Pacific Northwest
NATIONAL LABORATORY
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Modular Concept for Readout

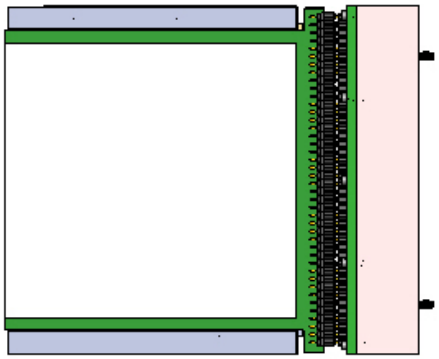
JIM FAST

PNNL

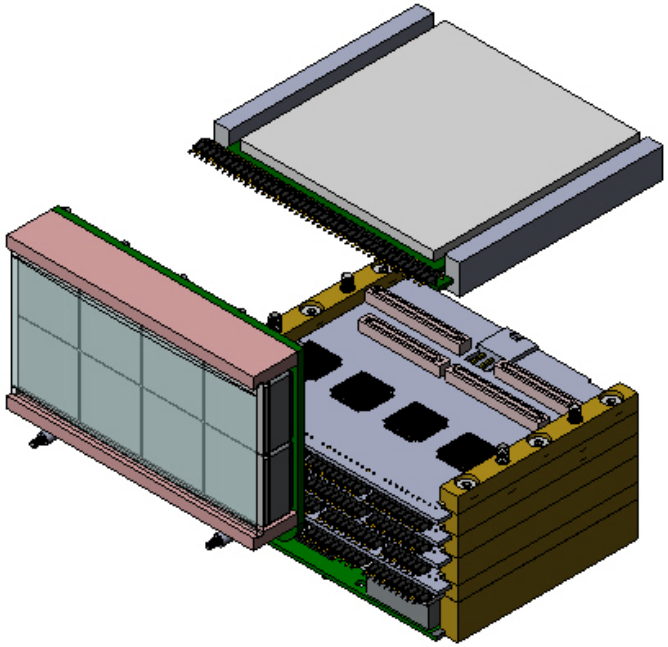
Developed based on March UH meeting discussions

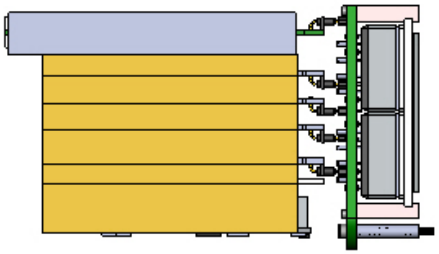
- Main goal of reconfiguring PMT/filter/readout modules is to relieve mechanical coupling between readout and associated cooling and cables and the optical joints from the PMTs to the prism
- Divides region in to 3 modular assemblies
  - PMT/filter/front board assembly (2x4 array)
  - HV board assembly
  - Readout assembly (most of “board stack”)
- Connections from HV and readout to front board via pogo pins
  - No direct mechanical linkage between these elements
  - PMT assembly mounts to QBB at prism - no relative motion as QBB bends when it is moved around
  - HV and readout modules mount directly to cooled QBB top plate eliminating card cages and multiple cooling loops/connections

Notional layout of new configuration

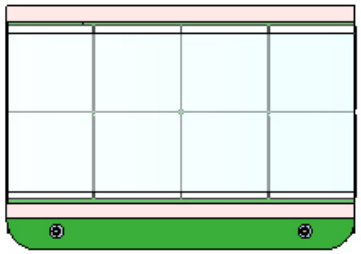


TOP VIEW





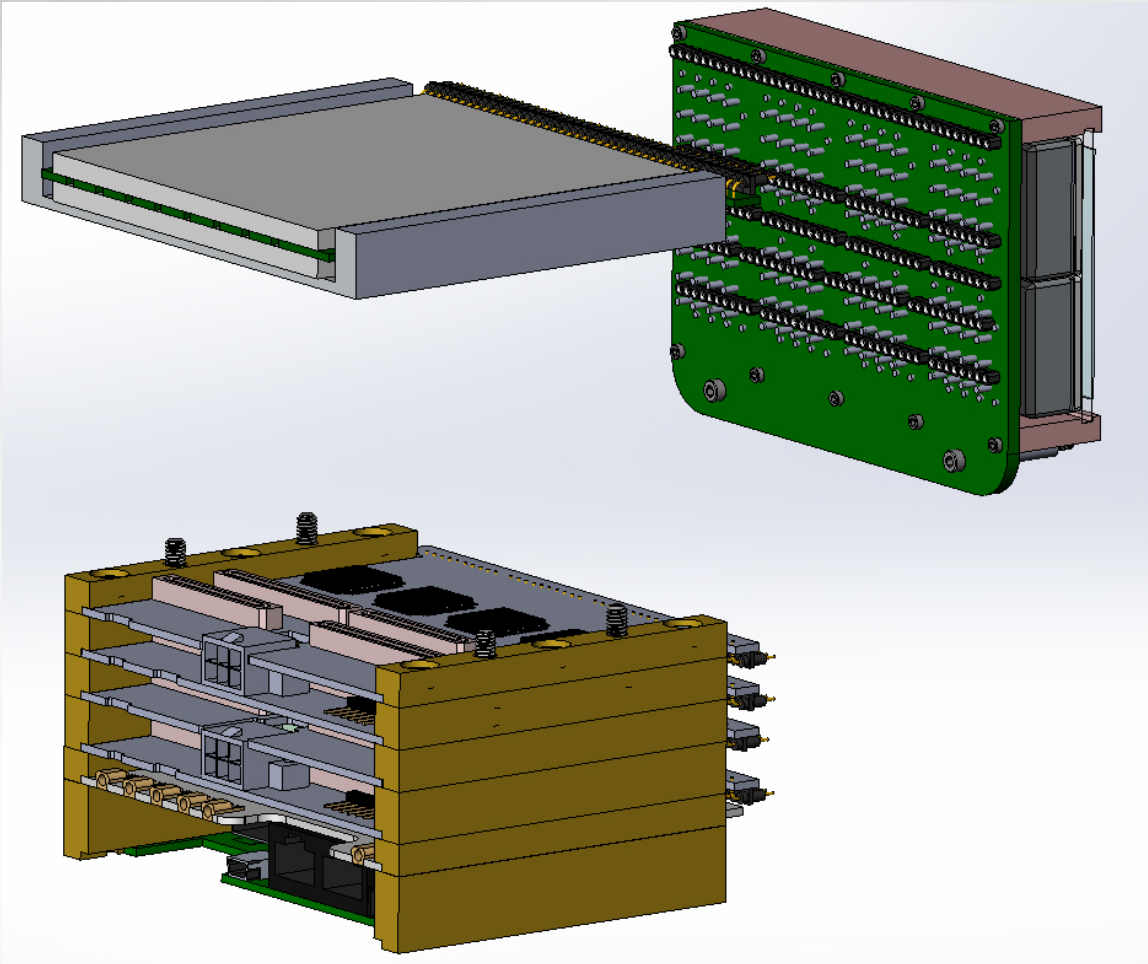
SIDE VIEW



FRONT VIEW

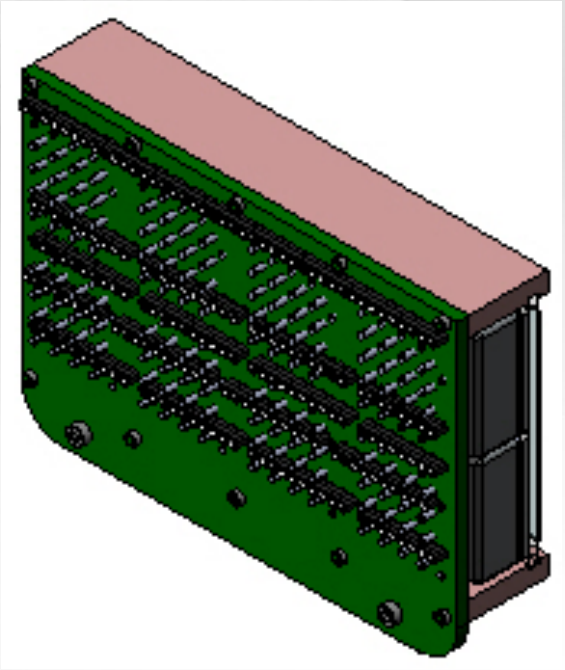
Assembly comments

- PMTs glued to front board using silicone while on vacuum chuck to get surfaces coplanar
- Filter applied to PMTs with grease and secured in place using PEEK bars connected to front board
- HV board mounted in metal U with thermal compound for improved cooling
- Board stack assembled and screwed together to provide high pressure and good thermal contact up metal bars on sides
- Heat flow is then up to HV board and in to top plate of QBB



PMT Module

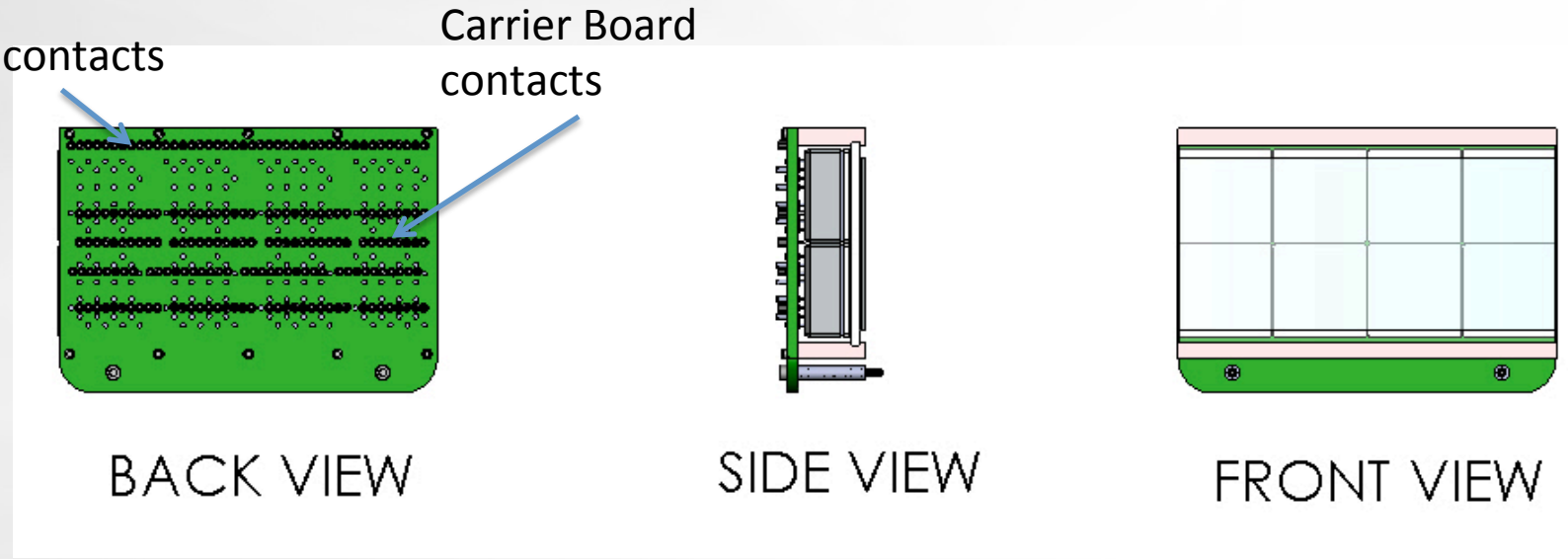
- Pogo pins land on gold pads – available as board mount objects
- Board spacing compatible with available connector heights
- Rotated half of PMTs to improve clearances to HV pins on PMTs
- Single filter integral to module – forces during install/remove of module do not go on PMT windows



Current idea is to use optical grease between PMTs and filter.

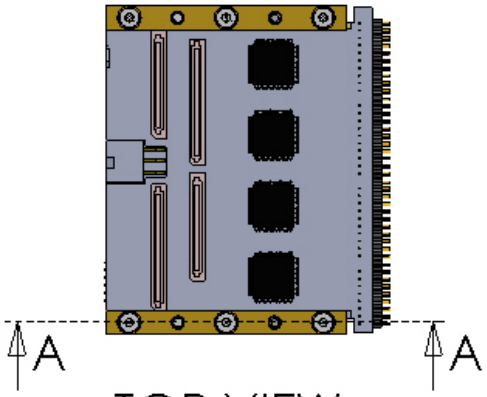
Module will be mechanically rigid so grease can be thin and joints should be stable.

Will conduct tests with glass and PCB material.

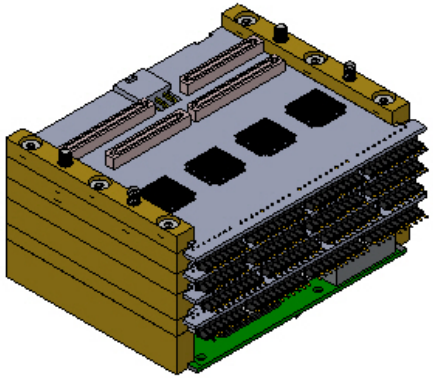


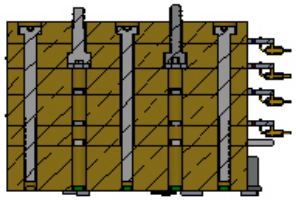
Readout module

- Brass/Cu bars soldered to boards (one side) for improved thermal performance and alignment
- Stack assembled and bolted from top in to a complete module that can be bench tested and easily cooled by fastening to cold plate at top
- HV module screws to QBB top plate (allows for inspection of HV pogo pin alignment to front board)
- Then readout module screws to HV module
- alignment can be provided with shoulder bolts, pins, steps in rails, ….



TOP VIEW





SECTION A-A

FRONT VIEW