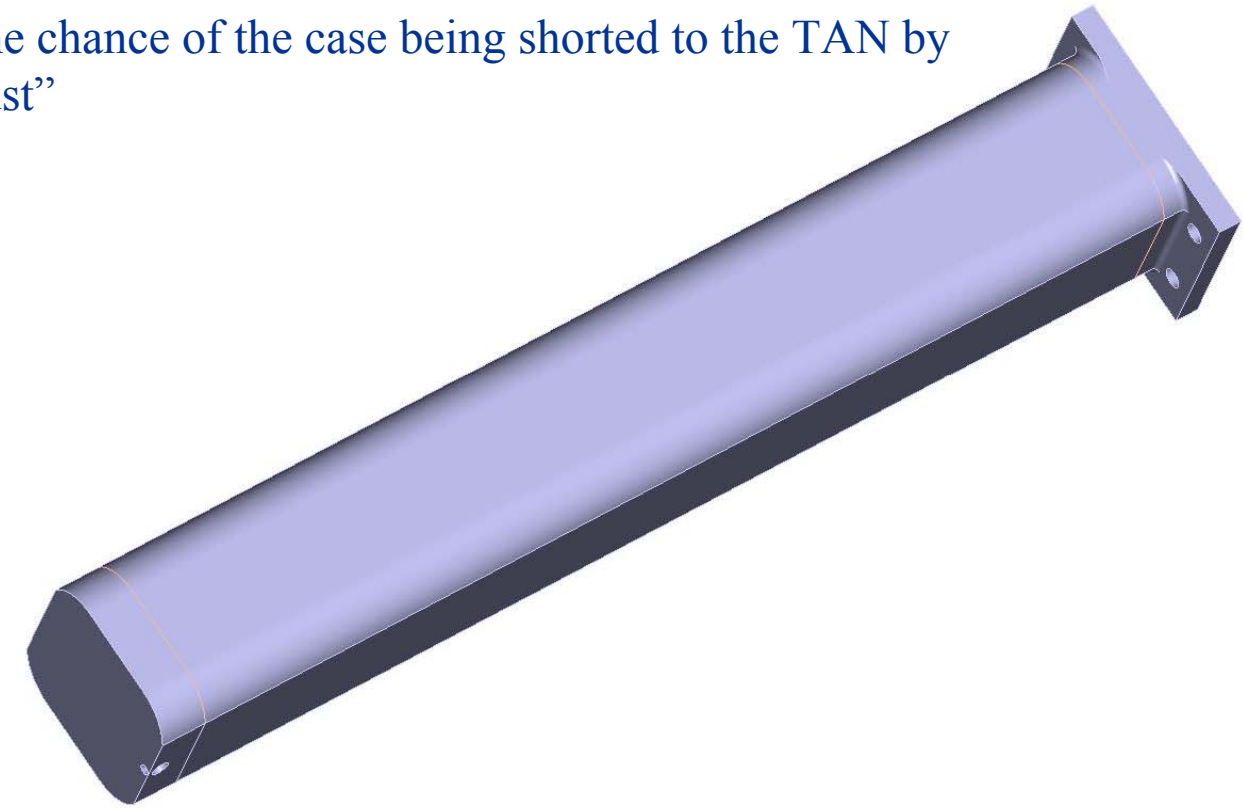
Vessel Isolation

- Vessel bottom edge rests against side of TAN on a ceramic button
- This centers the vessel in the TAN well
- Avoids having to tighten the absorber bar bolts excessively to center the vessel



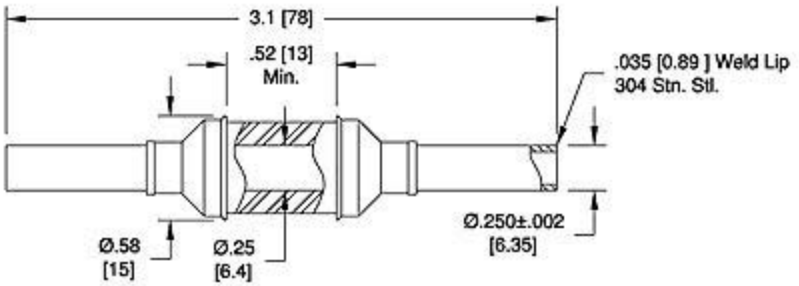
Vessel Isolation

- Redundant 75 micron coating of plasma-sprayed alumina is applied to all outside surfaces of the vessel
- This reduces the chance of the case being shorted to the TAN by conductive "dust"



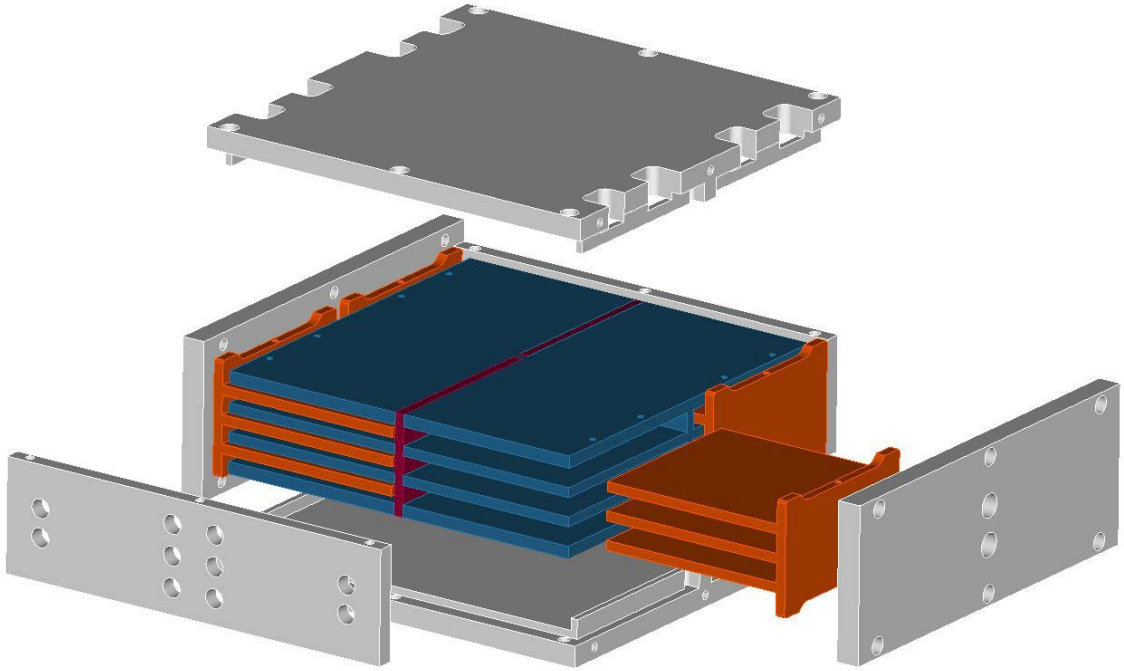
Vessel Isolation

- Gas lines are fitted with isolation breaks after they exit the cable "gutter box"



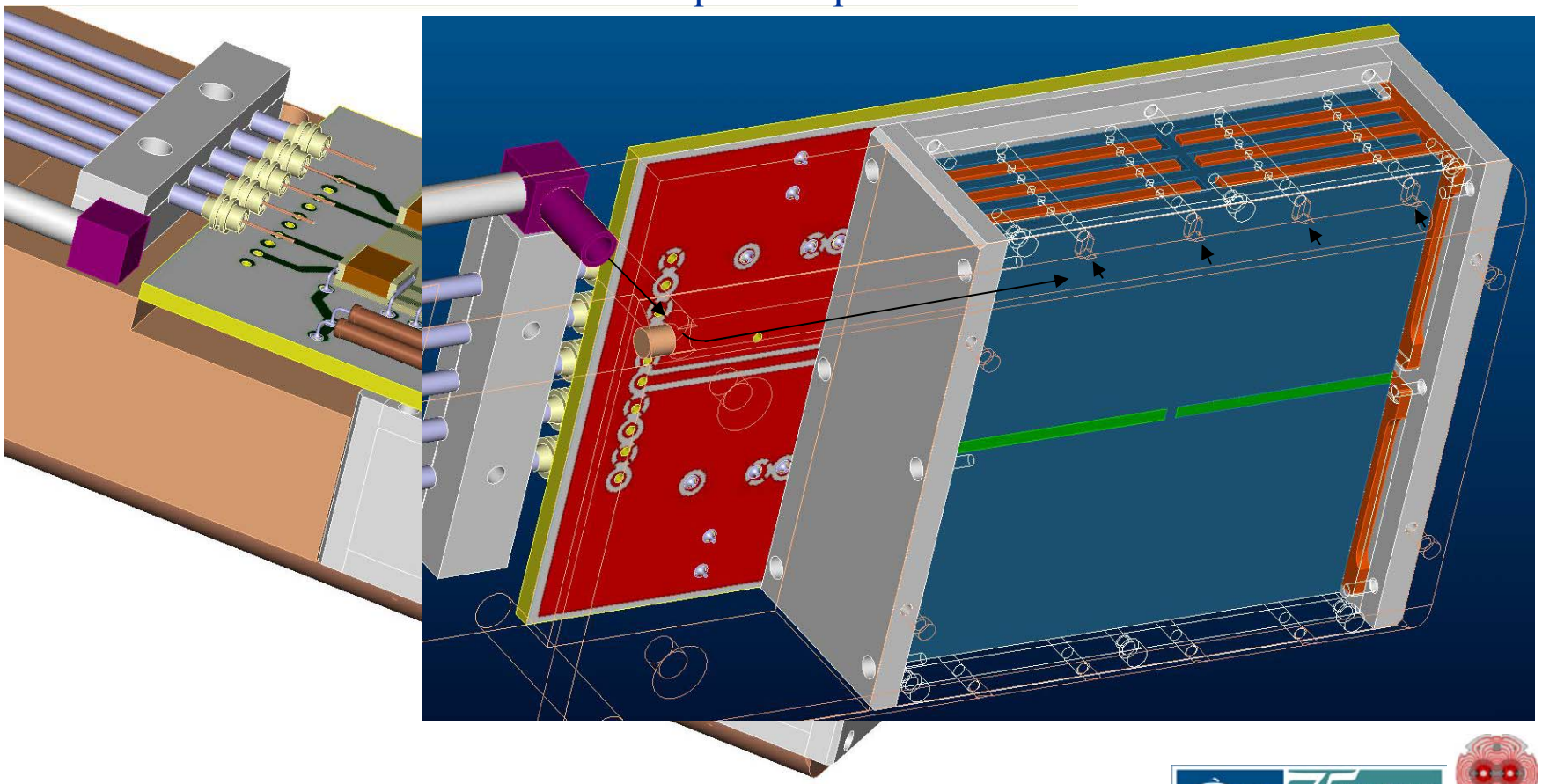
Detector

- Same basic design with modifications for positive gas ventilation of detector



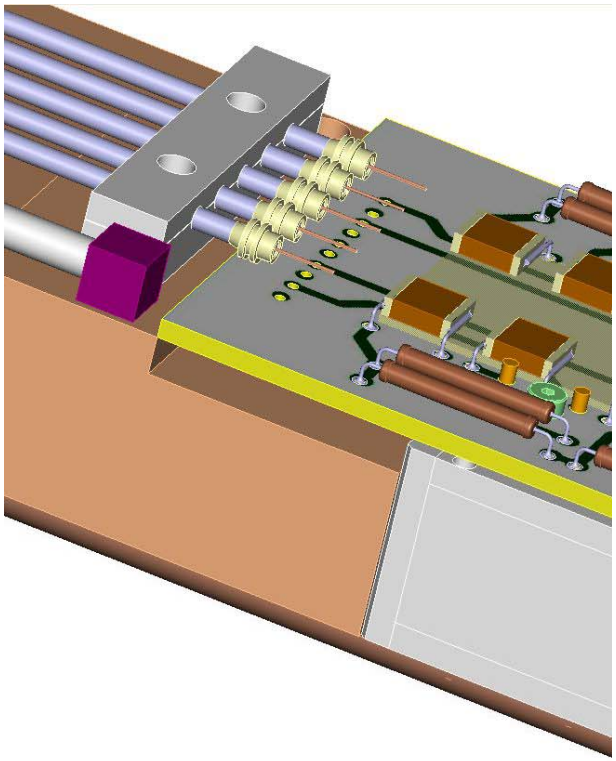
Detector

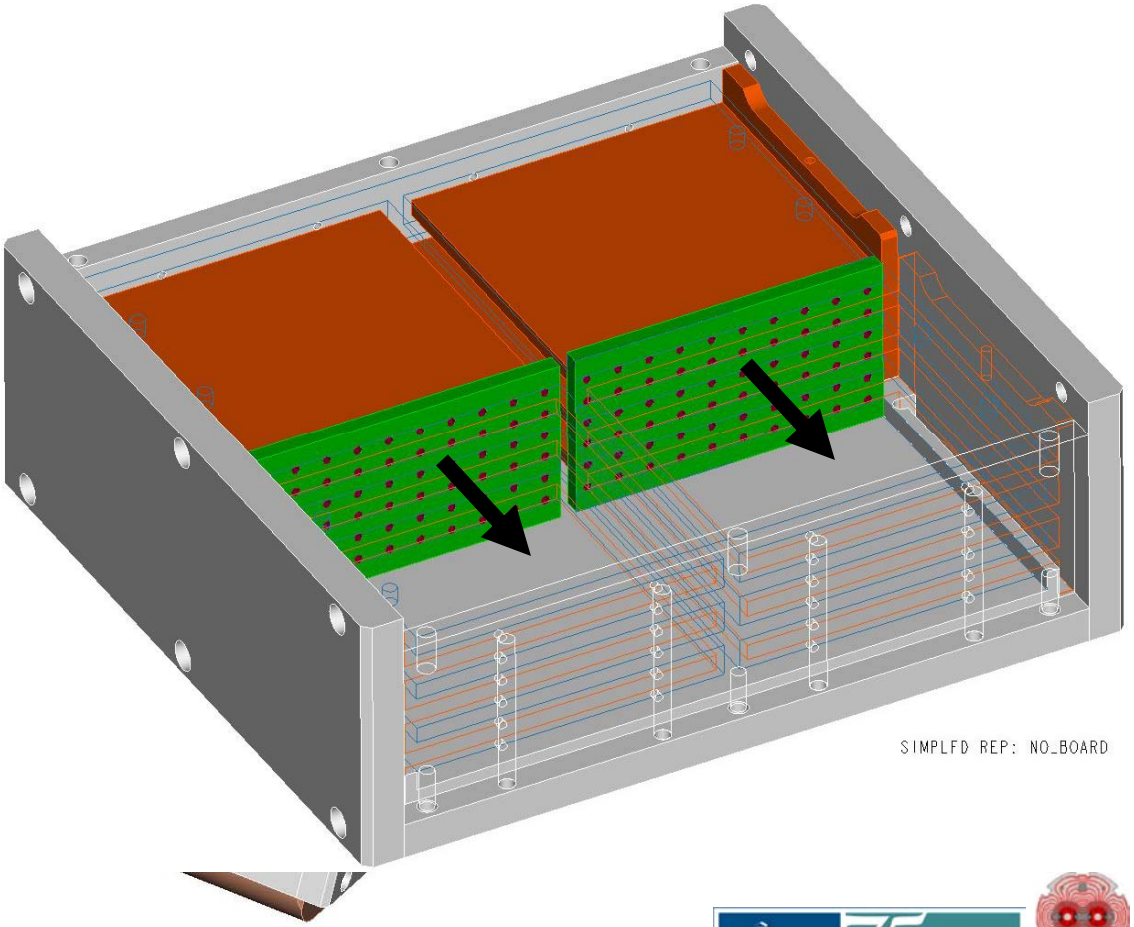
- Gas entry manifold constructed in copper detector support to provide “tubeless” gas delivery
- Holes drilled in Macor detector case provide path to interleaved electrodes



Detector

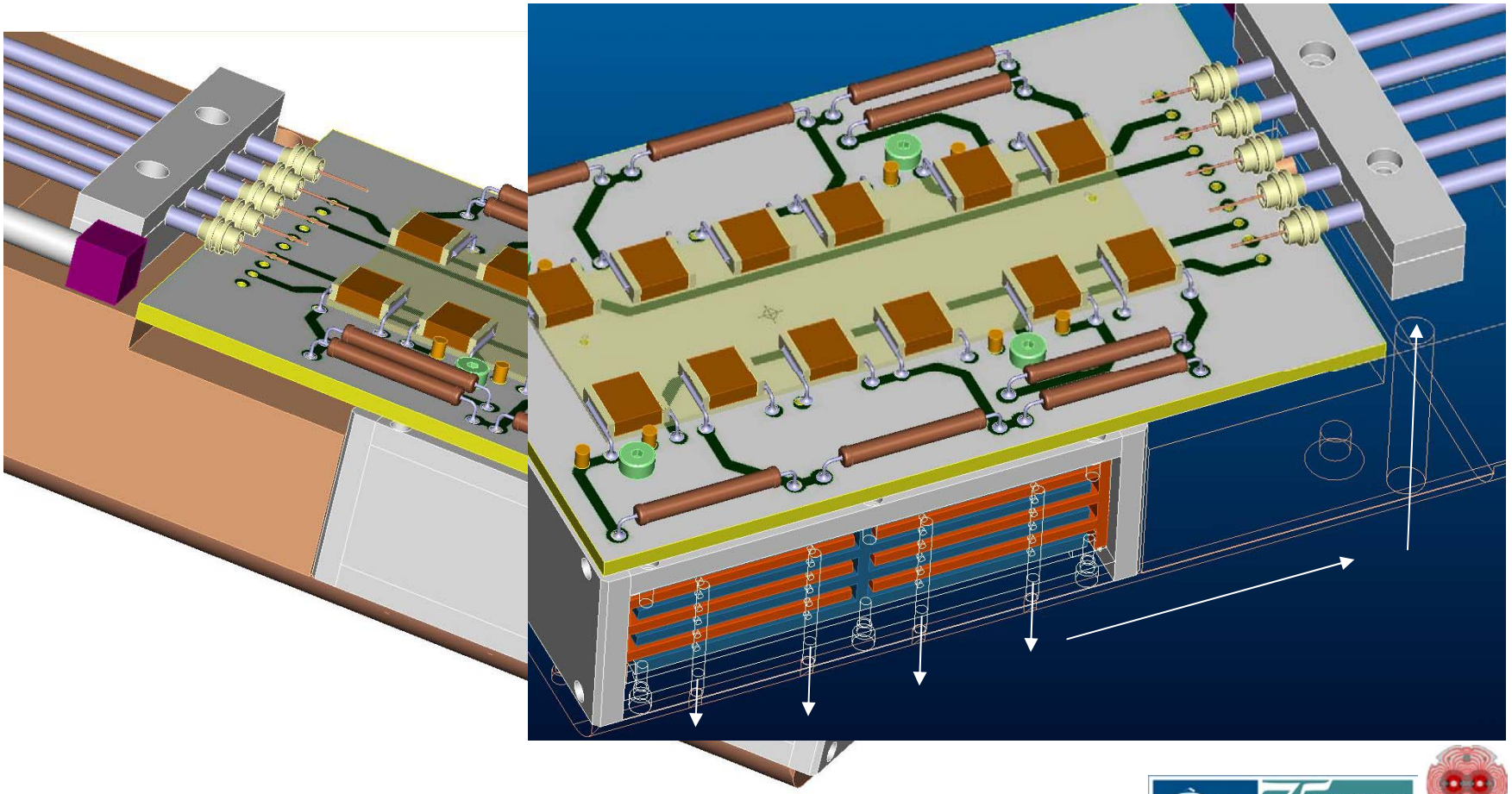
- Holes drilled in quadrant ground electrode walls allow gas to pass through detector quadrants to other side of case



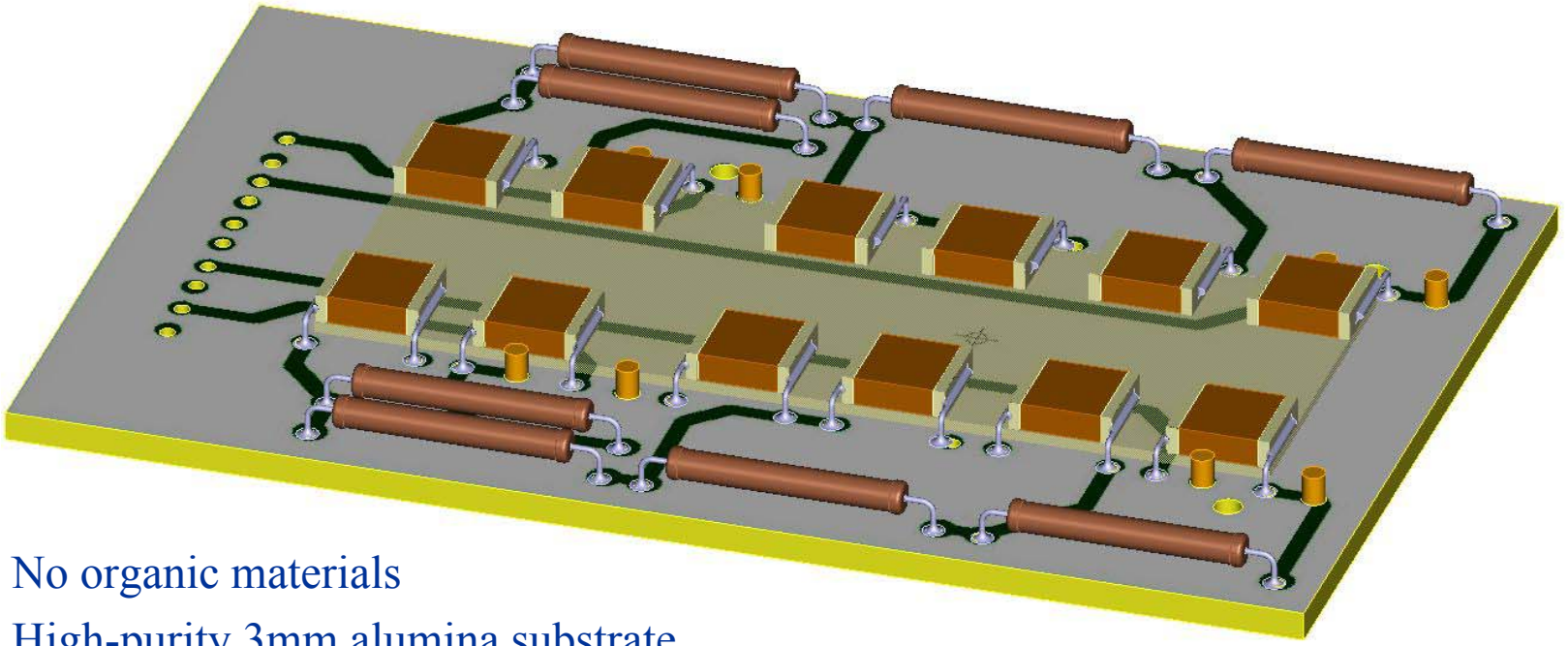


Detector

- Similar manifold construction in copper supports for exiting gas
- Gas flows through open space in tank to exit port

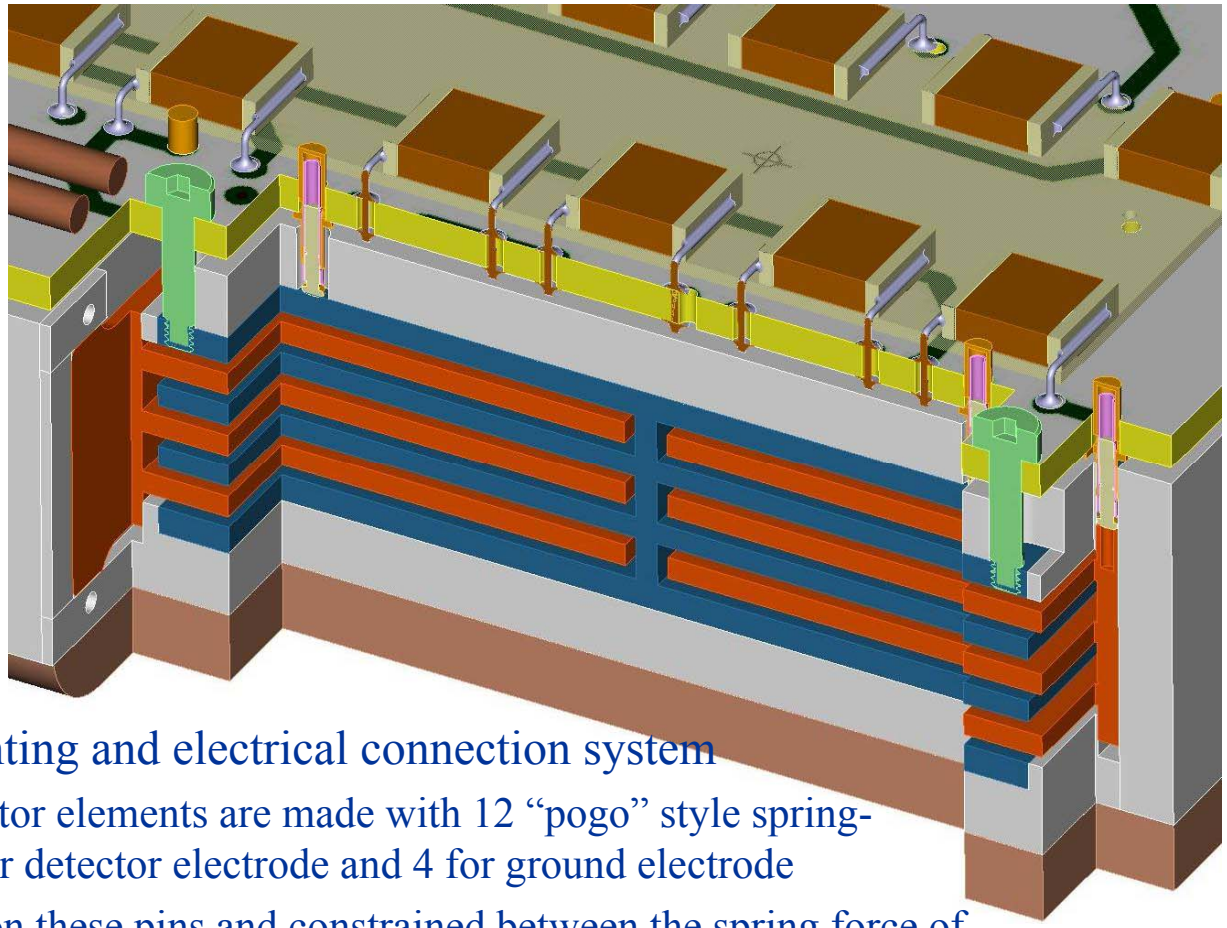


Detector PC Board



- No organic materials
- High-purity 3mm alumina substrate
- Traces are sputtered Ti-W with 3 micron gold metallization and 50 micron Cu
- Holes are laser-drilled but not plated through
- Components are leaded and soldered on both sides with 221deg C tin-silver solder

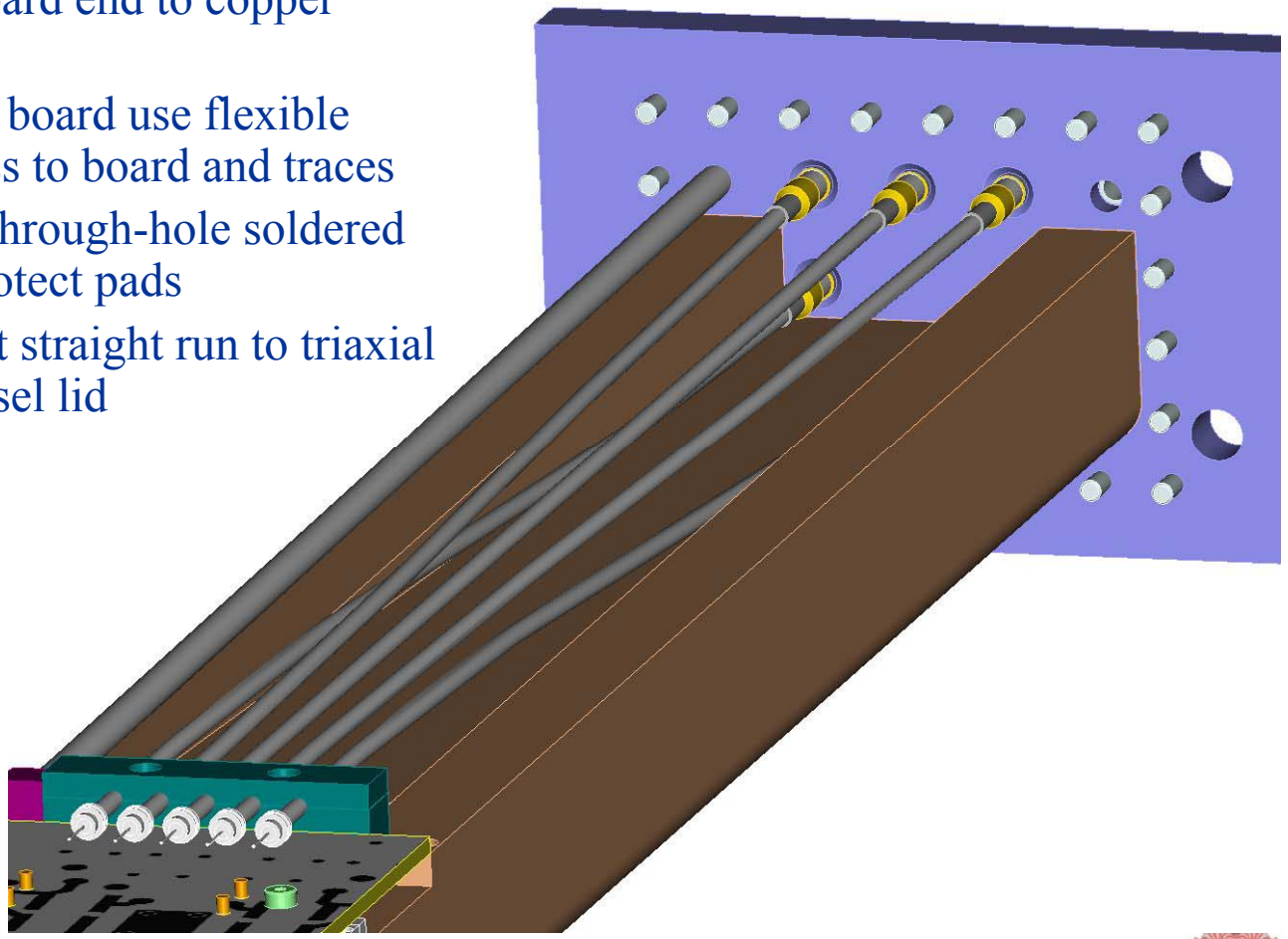
Detector PC Board



- Low stress board mounting and electrical connection system
  - Connections to detector elements are made with 12 “pogo” style spring-loaded test pins, 2 per detector electrode and 4 for ground electrode
  - Board is suspended on these pins and constrained between the spring force of the pins and fasteners that secure the board in a three point anchoring scheme

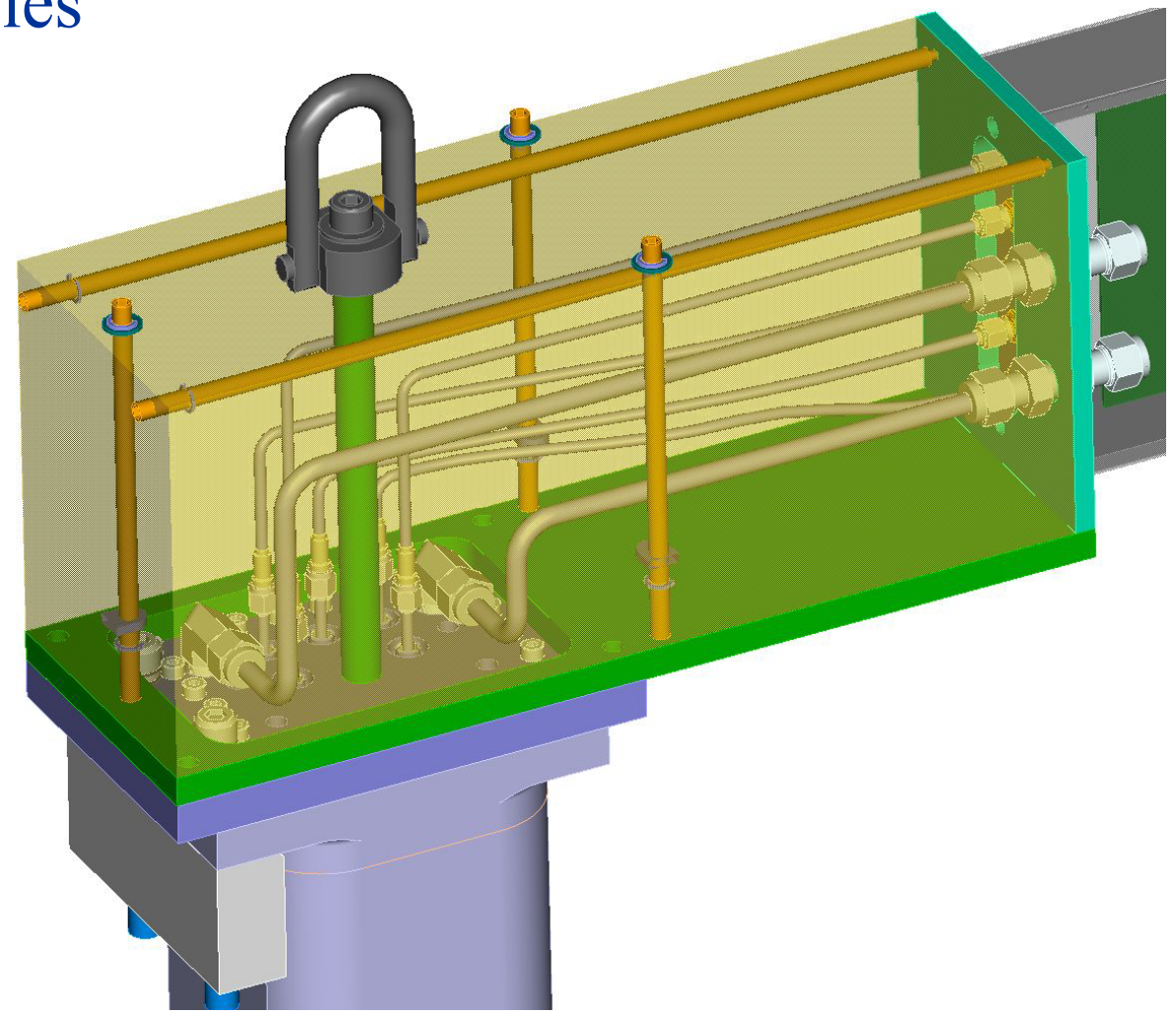
Rad Hard Cables

- Anchored at PC board end to copper support bar
- Connections to PC board use flexible braid to avoid stress to board and traces
- Termination pads through-hole soldered on both sides to protect pads
- Cables have almost straight run to triaxial feedthrough in vessel lid



Rad Hard Cables

- Cable to cable connector at lid aids disassembly of system
- Cables continue through shielded "gutter box" to active electronics enclosure
- Easy-release fasteners allow removal of cover from front of TAN



External Packaging

- Cable housing is one piece with easy access fasteners for quick removal
- “Gutter box” and electronics enclosure are fastened to detector for easy removal
- Lifting fixture allows lifting with or without electronics attached