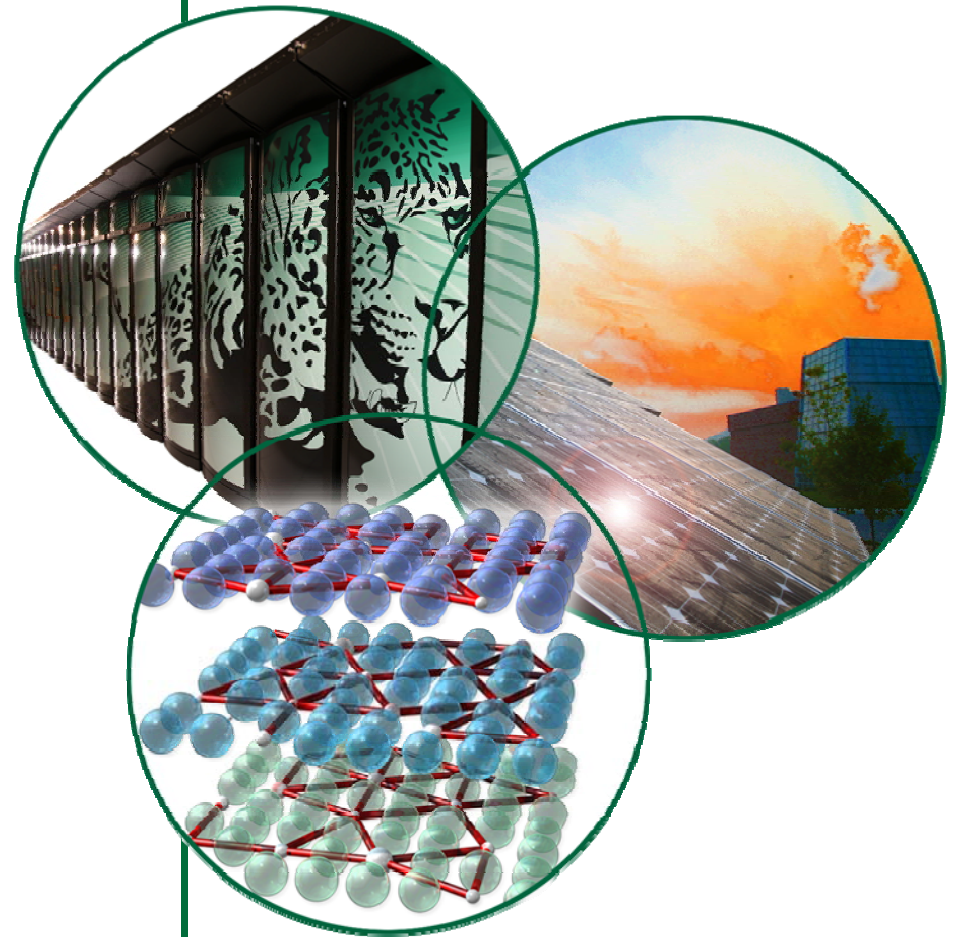


# Neutrino Factory Target Cryostat Review

Van Graves  
Cale Caldwell

IDS-NF Phone Meeting  
August 10, 2010

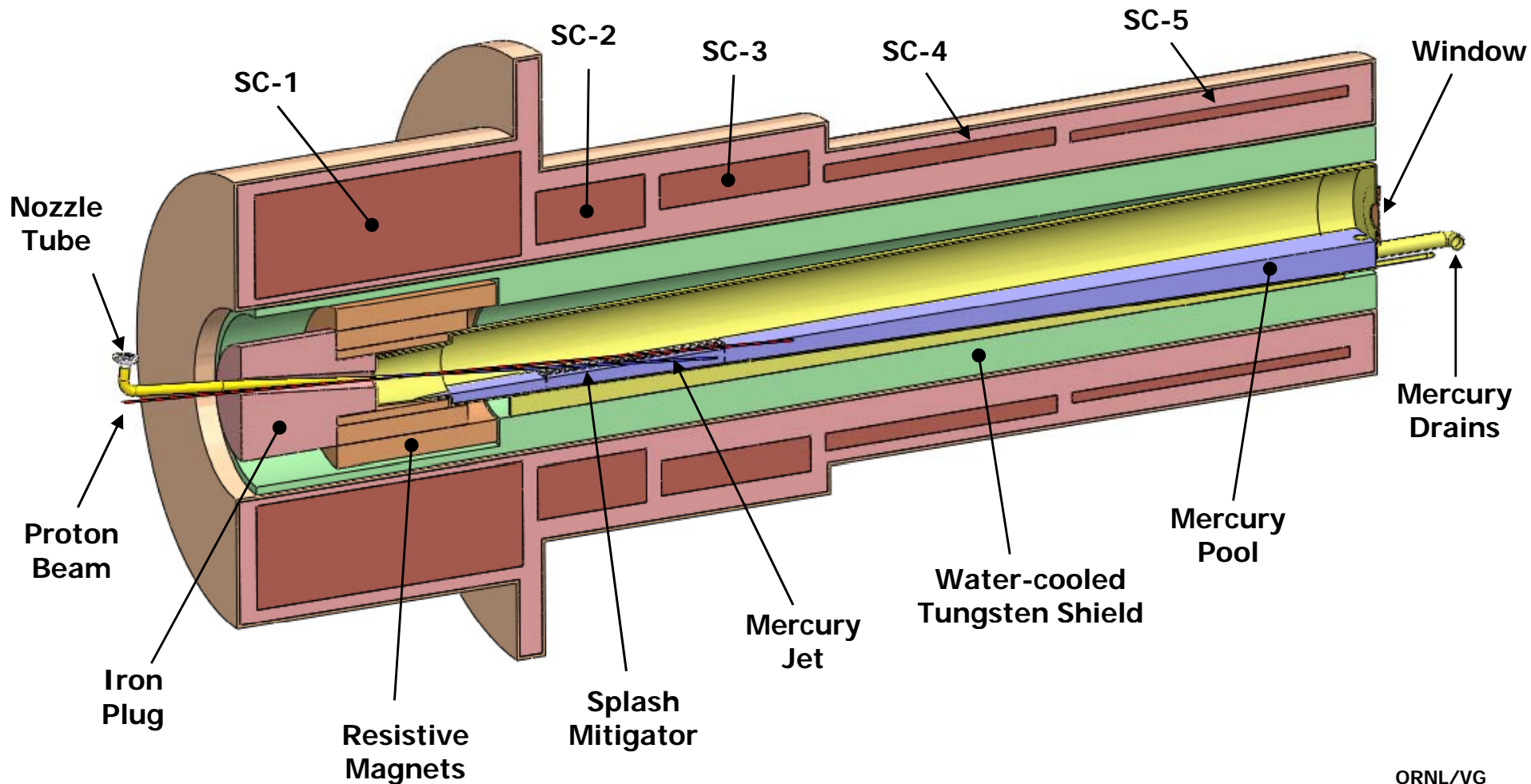


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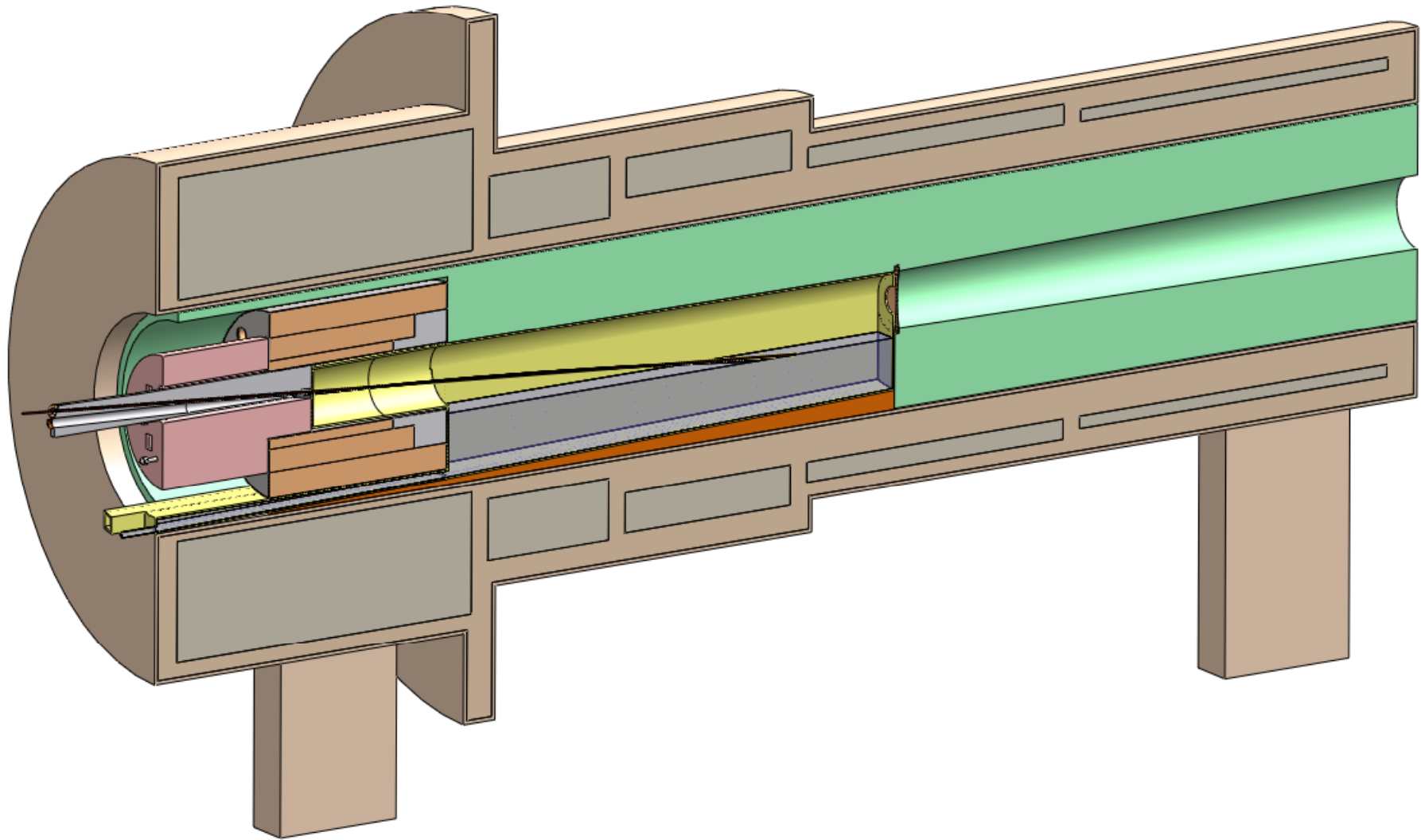
# General Target Concept – Downstream Mercury Drain

## Neutrino Factory Study 2 Target Concept



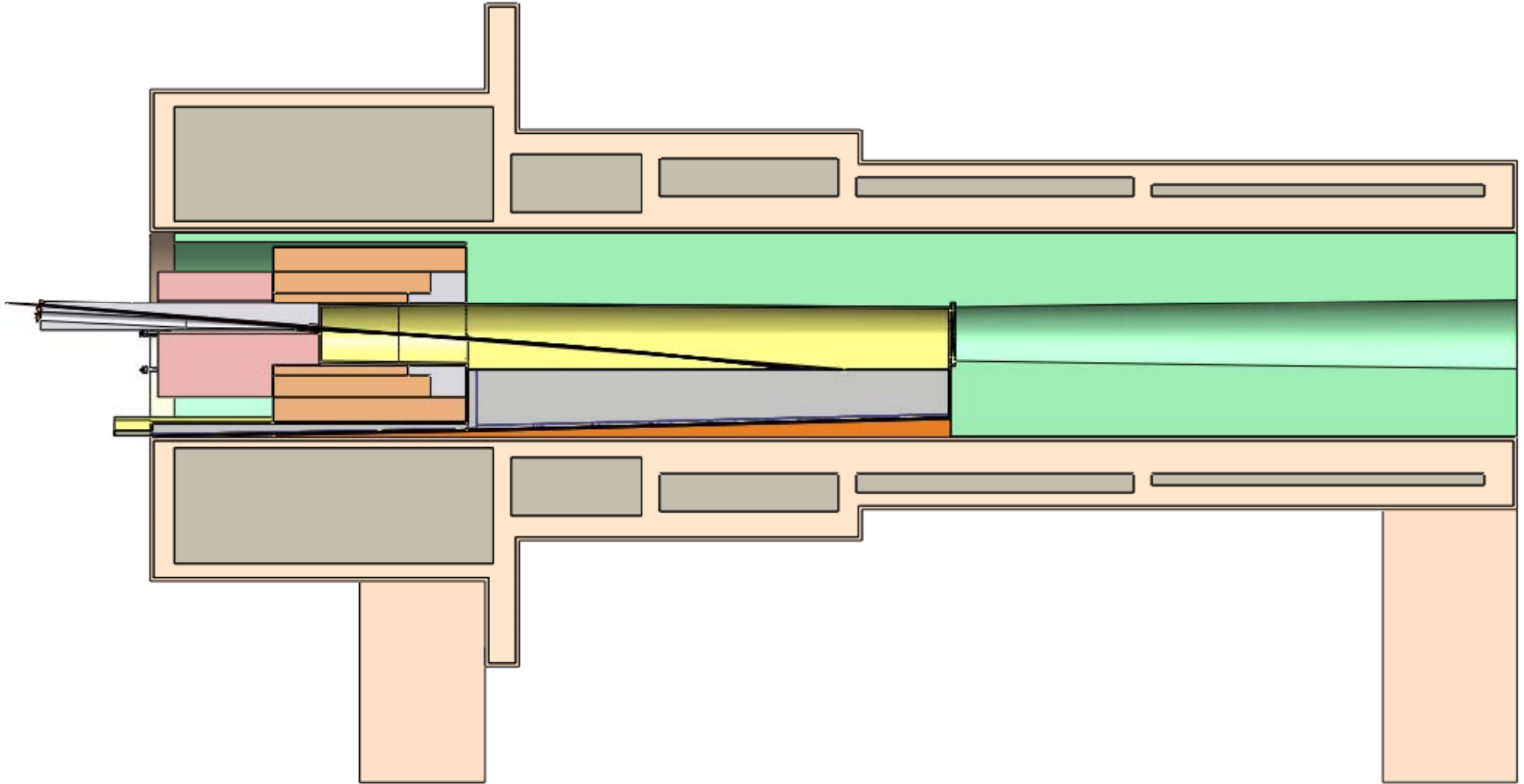
ORNL/VG  
Mar2009

# General Target Concept – Upstream Mercury Drain

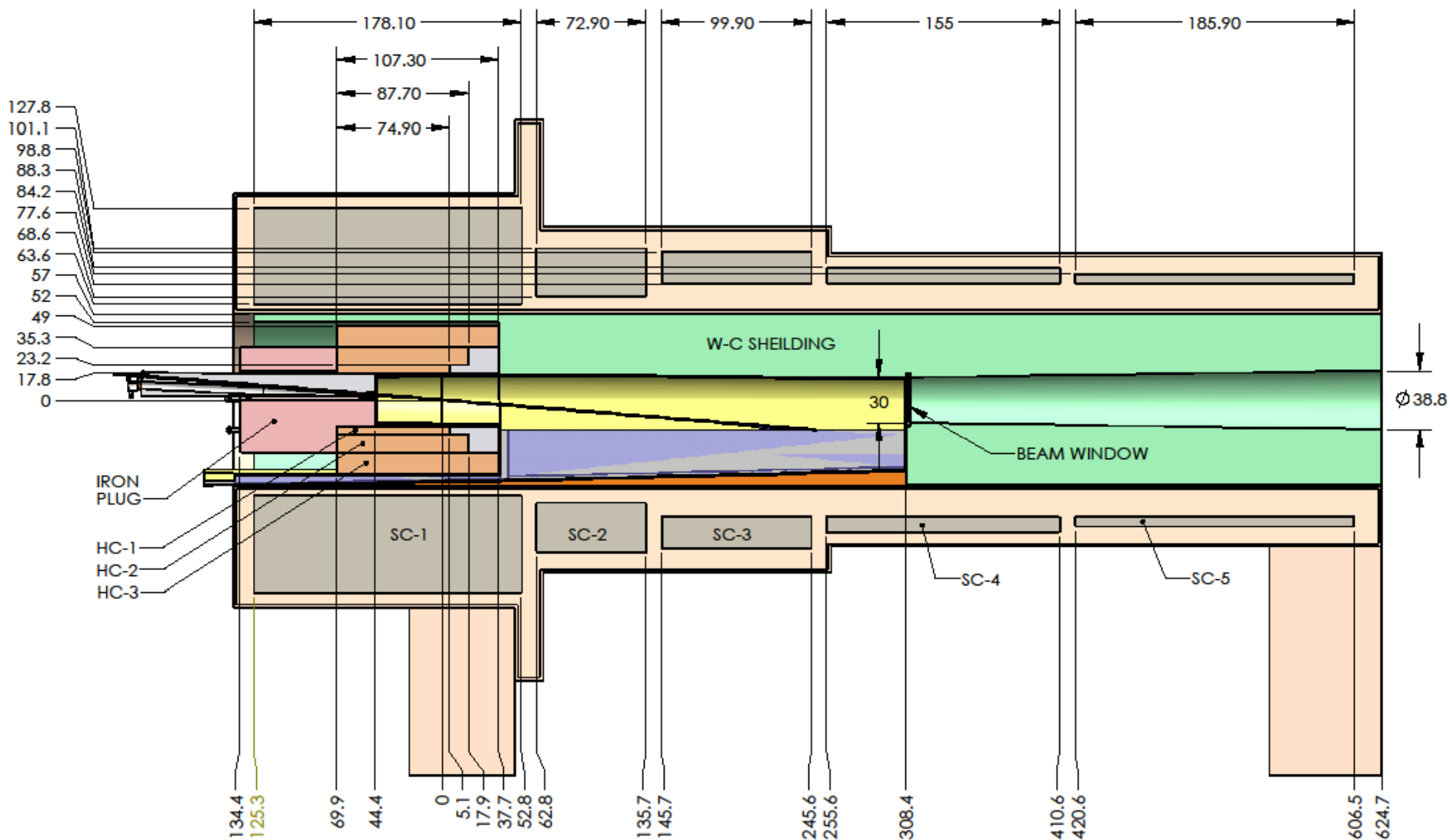


# NF Cryostat with Tapered Shielding

- Taper matches capture field
- No shielding under mercury
- Straight W-C bore up to beam window to allow removal of mercury chamber

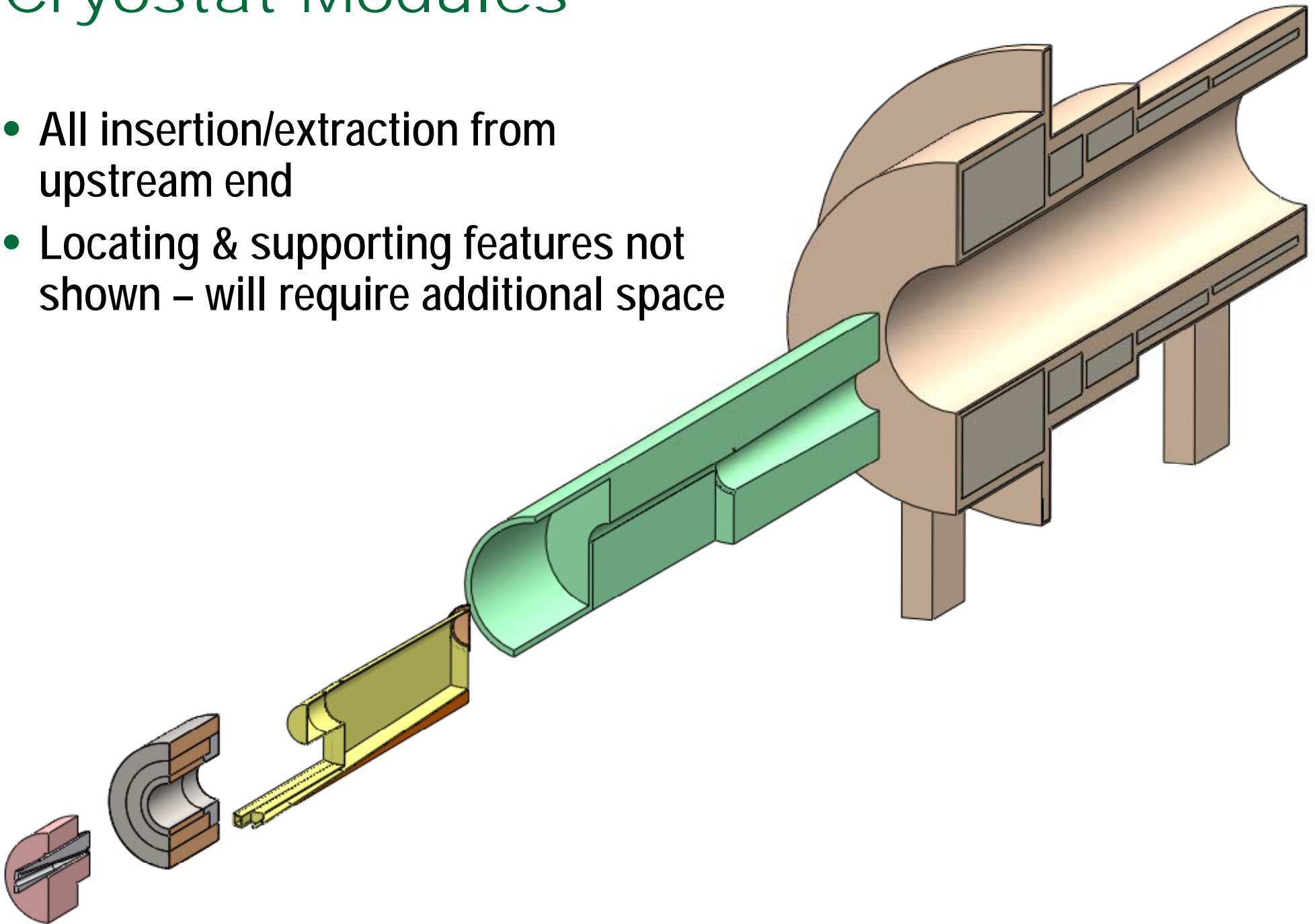


# Tapered Shielding Concept Dimensions



# Cryostat Modules

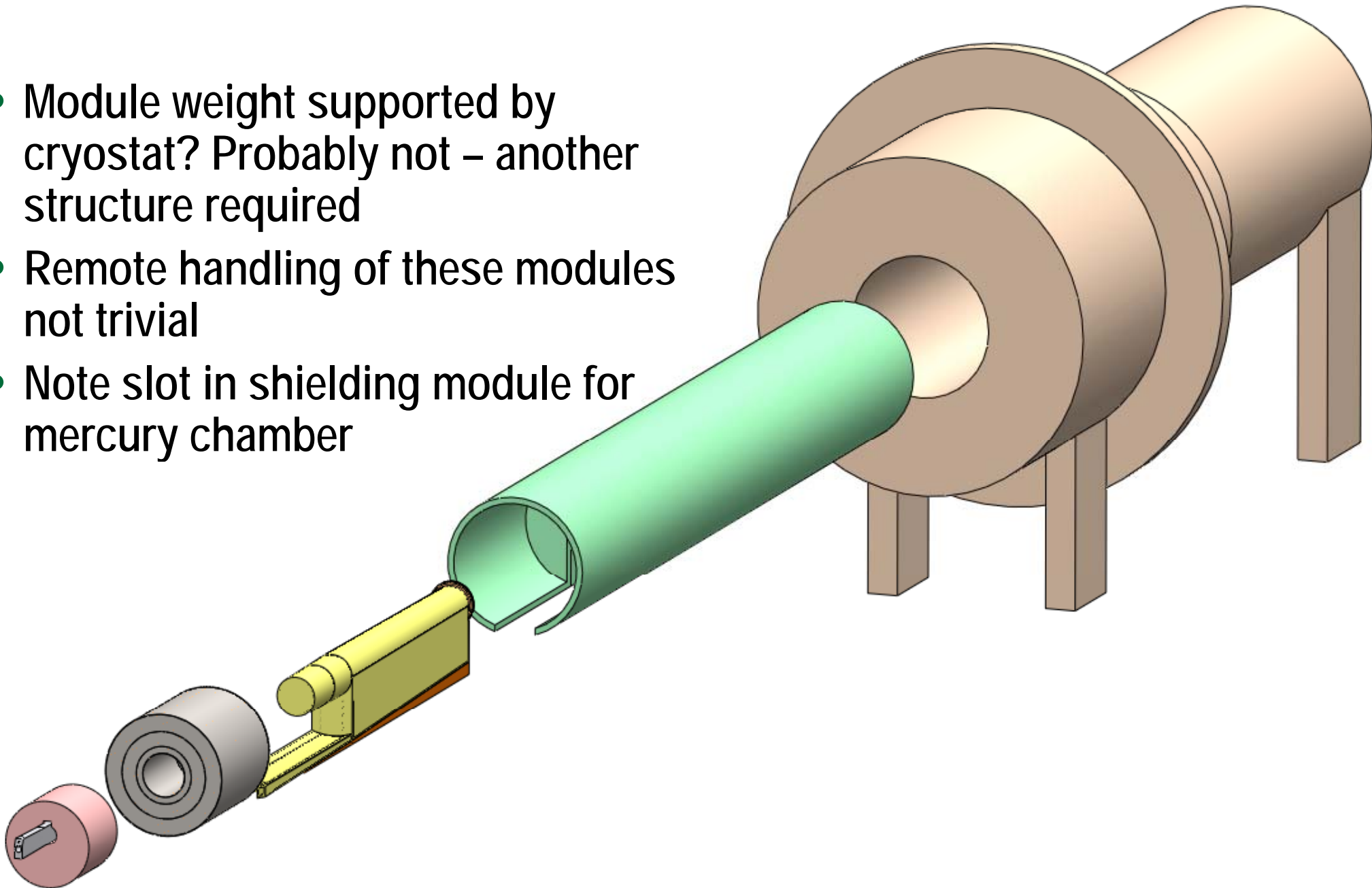
- All insertion/extraction from upstream end
- Locating & supporting features not shown – will require additional space





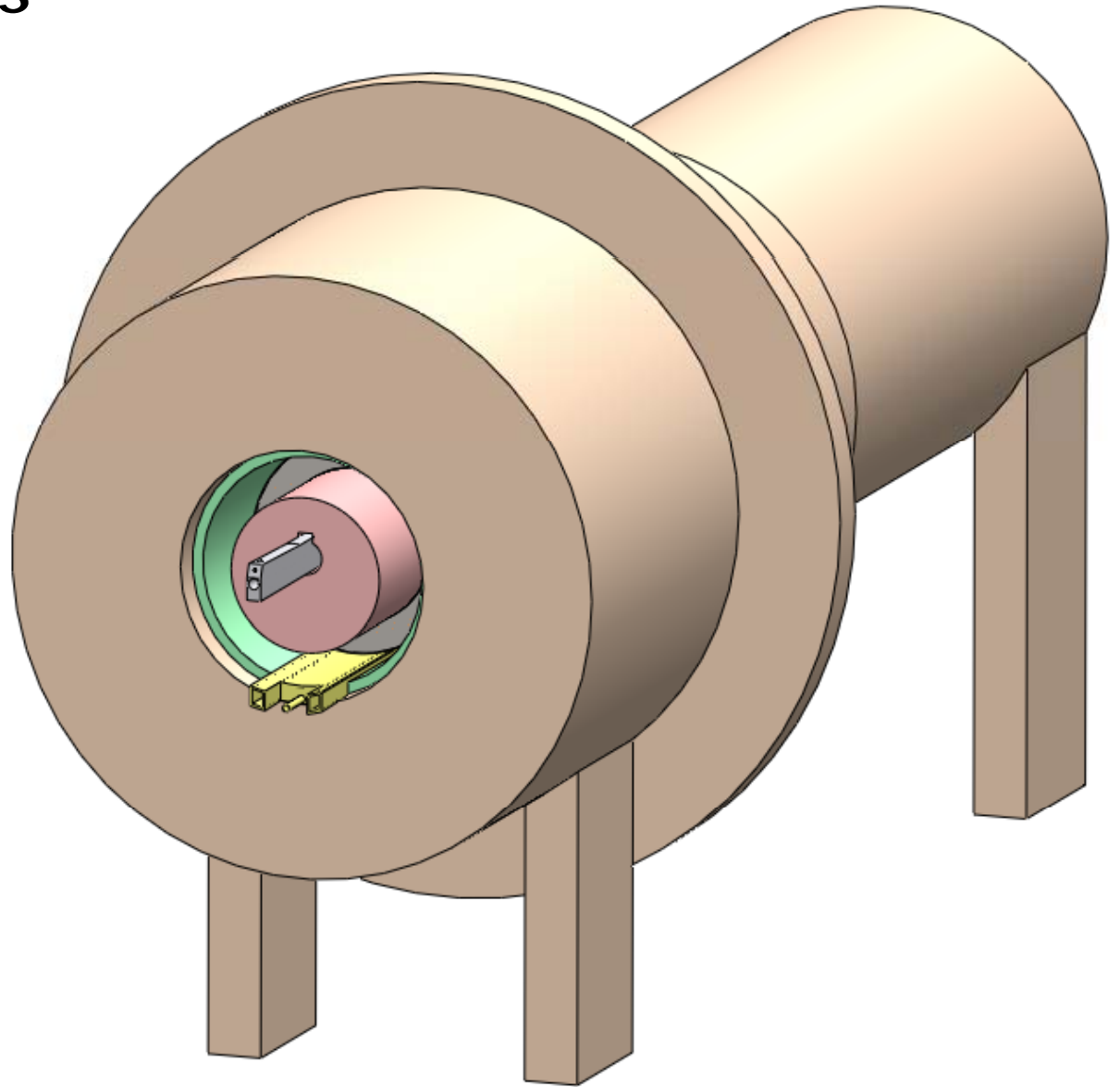
# Cryostat Modules Full View

- Module weight supported by cryostat? Probably not – another structure required
- Remote handling of these modules not trivial
- Note slot in shielding module for mercury chamber



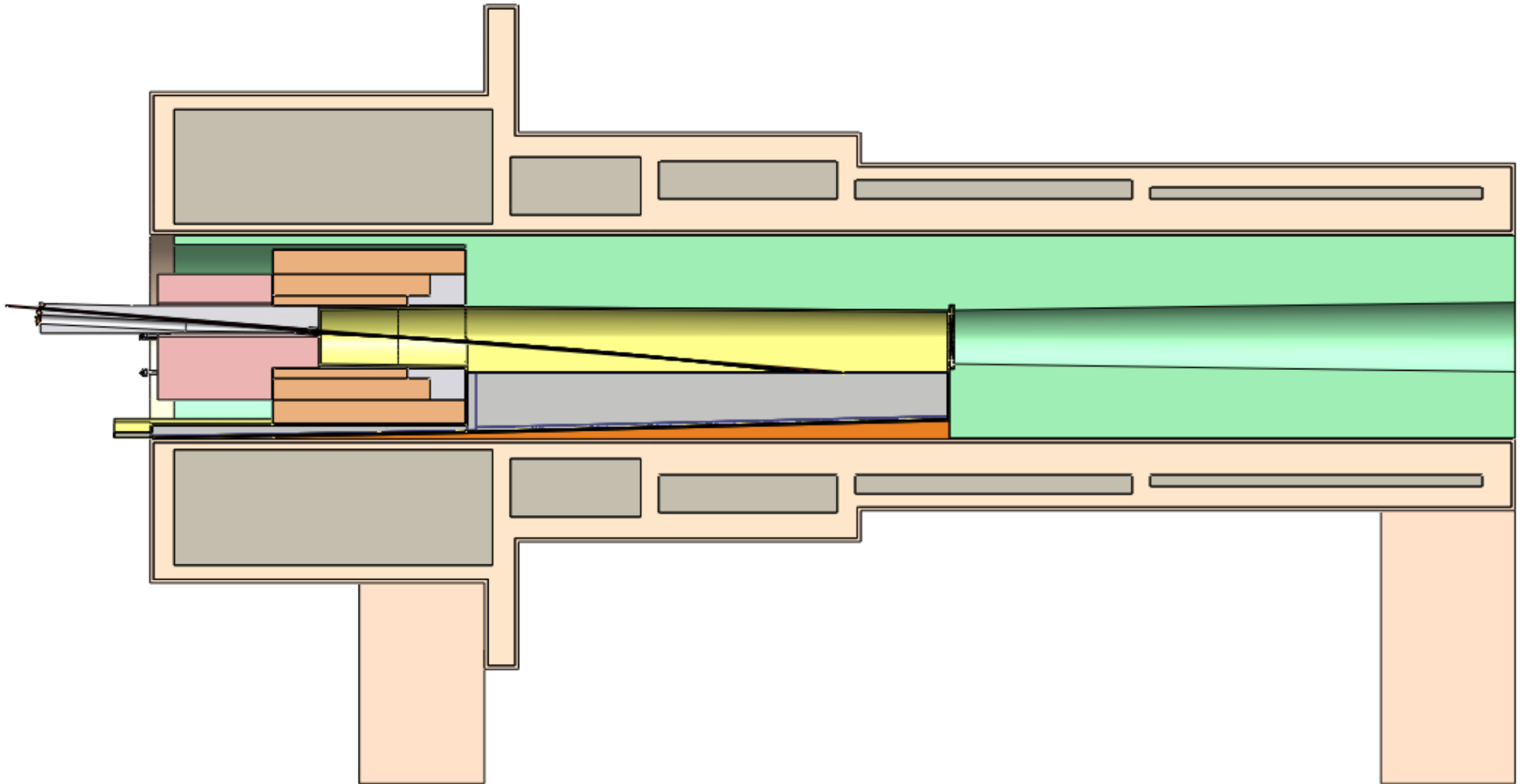
# Assembled Cryostat

- Resistive magnet leads & water cooling for these modules also enter from upstream



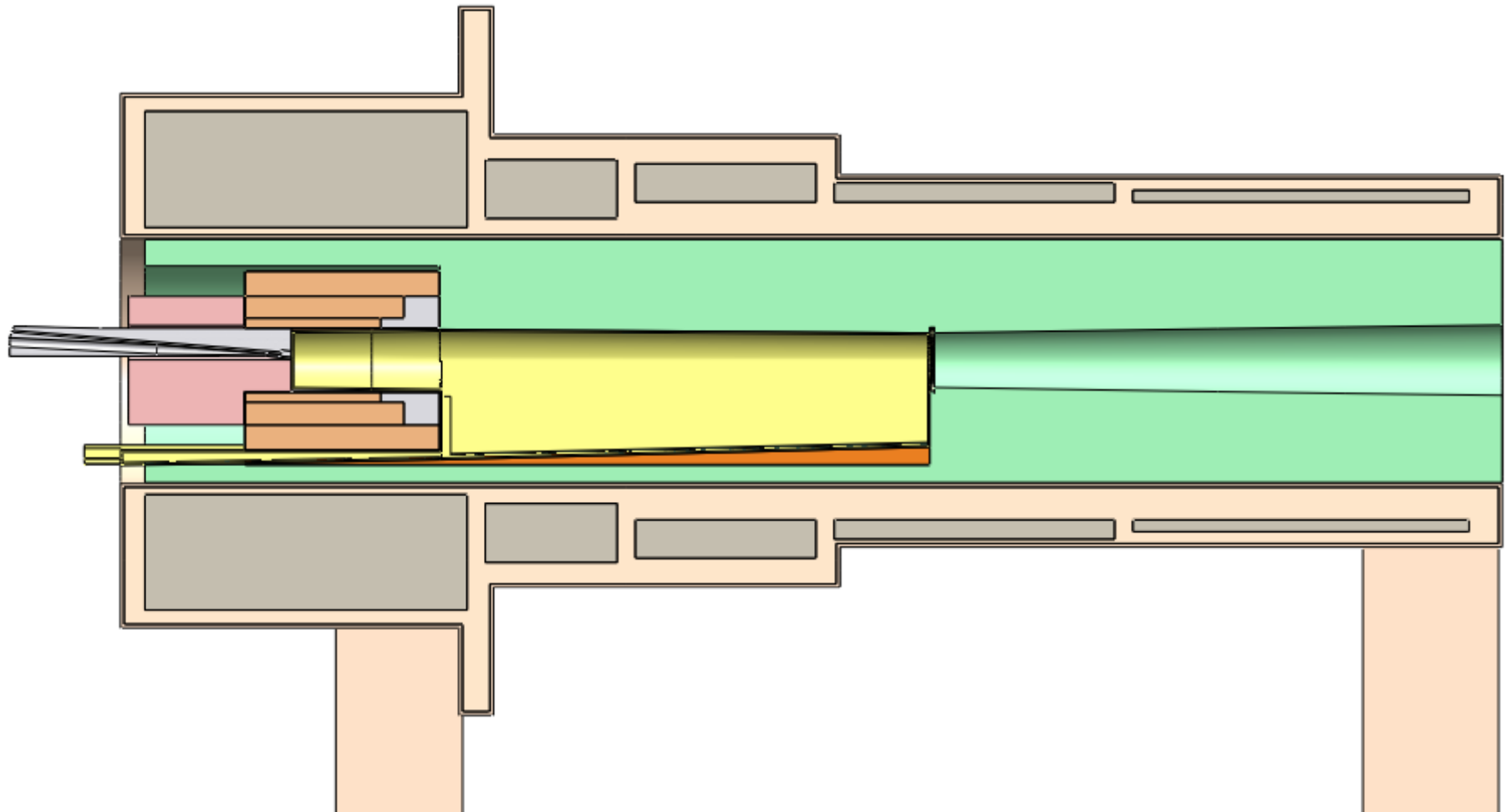


# Original: 5cm Shielding at SC1



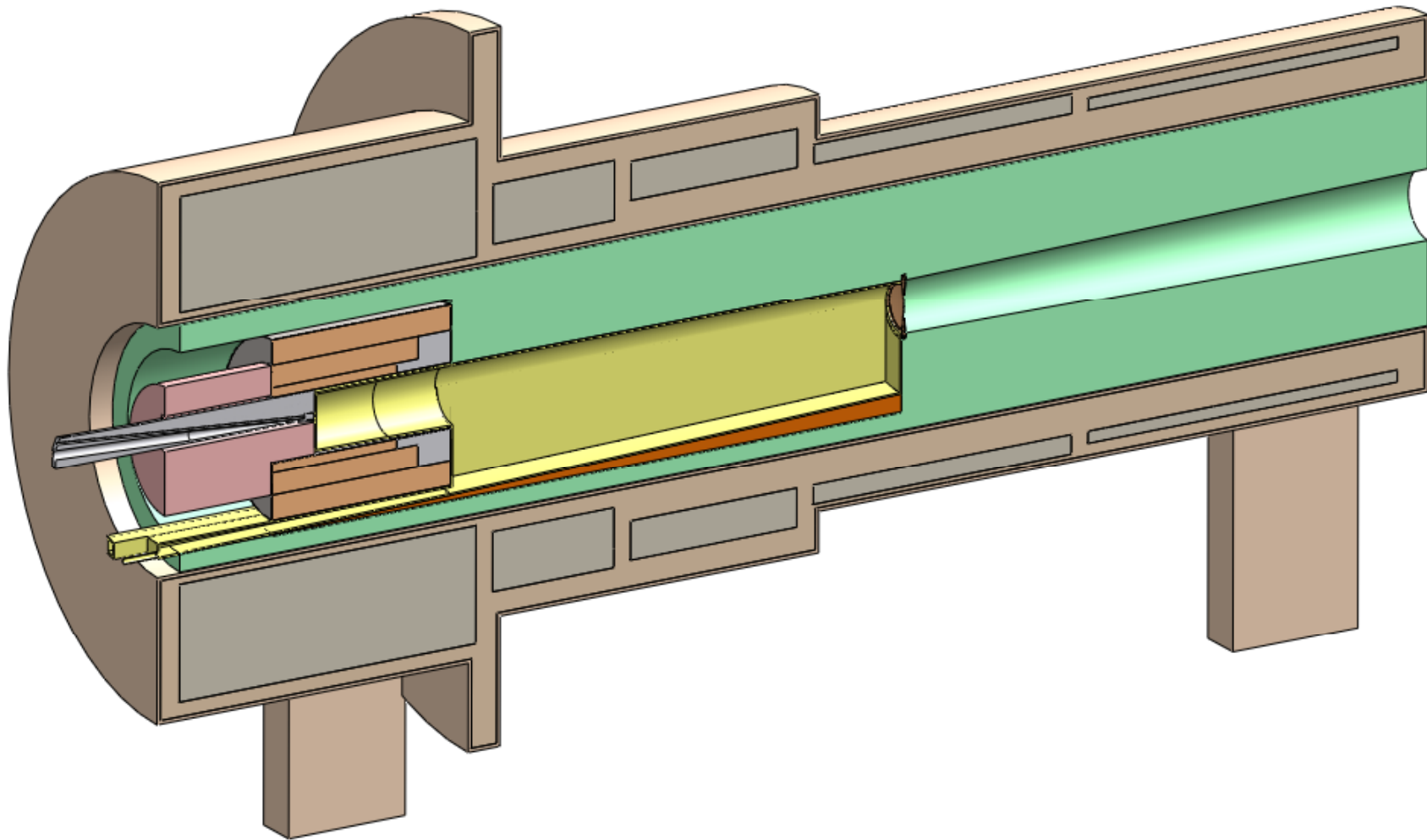
# V2: 10cm Shielding Below Resistive Magnets, 15cm Above

- Allows mercury drainage below magnets while still providing W-C shielding

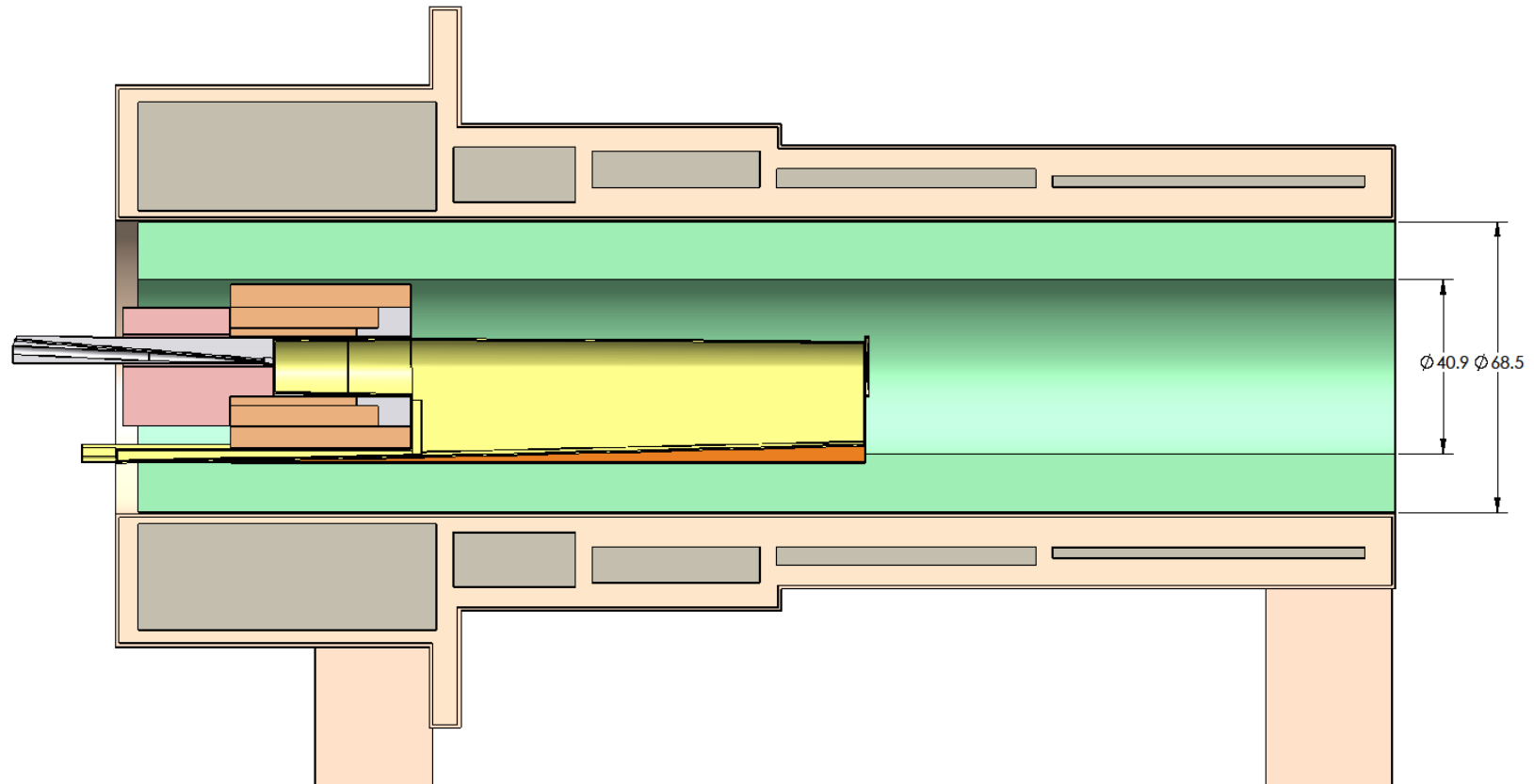


# V2 Iso: 10cm Shielding Below Resistive Magnets, 15cm Above

- Asymmetric W-C structure, minimal shielding for SC1

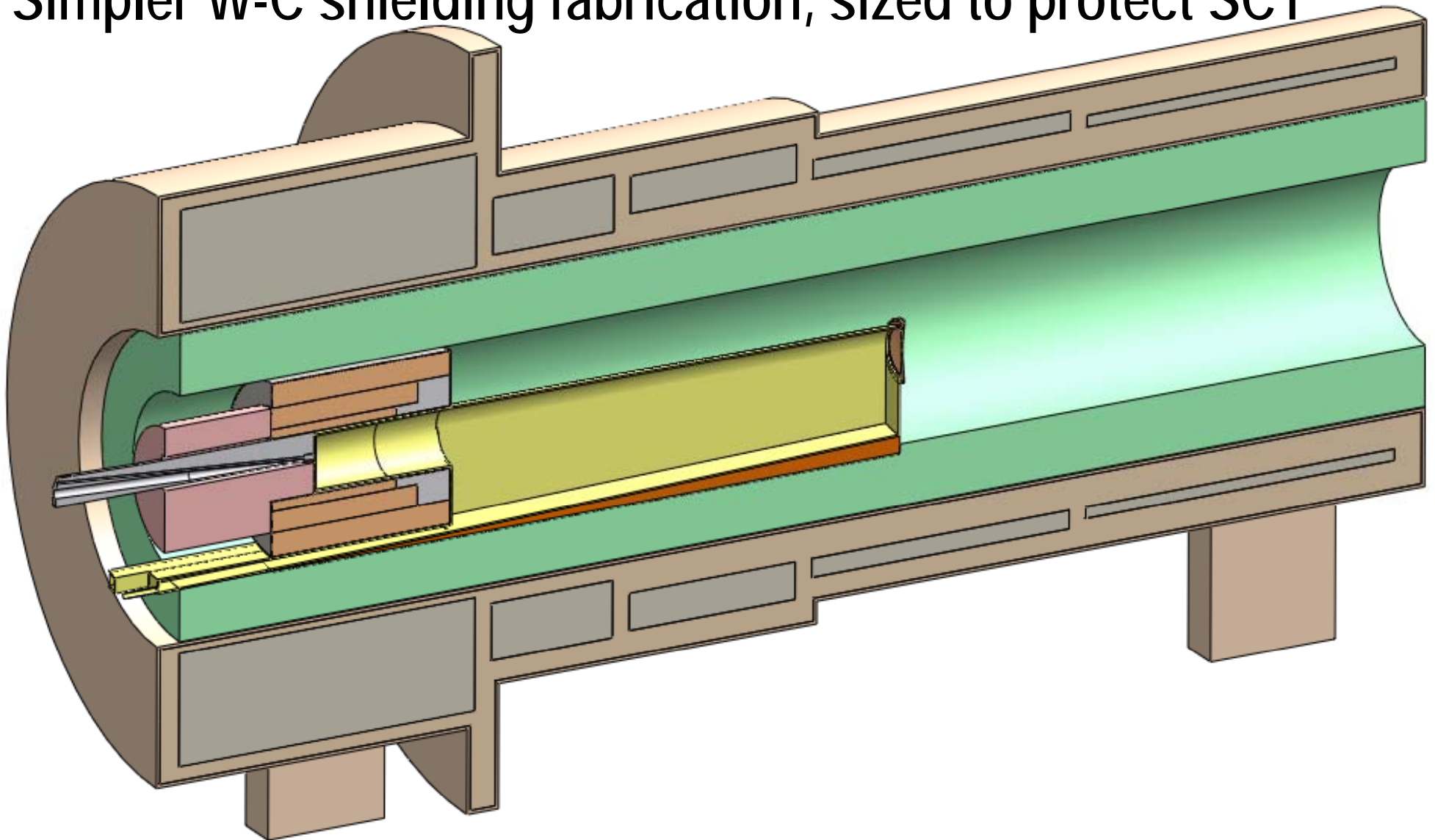


# V3: 30cm Shielding Below, 35cm Above, Constant ID



# V3 Iso: 30cm Shielding Below, 35cm Above, Constant ID

- Simpler W-C shielding fabrication, sized to protect SC1



# Some Questions as Design Progresses

- Can system perform without iron plug and/or resistive magnets?
  - Removal simplifies remote maintenance, provides more space for nozzle & beam dump.
- What does internal cryostat structure (weight support, magnet force restraints) look like, and how does it affect overall cryostat size?
- Are 5 SC magnets required in this cryostat?
  - Downstream beam window should be at end of cryostat for remote maintenance from downstream end.
- What shielding thickness is required to protect SC1?
  - This will ultimately drive cryostat bore diameter.



# Summary & Reminders

- Current NF target design based on physics performance characteristics
- Further consideration shows it is an assembly of several subsystems, each with different design requirements and trade-offs
  - Several areas of engineering-related R&D, including heat removal, Hg flow, nozzle development, beam windows
- With Hg target (nor with any other target), hands-on maintenance cannot be assumed at any point in operation
  - Remote features must be incorporated into initial design
- Final system concept will result from an integrated design approach with input from several technical areas