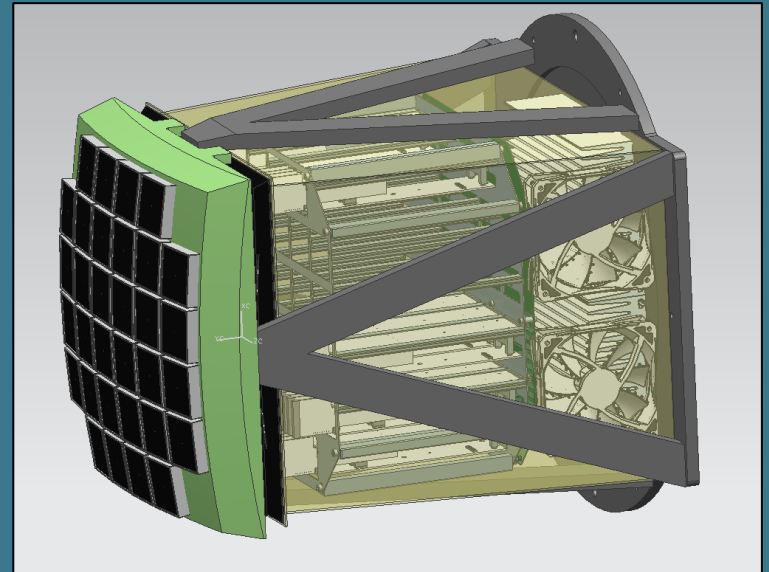
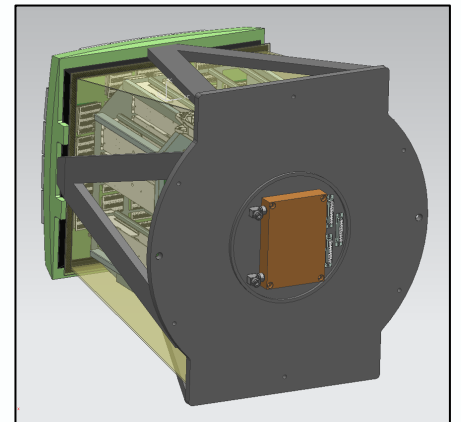
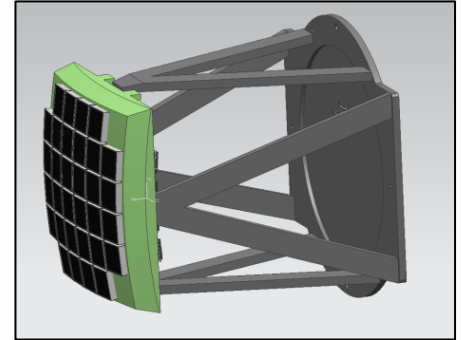


# CHEC Mechanical/Thermal Update

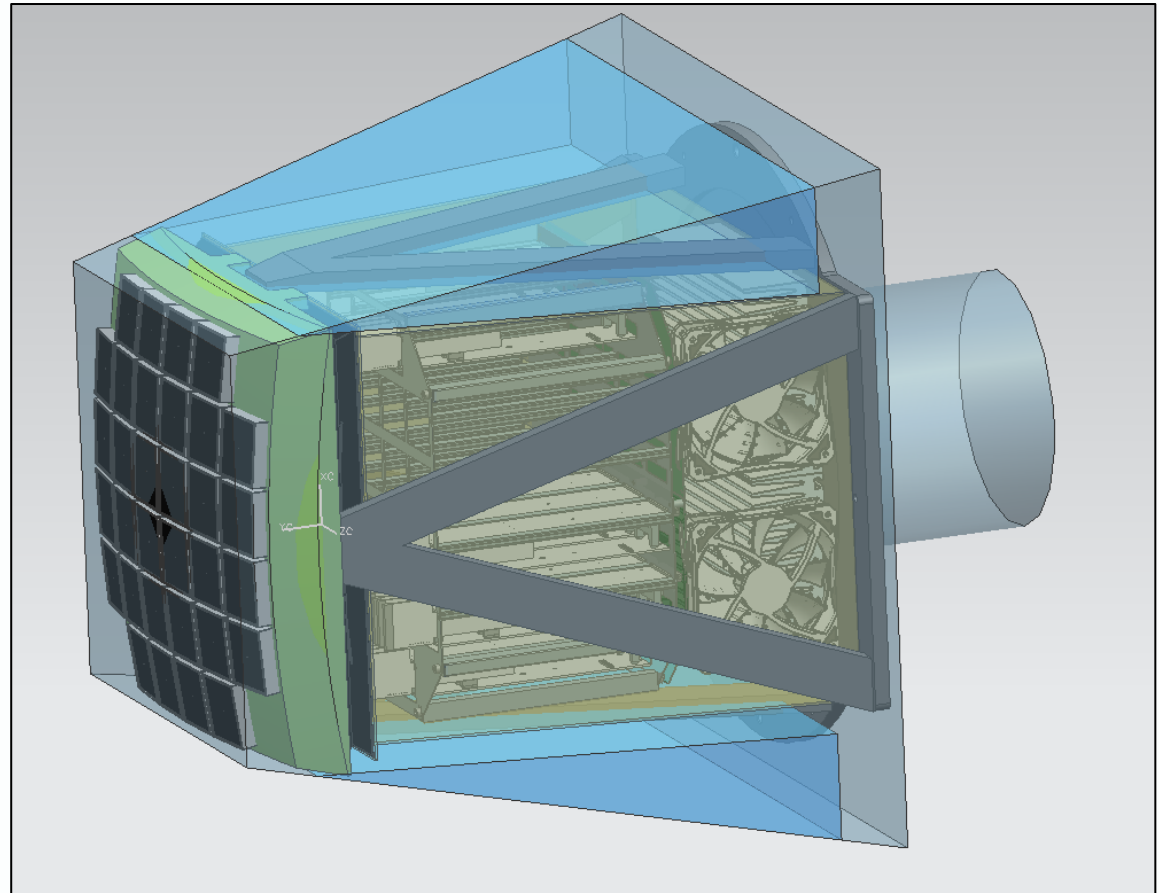
Jon Sykes and Duncan Ross  
Space Research Centre  
University of Leicester



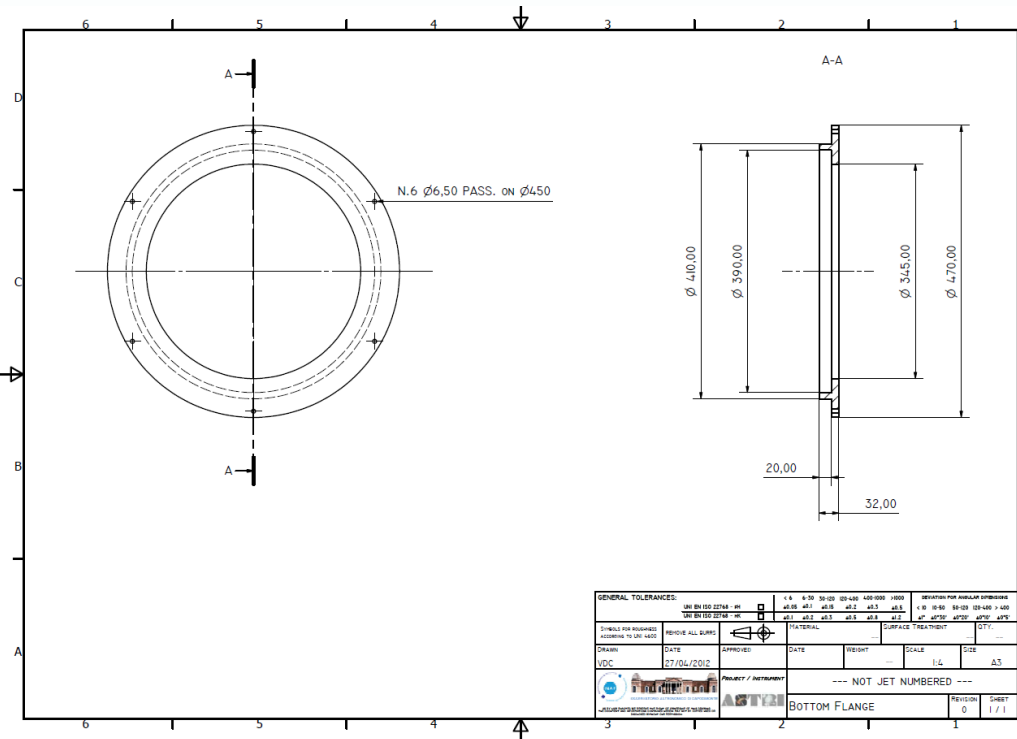
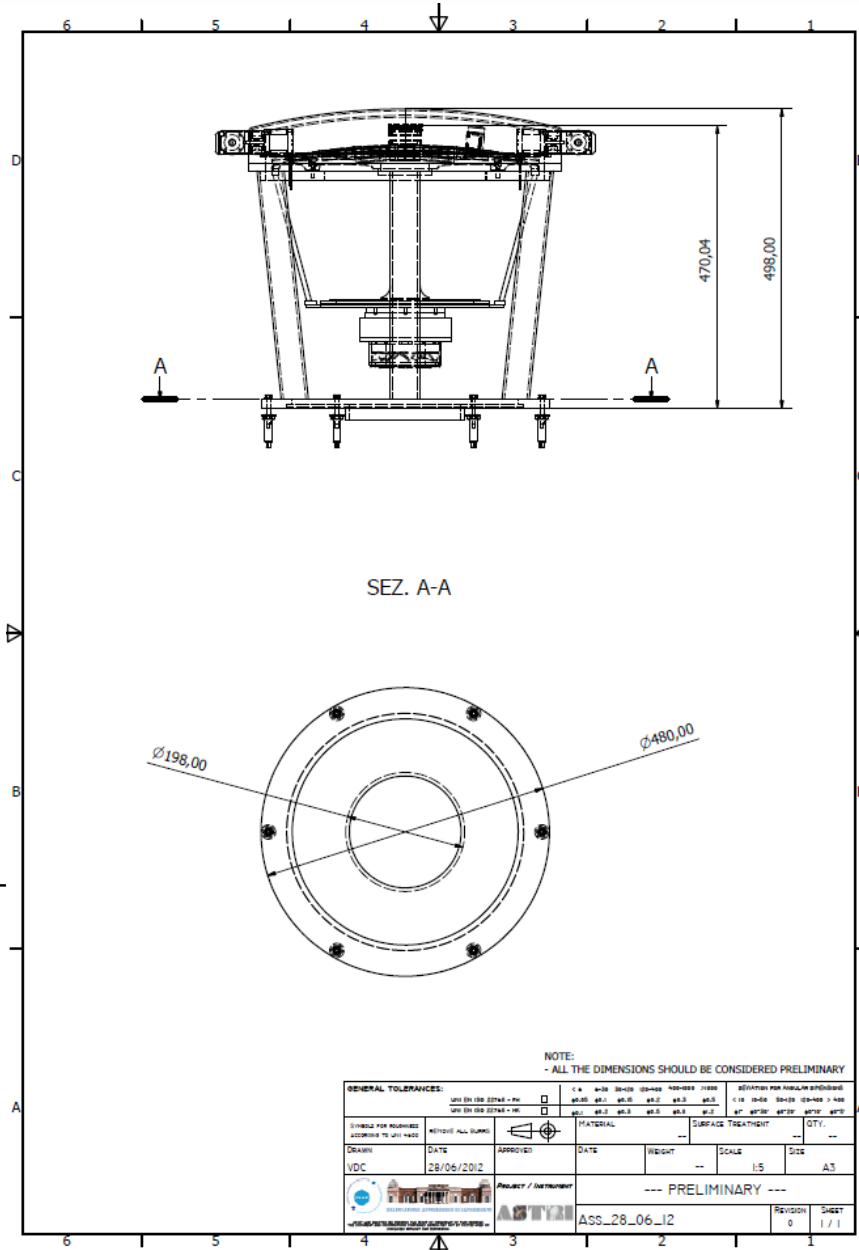
- Mechanical Design Overview
  - Envelope
  - Working assumptions on mechanical interface
  - Baseline Camera concept (MAPMTs)
- Thermal Design Overview
  - Working assumptions
  - Thermal control system concept
- Preliminary Assembly Concept
- Interfaces and Interface Management
- Current and near future work



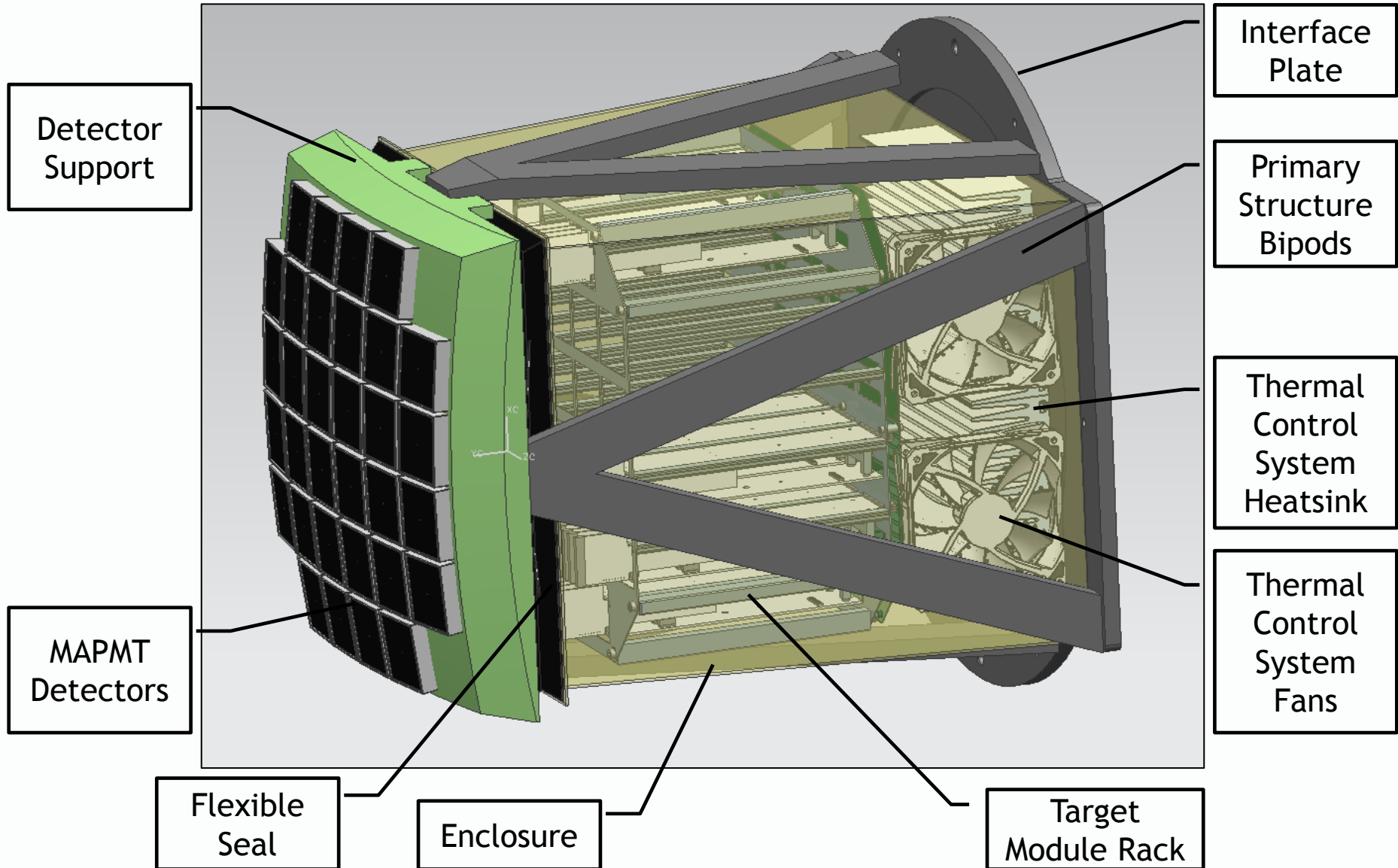
- Envelope definition
  - ASTRI imposed length limit = 500mm
  - Shadowing. Allowable volume defined as 12 degree 'shadow' from front face
    - Ref email Tim Greenshaw 14/5/2012
  - This determines the open door envelope
  - Tube interface based on assumptions inferred from ASTRI interface drawing ASS\_28\_06\_12
- Need to confirm working assumptions and any other restrictions and document in ICD



- 'Working' Mechanical Interface
  - based on assumptions inferred from ASTRI interface drawing ASS\_28\_06\_12 and untitled ASTRI drawing 27/4/2012
- Need to confirm (or otherwise) with ASTRI/Project Office



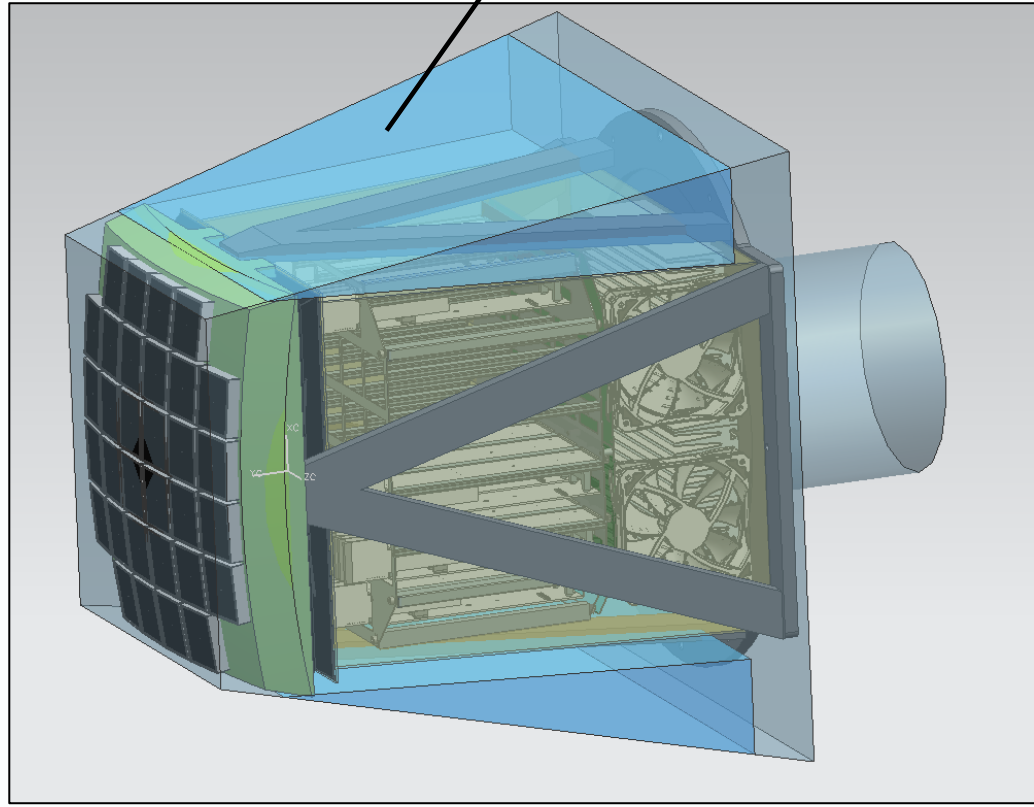
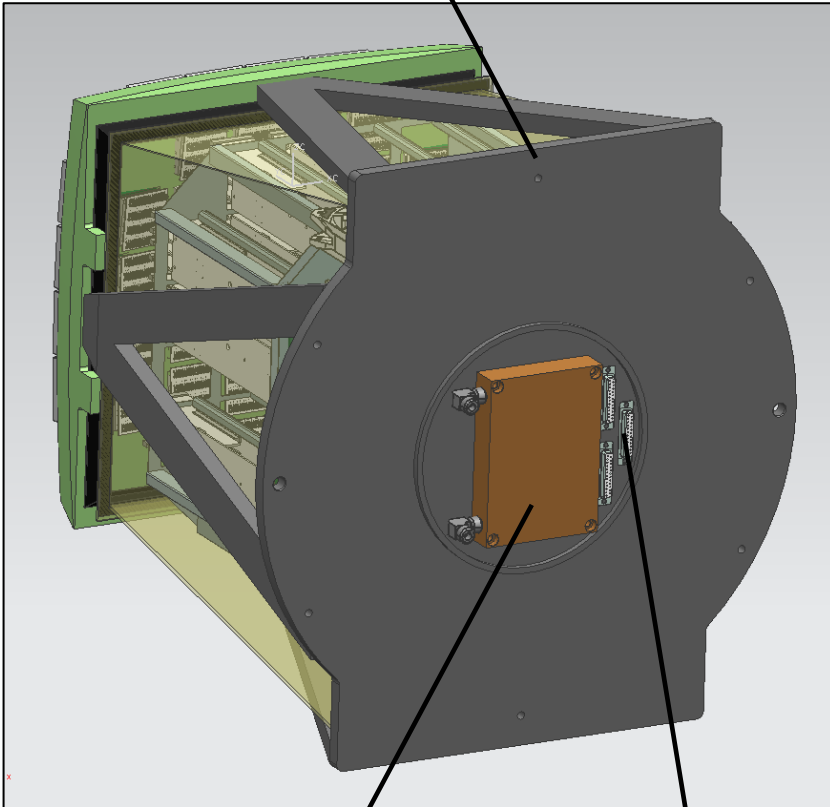
# CHEC Mechanical Concept



# CHEC Mechanical Concept

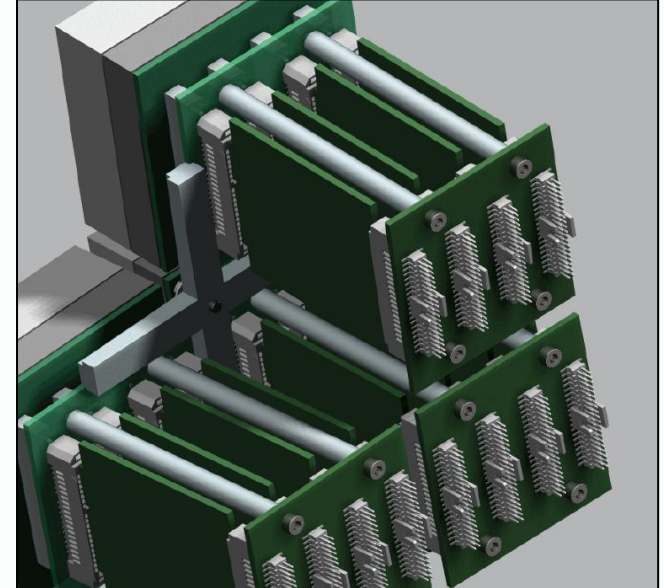
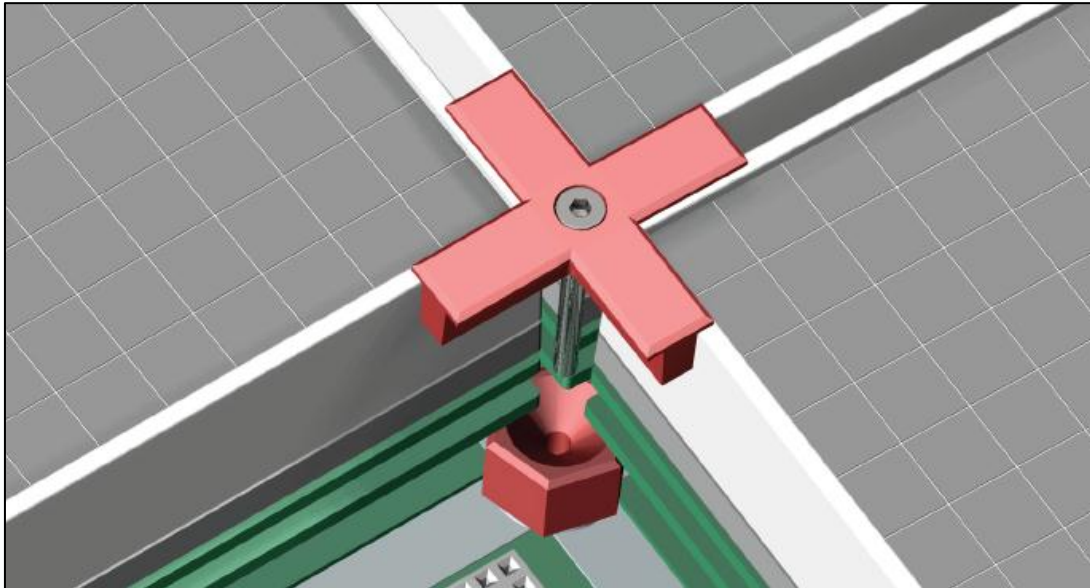
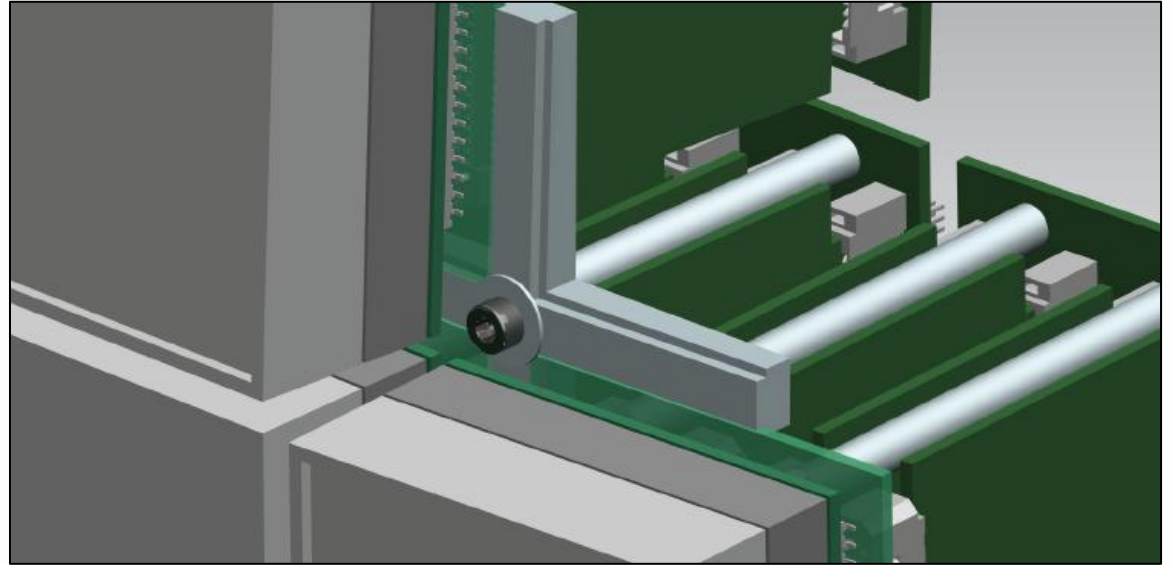
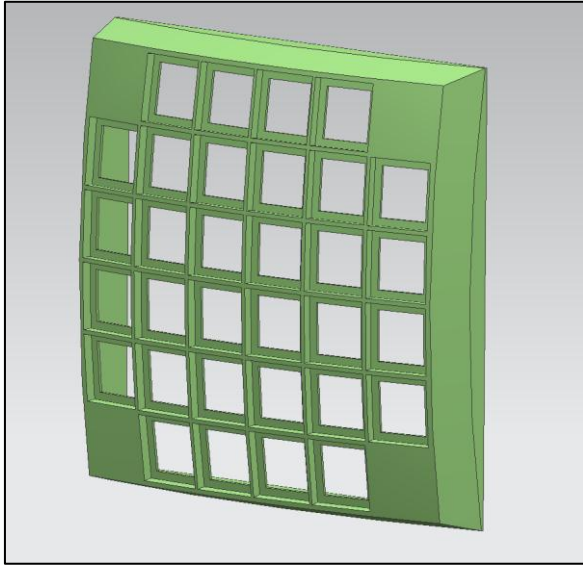
Mechanical interface to telescope

Door envelope (open)

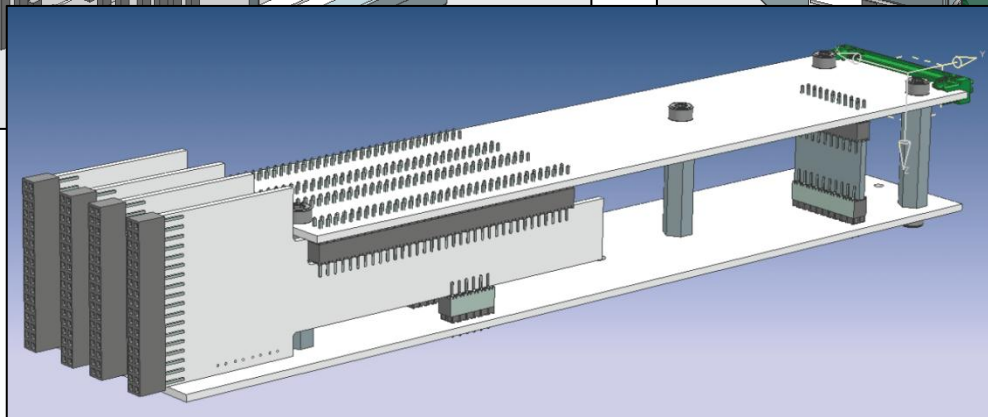
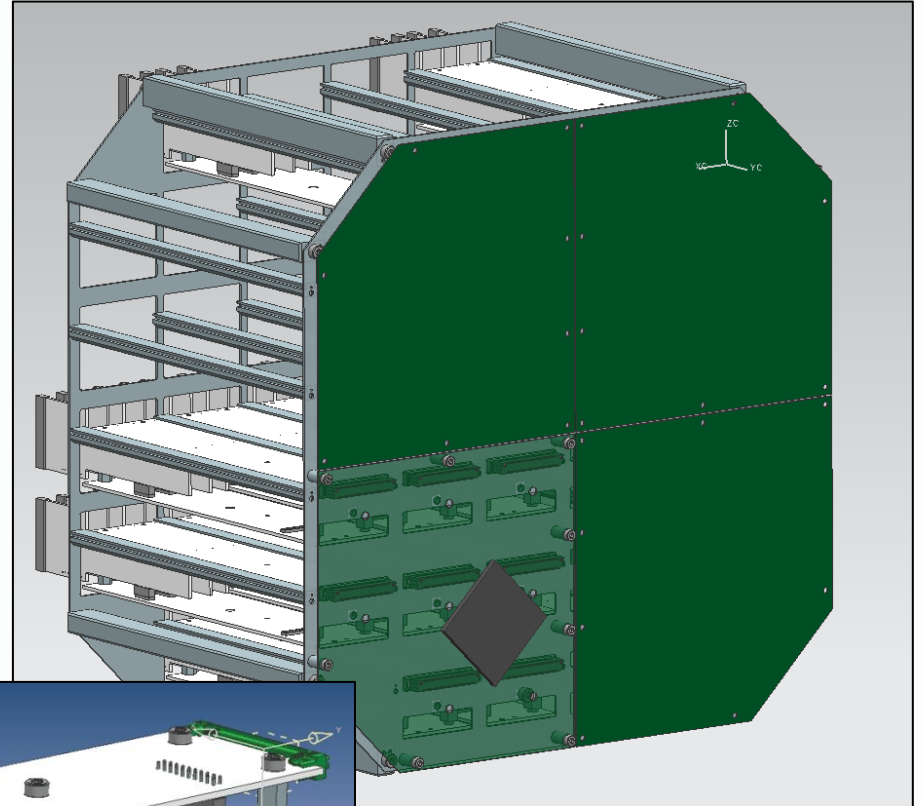
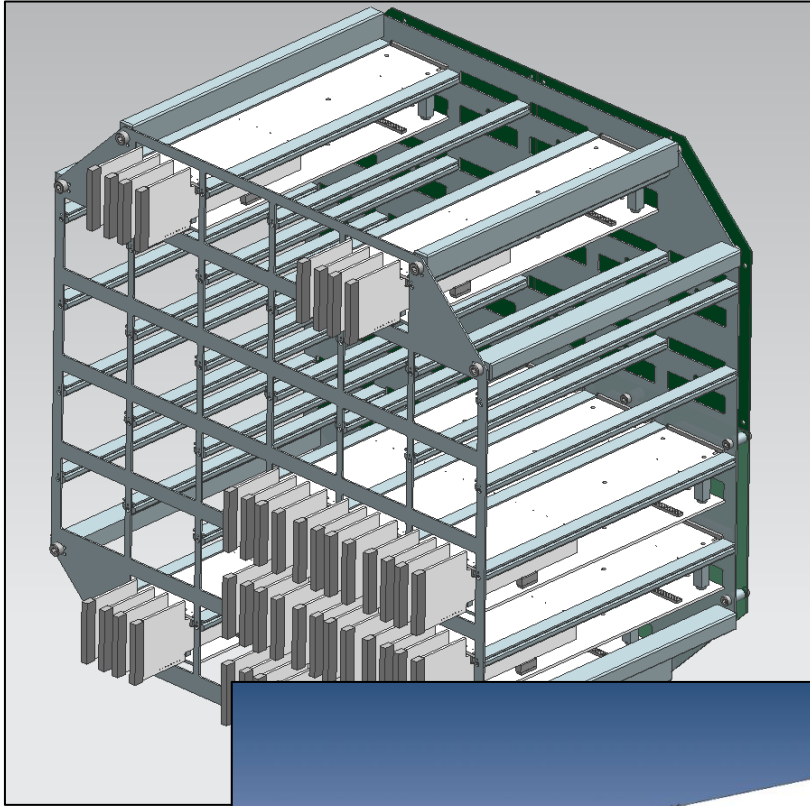


Water flow heat exchanger

Electrical connectors

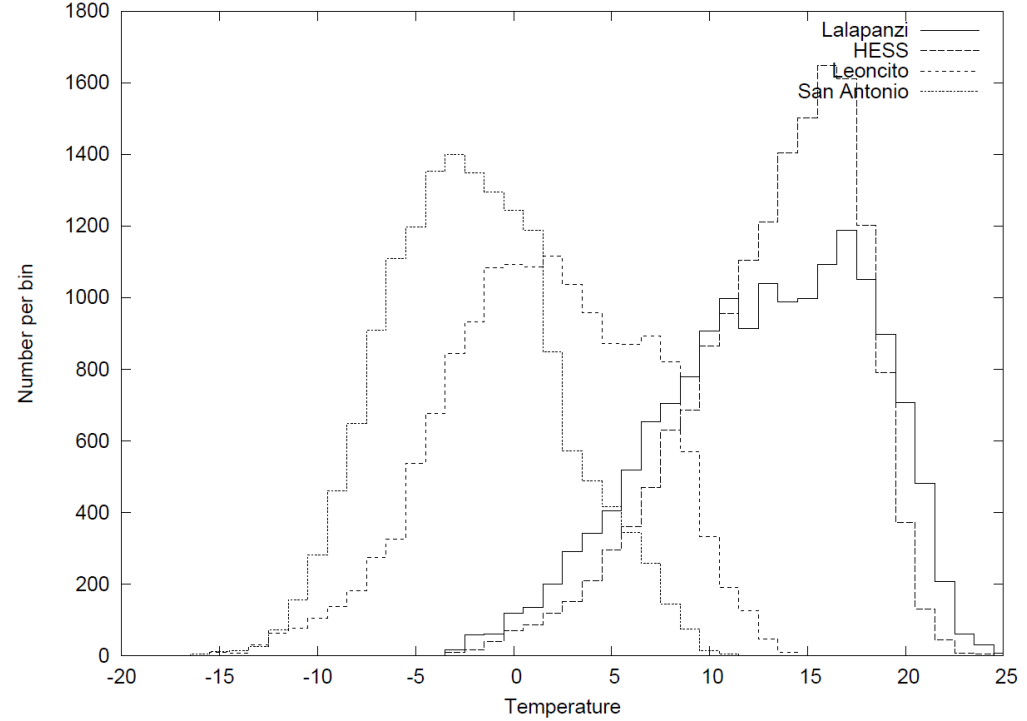


# CHEC Mechanical TARGET MODULE rack assy





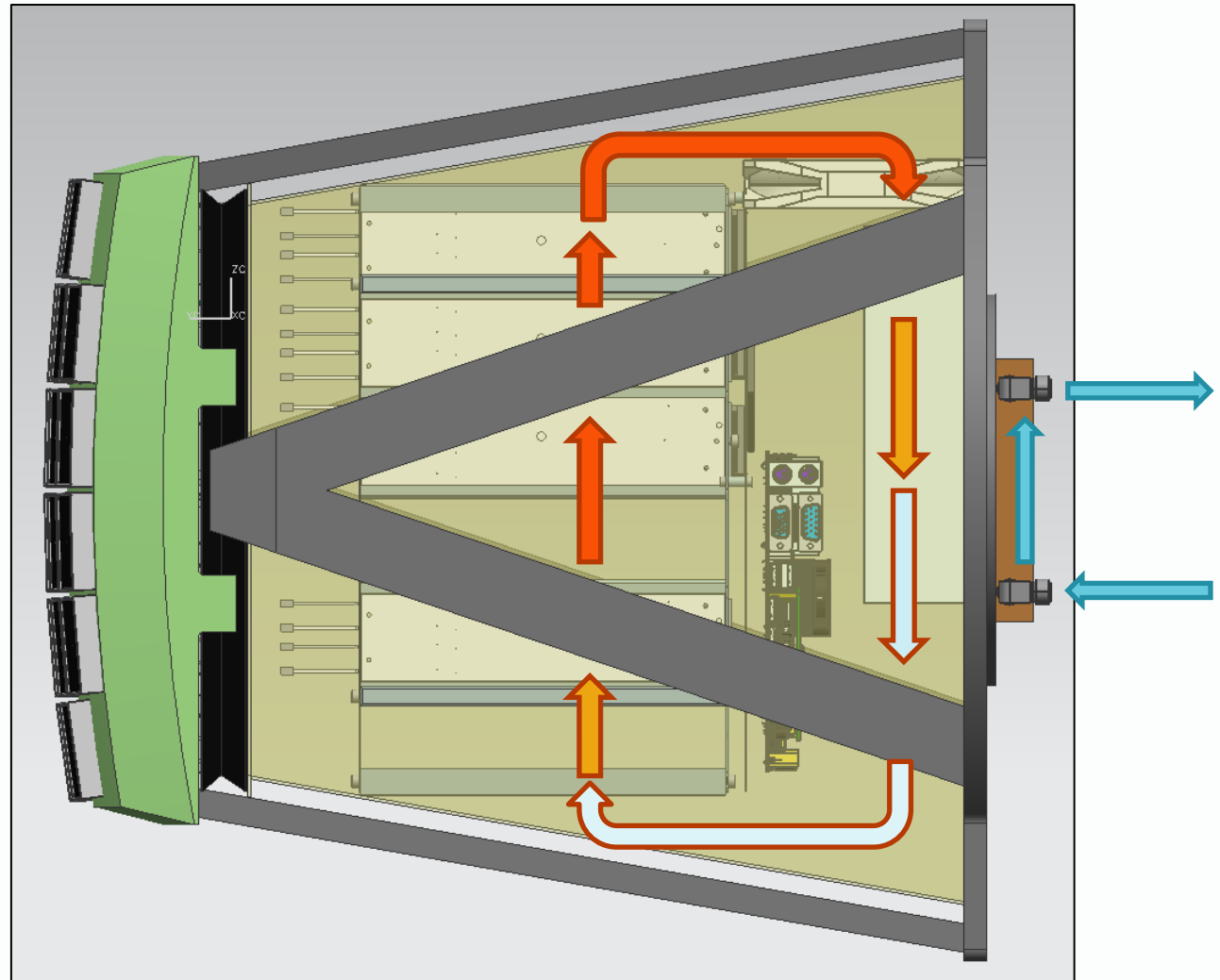
- Environment Currently specified as:
  - Normal Operation
    - +30 to -10 degrees C
    - 5% to 95% relative humidity
  - Survival Conditions
    - +60 to -25 degrees C
    - 0% to 100% relative humidity
- Power dissipation
  - 400W total internal
- Temperature limits – working assumptions:
  - MAPMT assumed not a driver
  - Target module max nominal environment temperature 40 degrees stated in CHEC to Target ICD
  - Si detector requirements TBD



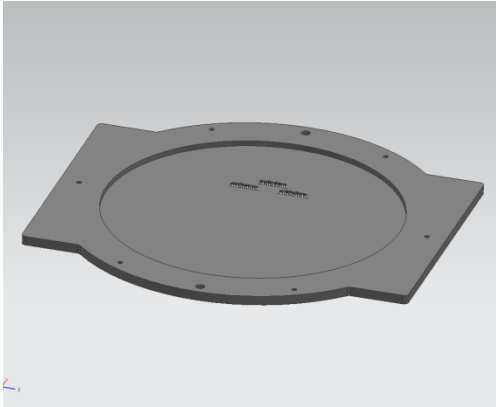
- Ref email Tomas Bulik 5 September (Moonless time)

- CHEC Thermal Interface
  - Assumed to be cooling water supply
    - Temperature?
    - Flow Rate?

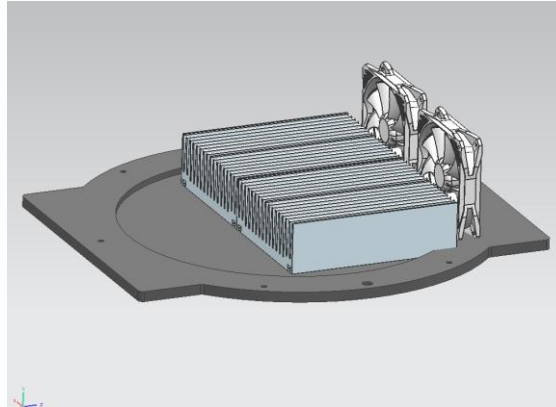
- Majority of dissipation in TARGET modules
- Recirculating internal flow over heatsink
- External water cooled heat exchanger
- Connections routed via telescope tube?
- Analysis of internal flow ongoing at Leicester
  - Siemens NX Thermal/Flow model



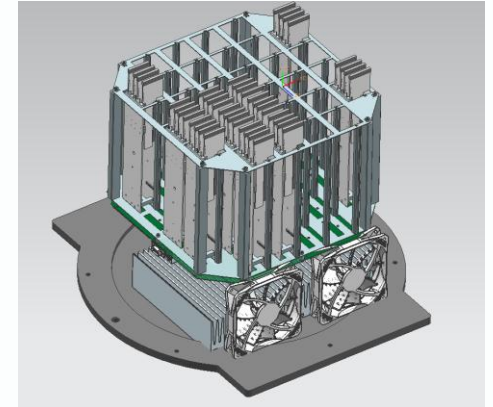
# CHEC Assembly Concept



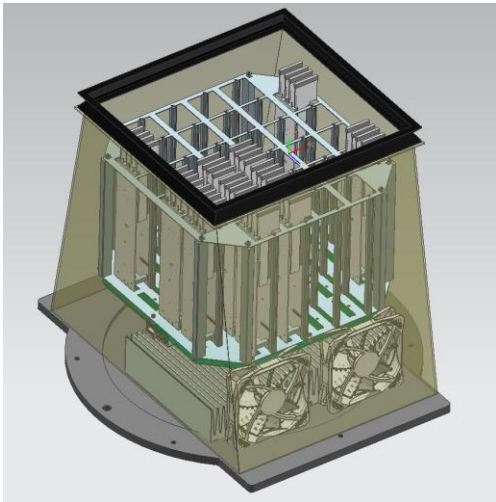
- Baseplate



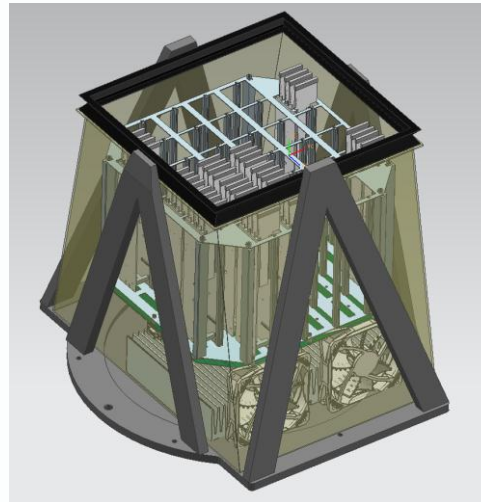
- Add Thermal Control



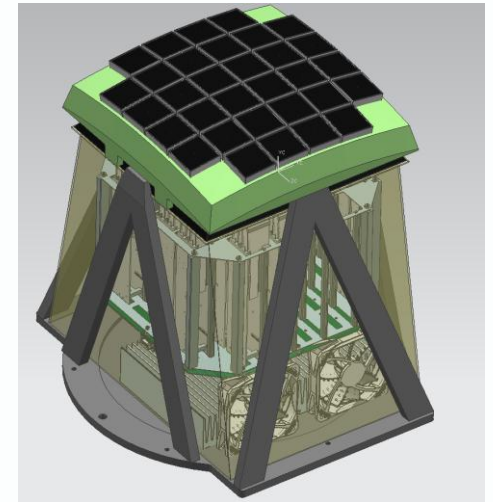
- Add Rack



- Add Cover



- Add Bipods



- Add Detectors

- External Interface Management
  - CHEC to ASTRI telescope ICD in progress
    - Project office document with camera team inputs
    - Dedicated interface meetings/splinters (optical, mechanical)?
- Internal Interface Management
  - CHEC to TARGET module ICD issued (draft?)
    - UoL document with SLAC inputs
  - CHEC to Door Mechanism ICD required
    - Propose UoL to draft
    - Meeting at UoL to discuss ~end September
  - Collect and document other subassembly interfaces e.g. calibration assy
    - Functional diagram (at least a working version) would inform

- Near term work
  - Interface definition and documentation a priority:
    - Confirm working assumptions and formalise
      - Minimise nugatory work
      - Allow engineering design of mechanical and thermal systems to progress on both sides of interface
  - Thermal design/analysis
    - To follow detector choice:
      - Si detectors may place more stringent thermal requirements on thermal control system
      - Thermal design update as required
      - Analysis of internal flow
      - Specification of thermal interface
  - Define schedule and scope of test model activities
    - Plan design/build of test camera hardware

- Assembly/mechanical config:
  - Consider attaching rack to primary structure rather than baseplate
- Thermal control:
  - May need better flow path around preamps
    - E.g. suitable baffle system at the front end
    - May be possible to relax the shadowing requirement if this results in adequate space for the thermal control system
  - Progress thermal modelling