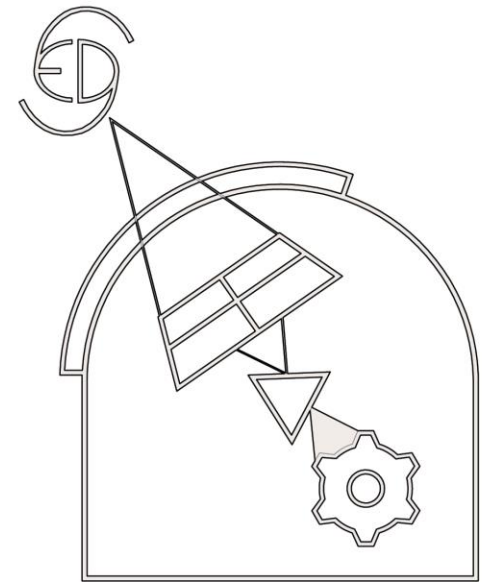


# SEDm: Hardware

Michael Feeney

03.21.2018

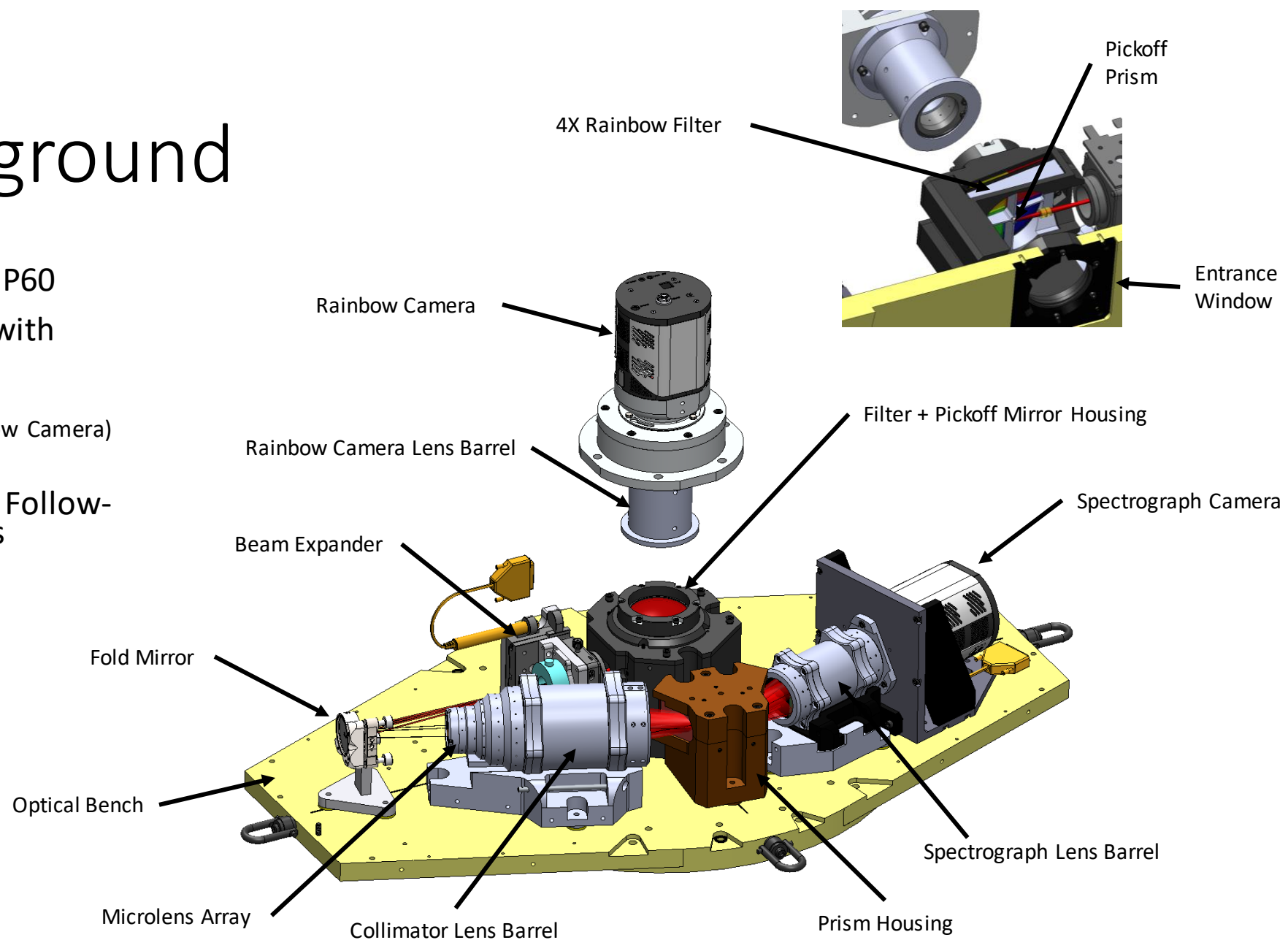


# Overview

- Hardware Background
  - Brief History
- Outstanding Hardware Issues
- Future Hardware Upgrades

# SEDM: Background

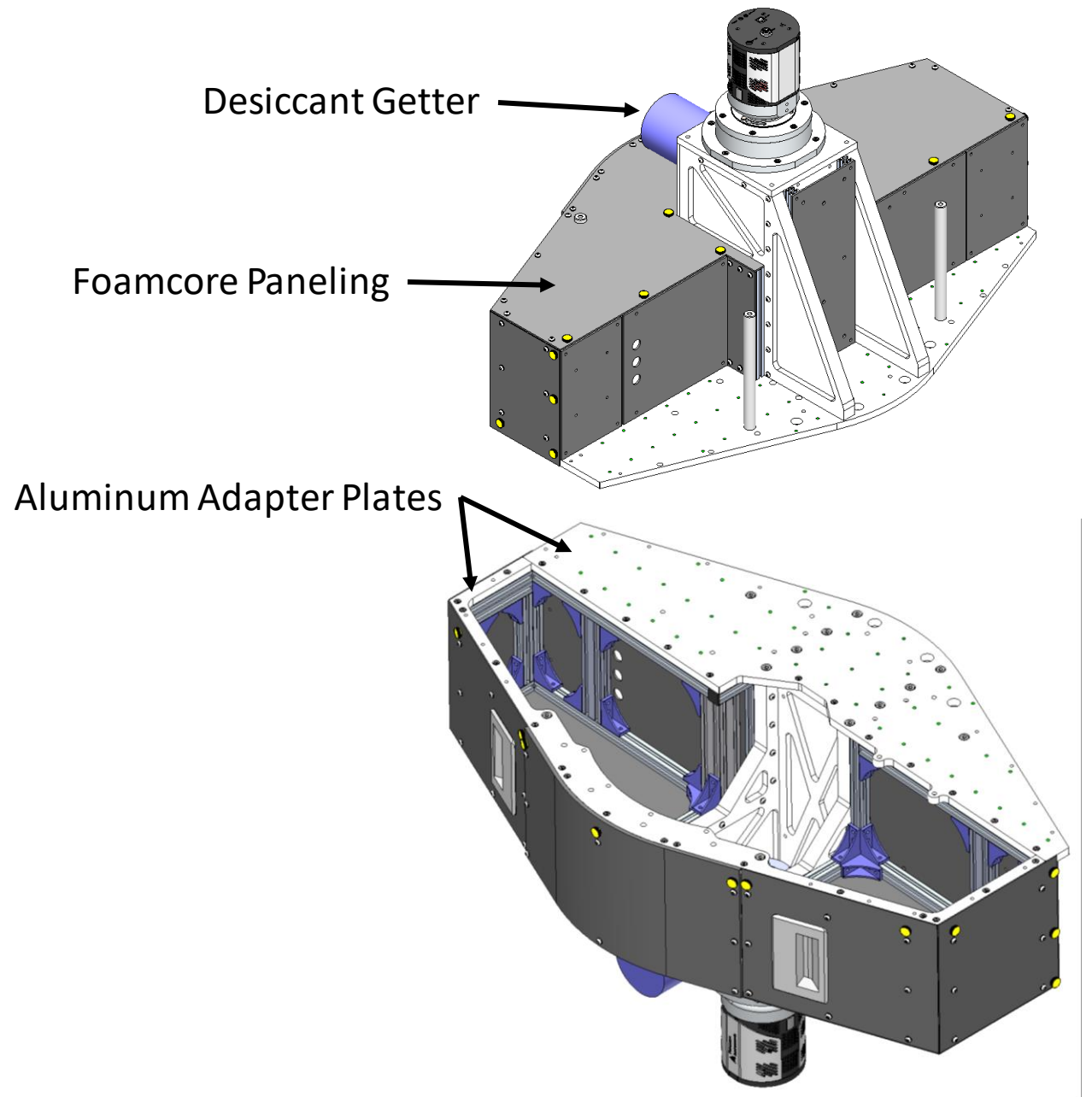
- **Location:** Palomar Observatory P60
- **Description:** IFU Spectrograph with Lenslet Array
  - 2X PIXIS eXcelon 2048x2048
    - 1X camera for guiding (Rainbow Camera)
    - 1X camera for spectrograph
- **Purpose:** Low Resolution Rapid Follow-up for ZTF Transient Discoveries



# SEDM: Background

- **Summer 2017 - Upgrade Goals:**

- Instrument Enclosure
  - Better Instrument Accessibility
  - Stray Light Mitigation
- RC Camera Mount
  - Better Rigidity
- Collimator and Spectrograph Lens Barrel Mounts
  - Address flexure during pointing
- Adjustable Fold Mirror Mount
  - More Alignment Flexibility
- Electronics Outside of Enclosure
- Motorized Beam Expander
- Cable + Plumbing Management



# SEDM: Background

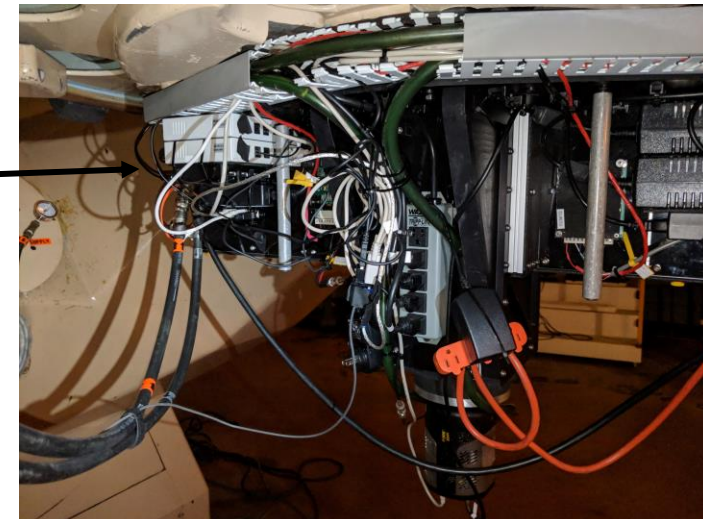
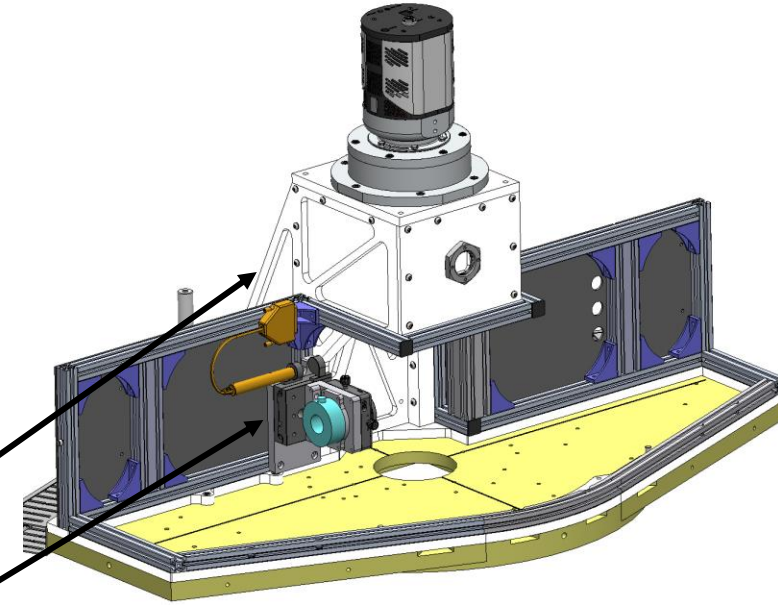
- **Upgrade Issues**

- Instrument Enclosure:

- Fragile (foamcore is not durable and sheds particulate on optics)
    - Complicated to access instrument (many non-captive thumbscrews)
    - Poor sealing to atmosphere (condensation and desiccant saturation)
    - Not an ideal design utilizing adapter plates (really need new integrated optical bench)
    - RC Camera gussets make enclosure complicated
    - Motorized beam expander mounted to enclosure (not ideal, should be tied to optical bench)

- Cable + Plumbing Management:

- A lot of room for improvement
    - Cables are loose and poorly organized
    - Electronics modules are zip tied and poorly constrained
    - Compromises Reliability and Servicability
    - Glycol plumbing lines adjacent to electrical cables



# SEDM: Outstanding Hardware Issues

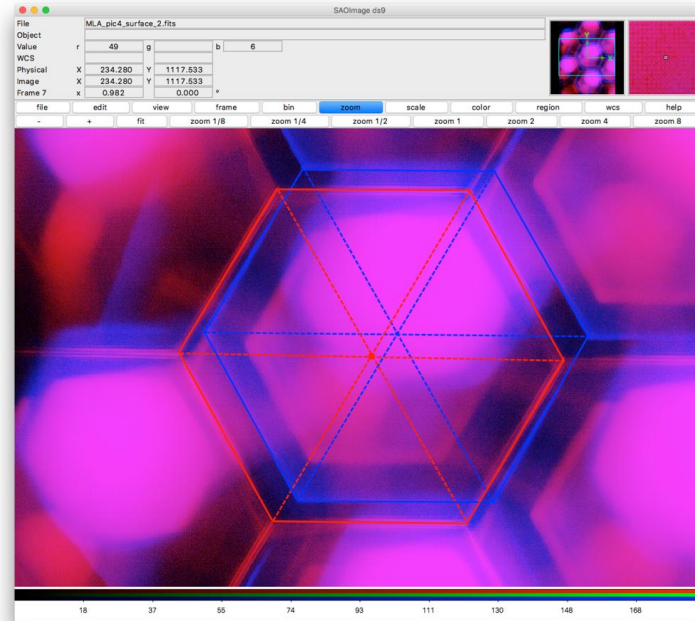
	Hardware	Description	Status	Schedule
INSTRUMENT	RC Camera Shutter	Create new shutter mount to fix interference.	Complete	03.19.2018
	Aμs Microlens	Quantify throughput.	In Progress	Week of 03.19.2018
	Jenoptik Microlens	Quantify throughput.	Not Started	04.2018
	Jenoptik Microlens Cell	Design and manufacture cell for new microlens	In Progress	Week of 03.26.2018
	Pickoff Prism Mount Upgrade	Reduce the vane profile on the mount (shadowing)	Not Started	04.2018
	Instrument Enclosure	New design	In Progress	04.2018
	Instrument Optical Bench	New design	In Progress	04.2018
	Cable + Plumbing Management	To be handled with new Enclosure/Bench	In Progress	05.2018
COMPUTER SYSTEM	Camera Communication Pipeline	Install 3X USB-Fiber cables for (2 for cameras, 1 spare)	Complete	02.26.2018
	Camera Computers	Get 2X new computers and port over to Linux OS	In Progress	04.2018
	Electronics Rack	For computers and equipment off of the instrument		04.2018
	Chiller Control System	For glycol chiller monitoring and control	In Progress	04.2018
TELESCOPE	Secondary Flexure	Fiducial registration points not reliable	Not Started	TBD
	TCS Drives	Upgrade to new servo motors (used on P48 and P200)	Not Started	TBD



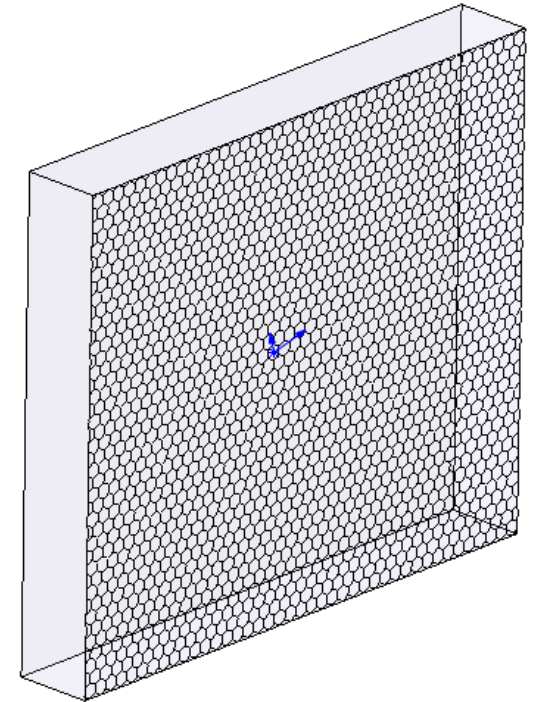
# SEDM: Hardware Progress



New CS45 Shutter Mount for RC Camera

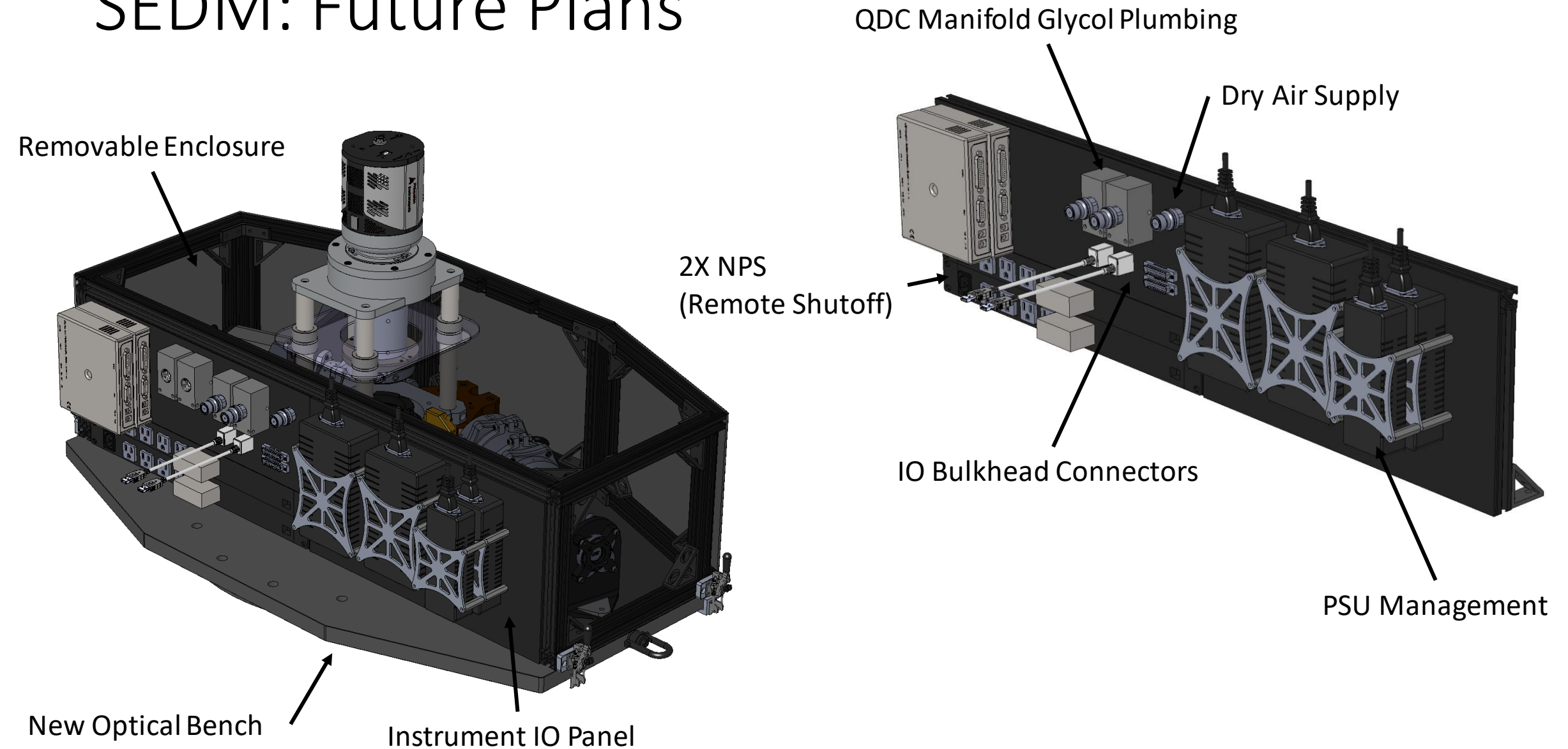


Hexagonal Microlens Misalignment



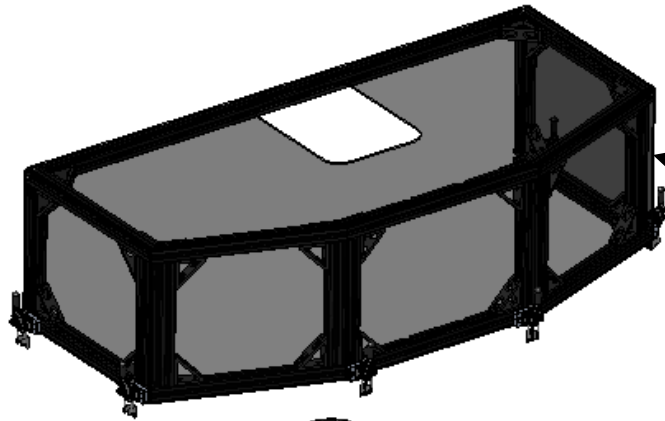
New Jenoptik Microlens  
(Powered on one face only)

# SEDM: Future Plans

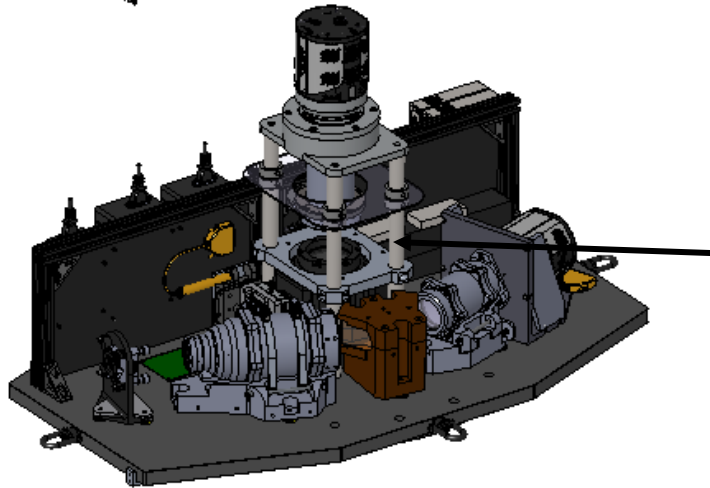
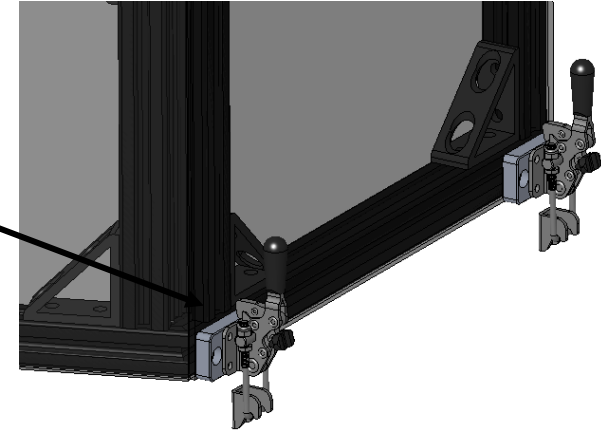




# SEDM: Future Plans

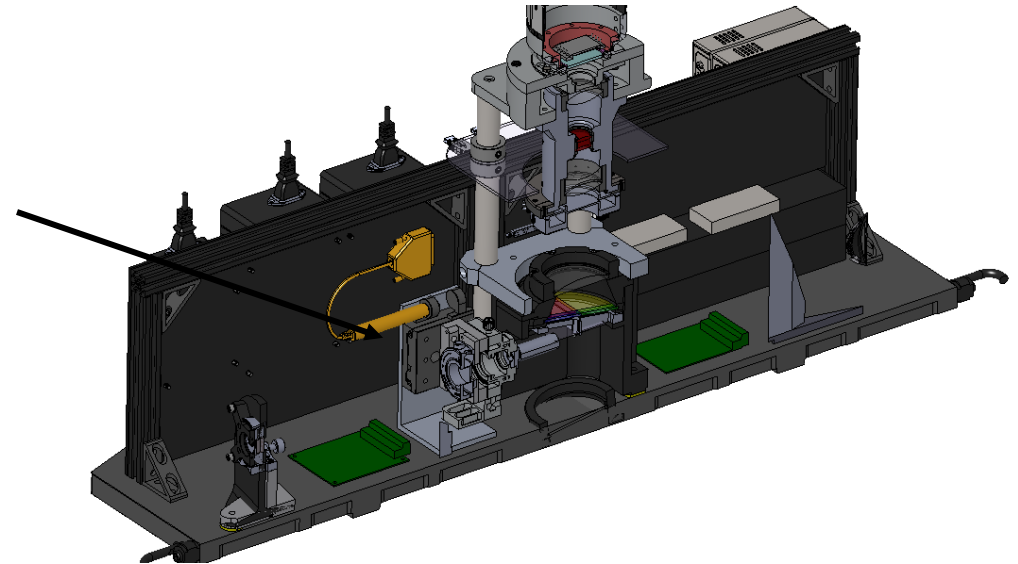


User-friendly, quick release, sealing enclosure. Cushioned rails for sealing, black acrylic paneling, toggle clamps for releasing.

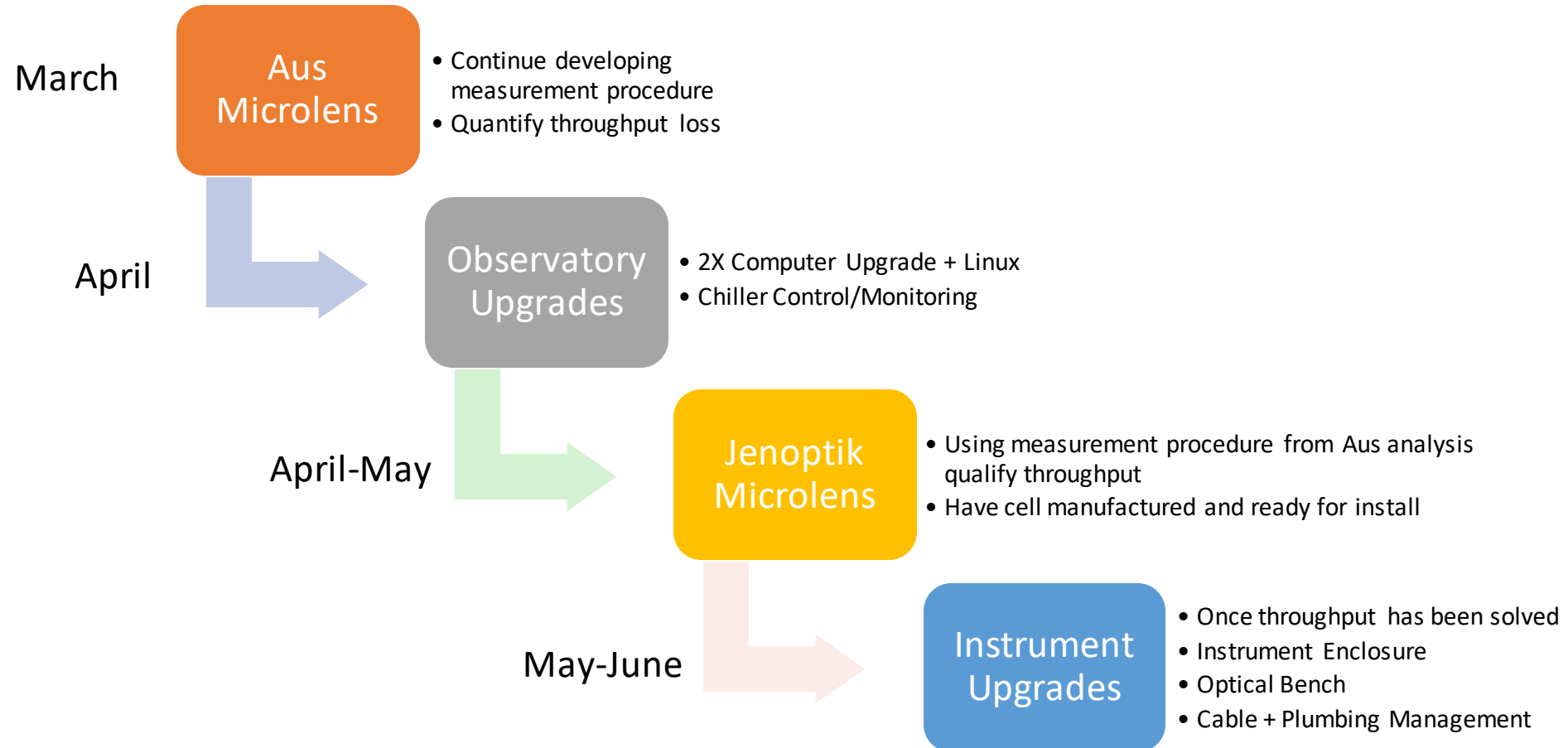


All optical components tied to optical bench

- Existing mounts can be reused and transplanted onto new bench.



# SEDM: Future Plans Flow chart



# Conclusion

- SEDM is important for ZTF
  - Reliability & Serviceability are critical
  - Some of the improvements can be done without interrupting SEDM science
  - Downtime will be required to update SEDM properly
  - We will have to negotiate with the scientists for engineering time