

NGAO LOWFS

Opto/Mech Status

Kent Wallace

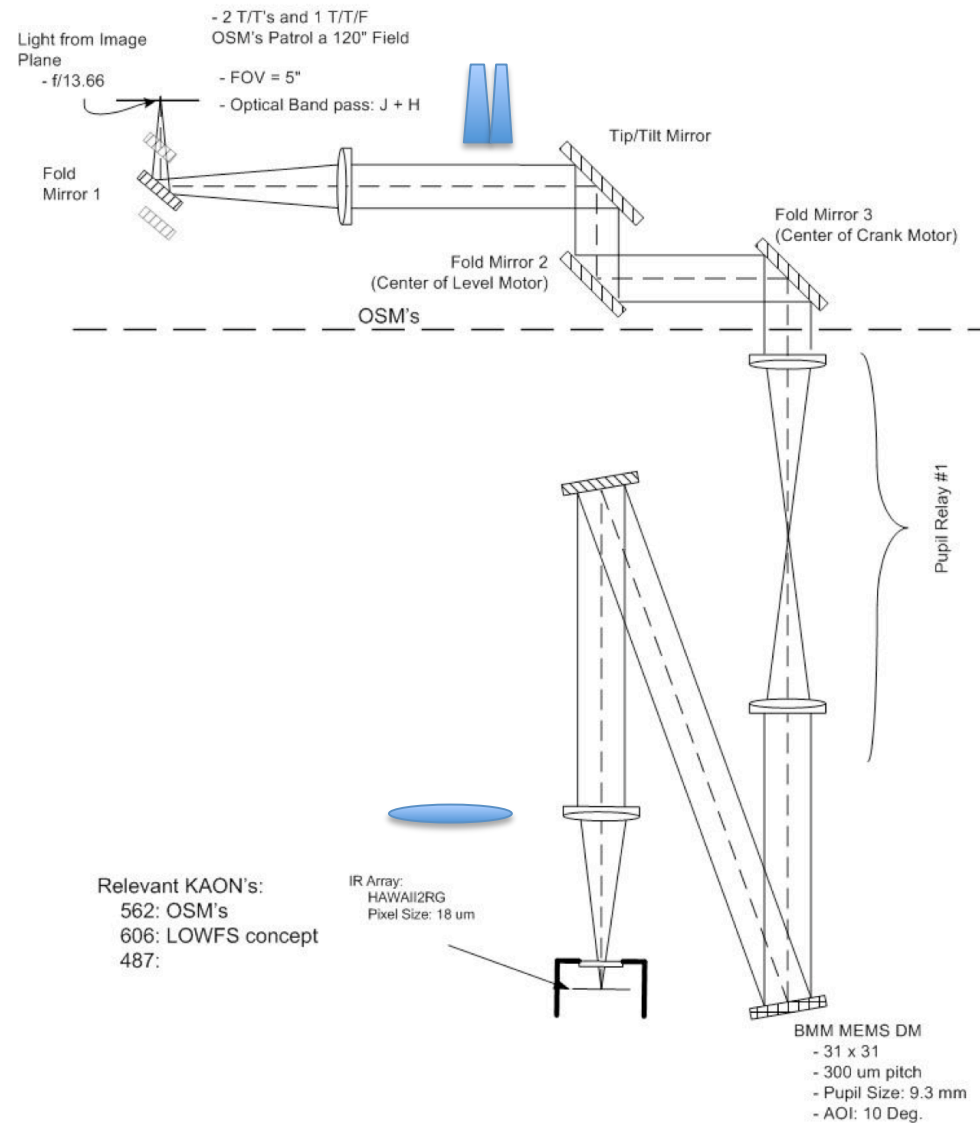
Randy Bartos

Gautam Vasisht

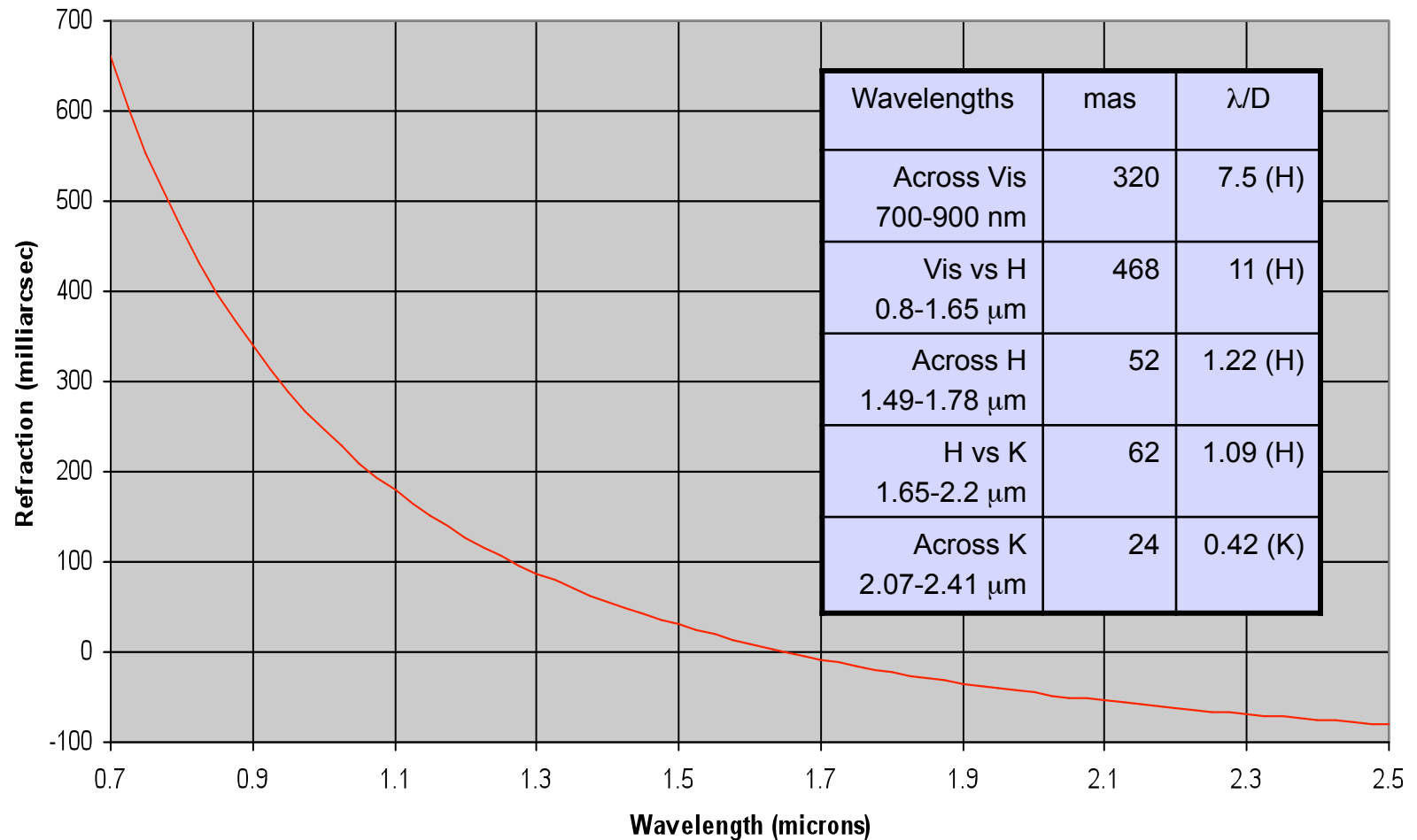
Optical Design

Optical Layout

Plate Scale: 1 " = 727 μ m

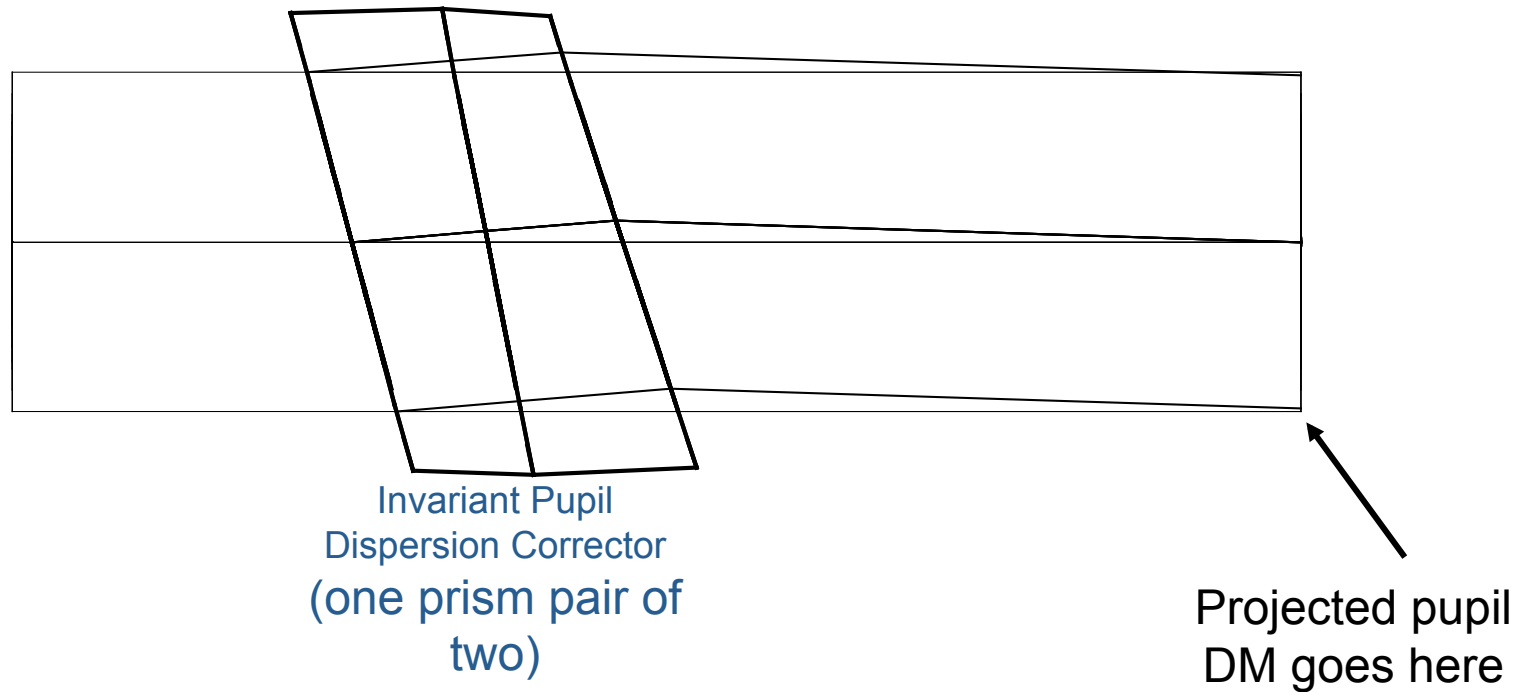


Atmospheric Dispersion



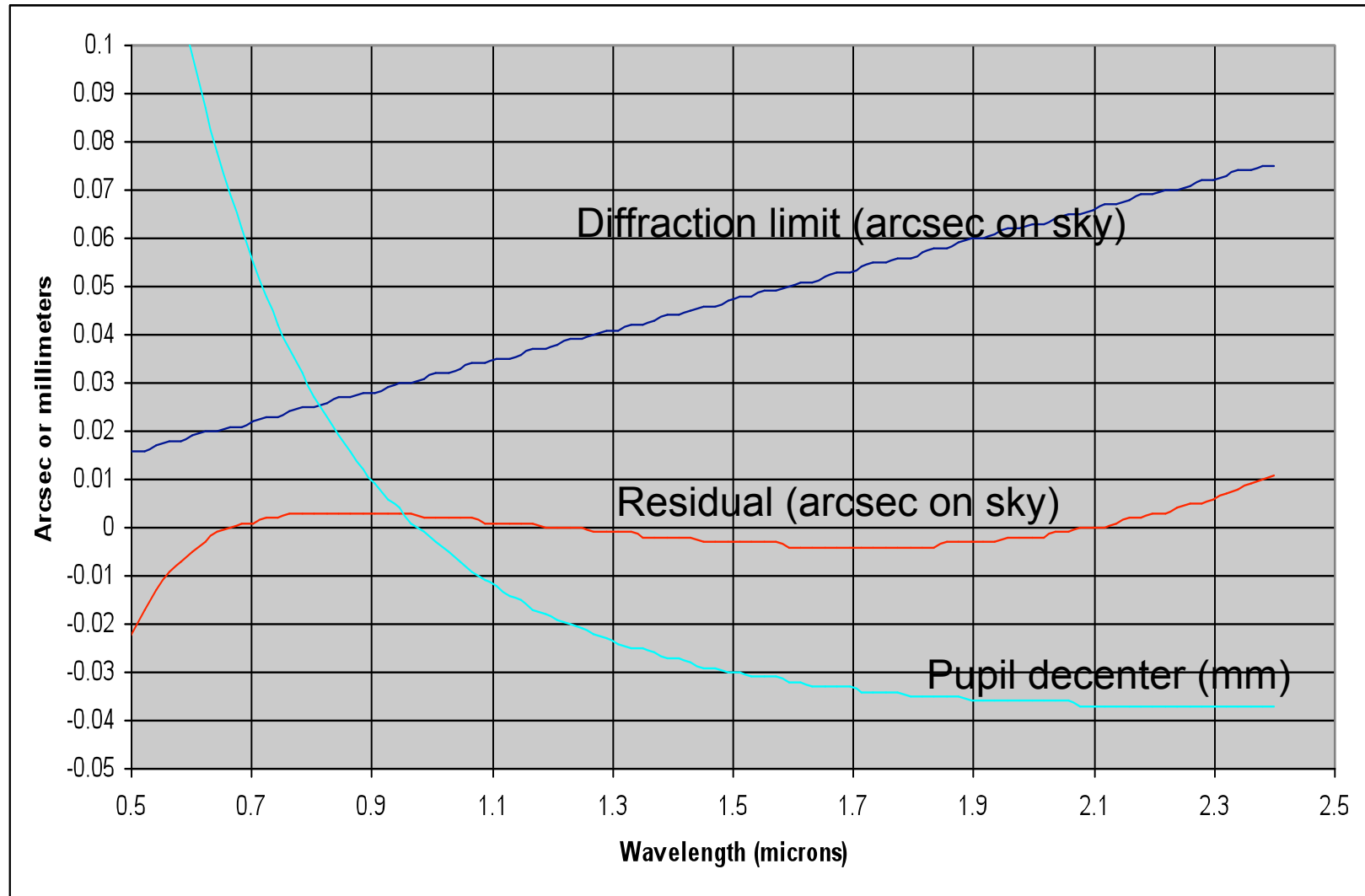
8 meter 700 mbar 10C 60 deg zenith
Refraction is relative to center of H-band (1.65 μm)

ADC optimization example



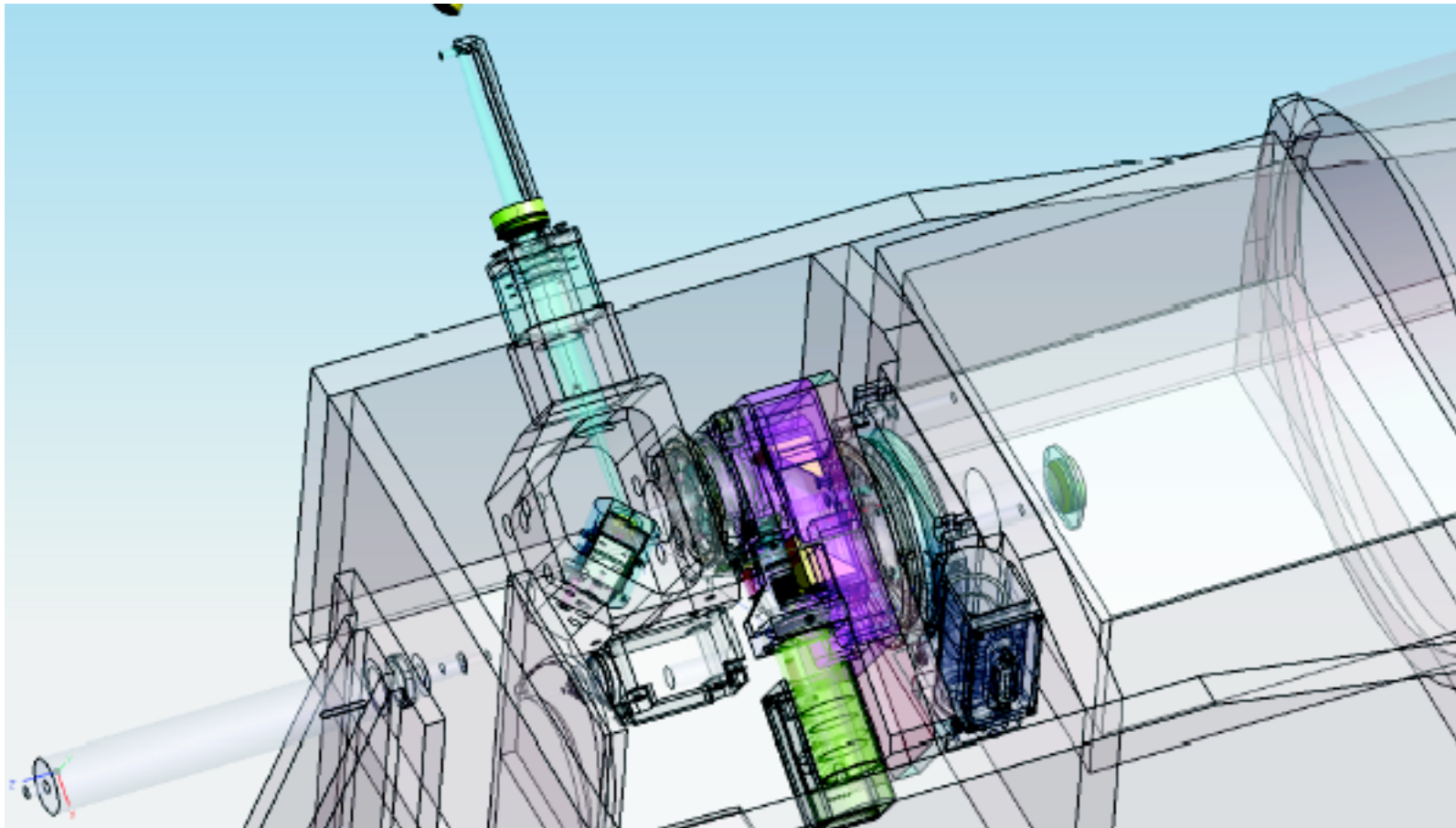
This design is for illustration purposes. It does not satisfy NGAO requirements

ADC Performance

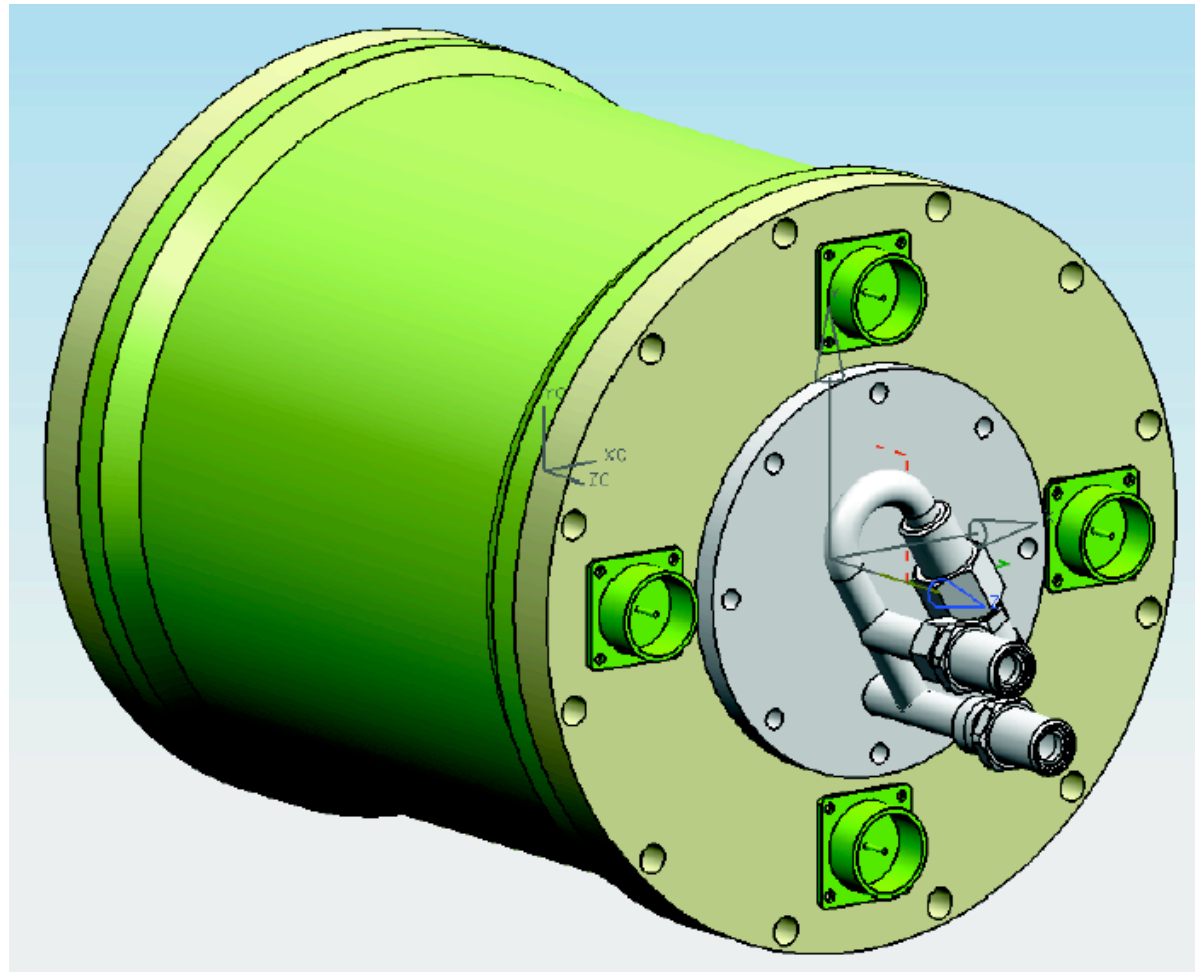


Mechanical Design

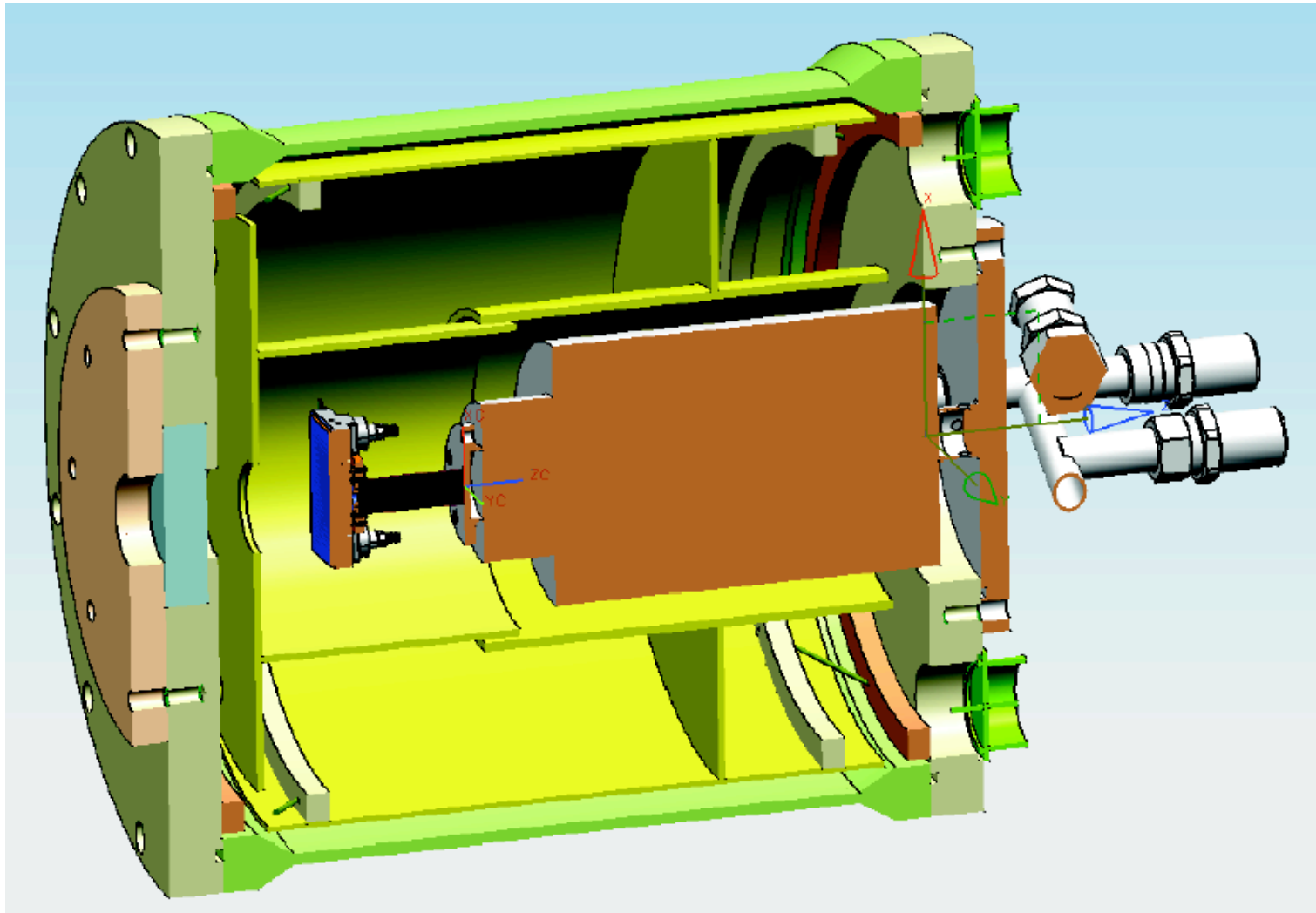
OSM



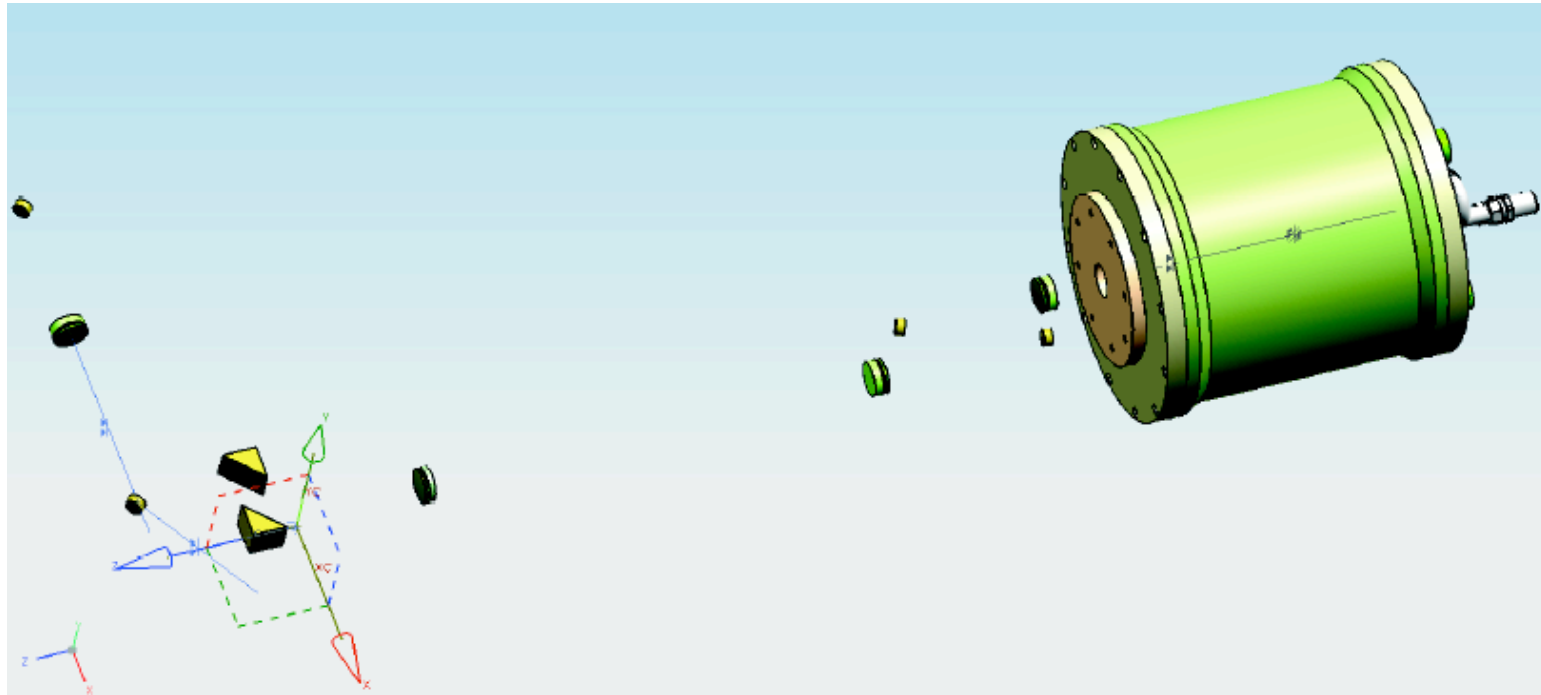
Cryostat



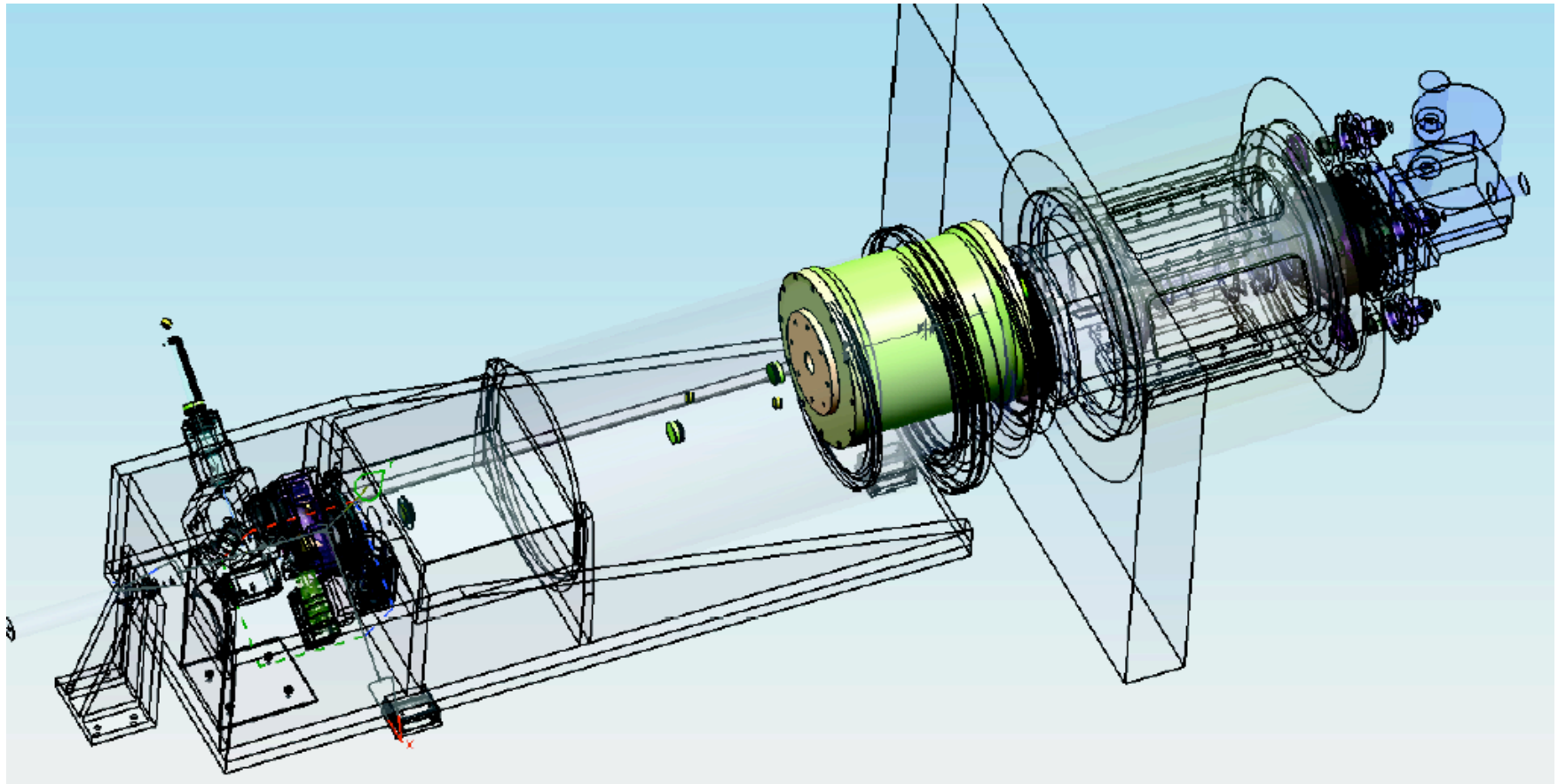
Cryostat Cross Section



Optical Relay and Cryostat



Optics/Cryostat Overlay with Previous Concept



IR Array Characteristics

- HAWAII2RG*
 - * = one quadrant non-functional
 - 18 um pixel pitch
 - Prefer array with 1.8 um cut-off
 - Runs significantly warmer
 - Given a choice between Sidecar ASIC and Leach Electronics, our choice is Leach

Hardware Cost Estimates

Optics Cost Estimates

Item Description	Preliminary Cost
Broadband ADC	\$ 8, 000
NIR Achromatic Doublets	\$35, 000
J/H Bandpass Filter	\$5, 000
Fold Mirrors	\$4, 000
Grand Total	\$52, 000

Mechanics Cost Estimates

Item Description	Preliminary Cost
ADC Prism Cells	\$ 5, 000
Lens Cells	\$ 15, 000
Optical Relay Mount	\$ 10, 000
MEMS DM Mount	\$ 35, 000
Cryostat Mechanics	\$ 85, 000
Cryogenic Cooler	\$ 30, 000
Grand Total:	\$ 180, 000

Electronics Cost Estimates

Item Description	Preliminary Cost
ADC Motors	\$ 15, 000
PZT Tip/Tilt Stage	\$ 15, 000
MEMS DM Electronics	\$ 100, 000
HAWAII2RG* Array	\$ 300, 000
Array Fanout Board, Wiring, Connectors, Cables	\$ 20, 000
Temperature Sensor, Controller	\$ 8, 000
Leach Electronics, Gen3	\$ 30, 000
Grand Total	\$ 488, 000

Future Work

- Refine our cryo-cooling options in conjunction with IR array selection
 - Use array with 1.8 μm cutoff
 - Can run significantly warmer
- Quantify effects of atmospheric dispersion
 - Determine if ADC is required
- Refine optical relay to DM
 - Consider a non-4F system with DM in converging beam

Future Work

- Refine J/H filter design
- Perform photometry to determine optimum detector sampling rates