CHARA Meeting
MIRC-X Update

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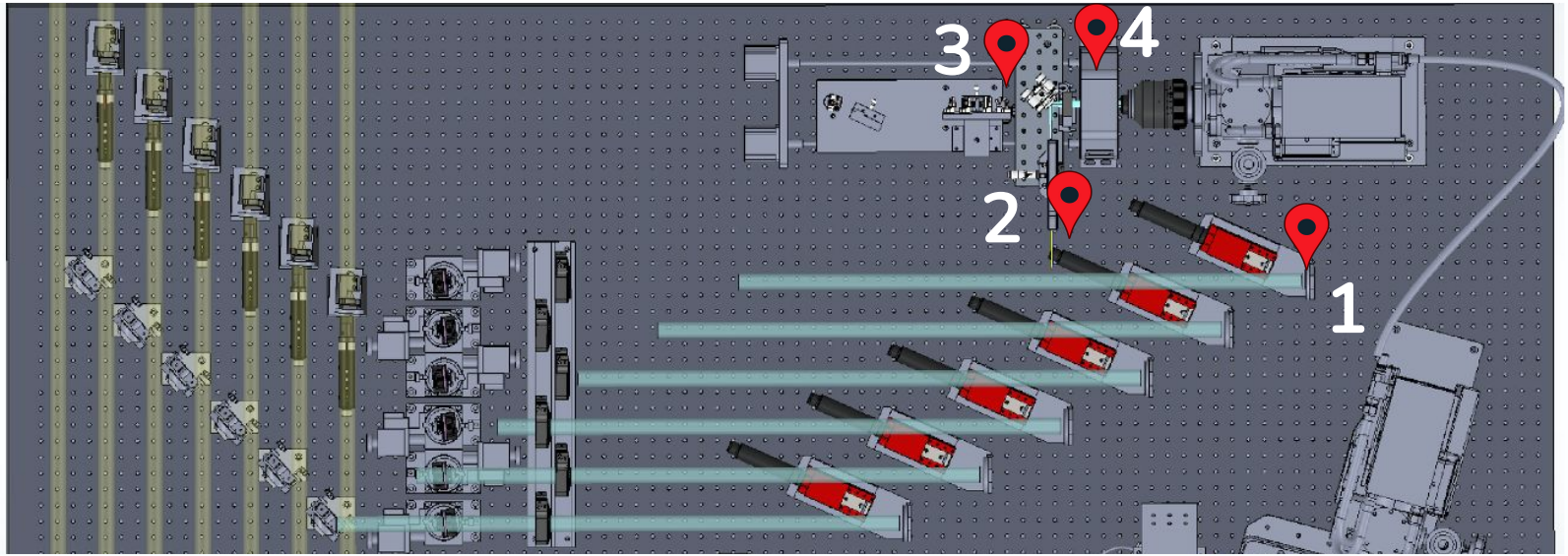
Sorabh Chhabra + MIRC-X Collab

Overview of MIRC-X Design

1. New OAPs (See Julien Dejonghe's Poster) and Fiber Array
2. Moving Mirror
3. Changing Magnification for 6T J-band
4. Filter Wheel



Fiber Array+design optimization

Work led by Dan Mortimer

New MIRC-X fiber array

Current fibers are mismatched in length by >2 mm

We have 6 fibers with better matched lengths at UM < 0.7 mm

Already assembled in V-groove

Confirm using fringes at UM before transportation to CHARA

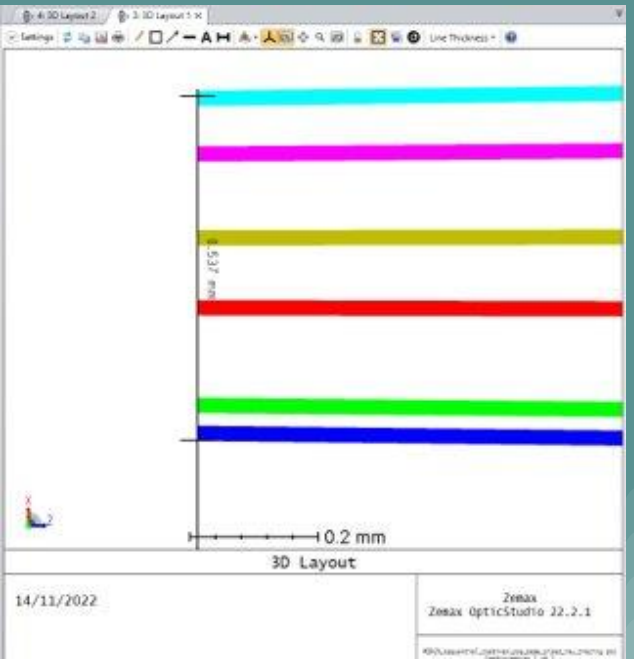
Beam	Length Difference	~dispersion at best point	New fibers length difference
12	0.73 mm	3.5 µm	0.18 mm
23	-0.64 mm	3.0 µm	-0.63 mm
34	-0.12 mm	0.5 µm	-0.25 mm
45	-1.45 mm	5.0 µm	0.44 mm
56	2.38 mm	-9.0 µm	-0.53 mm

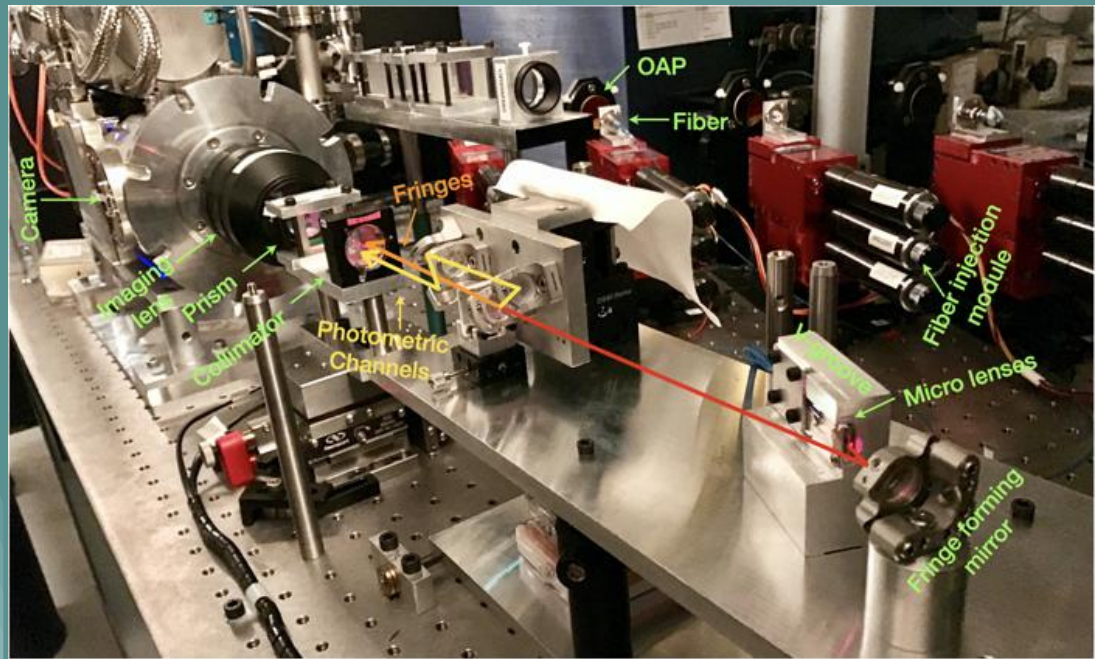
Calculated by Aaron Labdon

Optimizing the design

Angle of incidence between forming mirror and microlens array

Current angle of incidence = 22.5°
Beams overlap 20 mm away from focal point

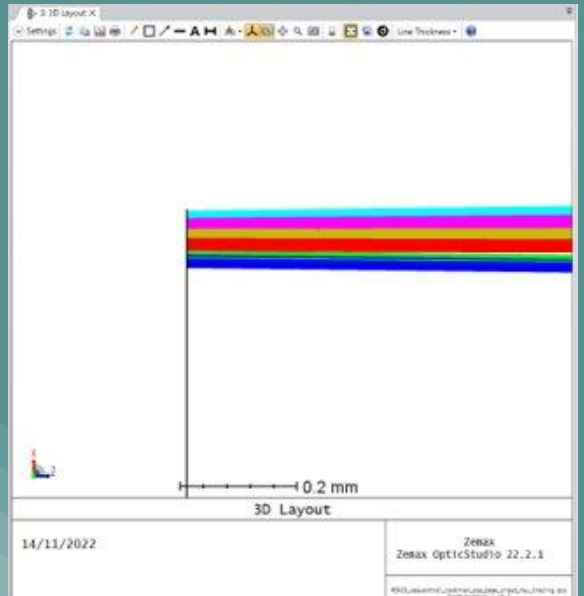


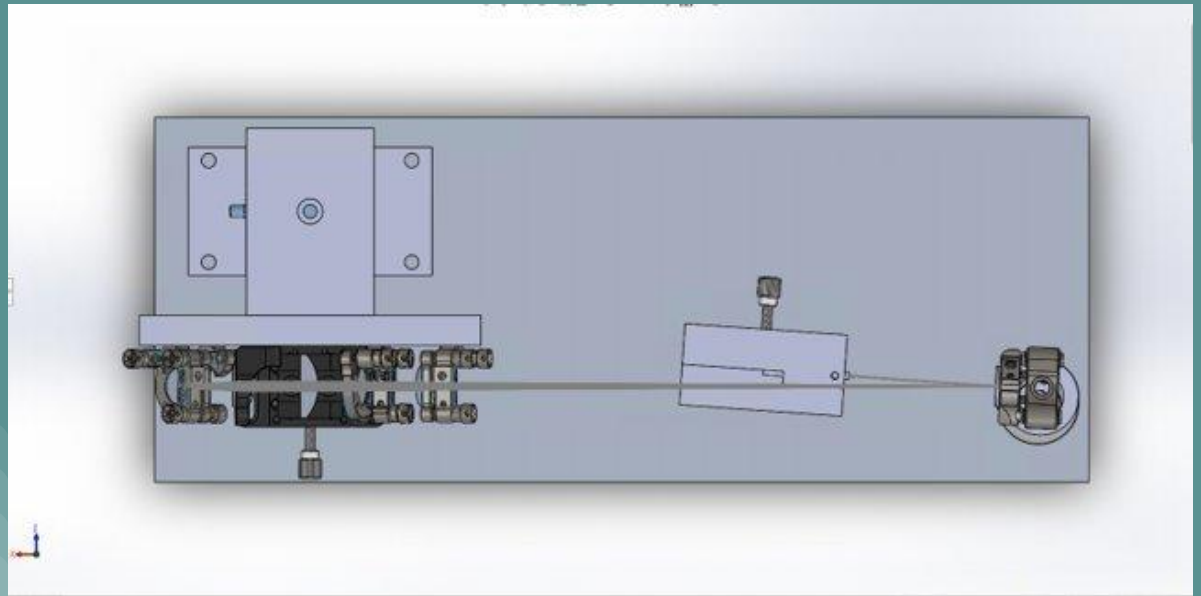


Optimizing the design

Angle of incidence between forming mirror and microlens array

Suggested angle of incidence = 2°
Beams overlap ~ focal point

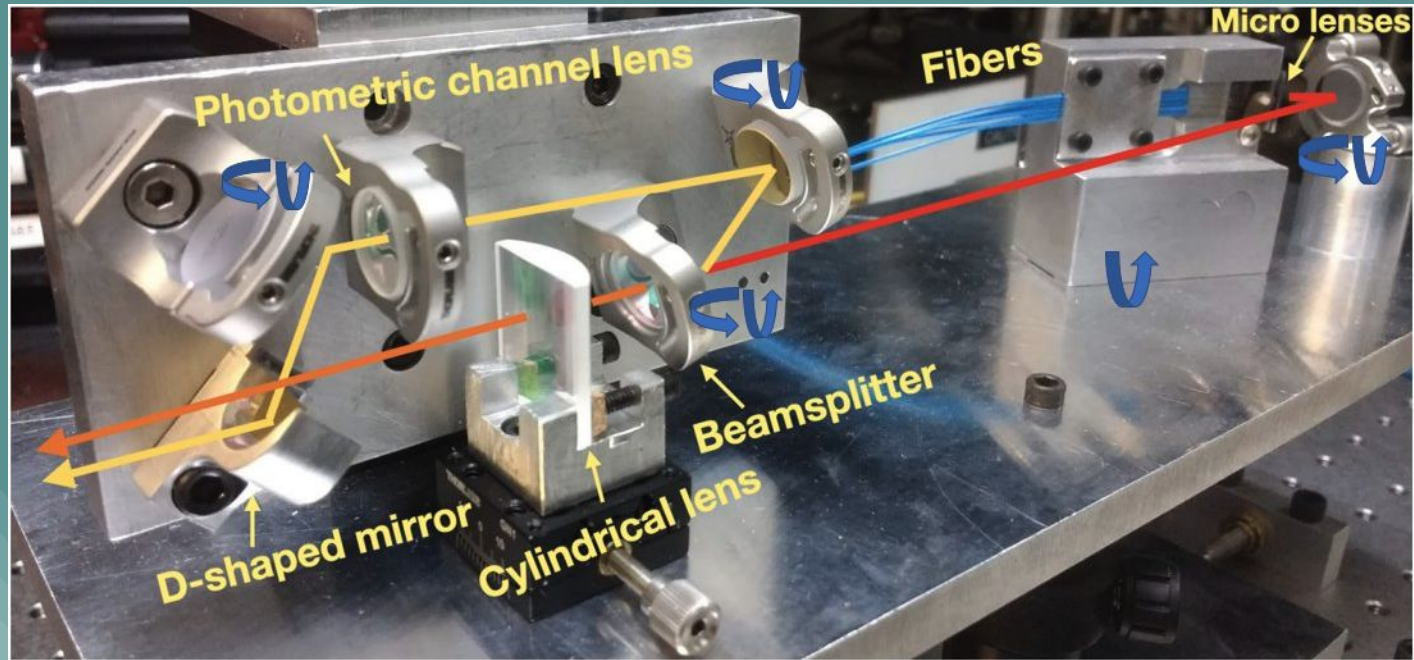




Optimizing the design

Adding degrees of freedom

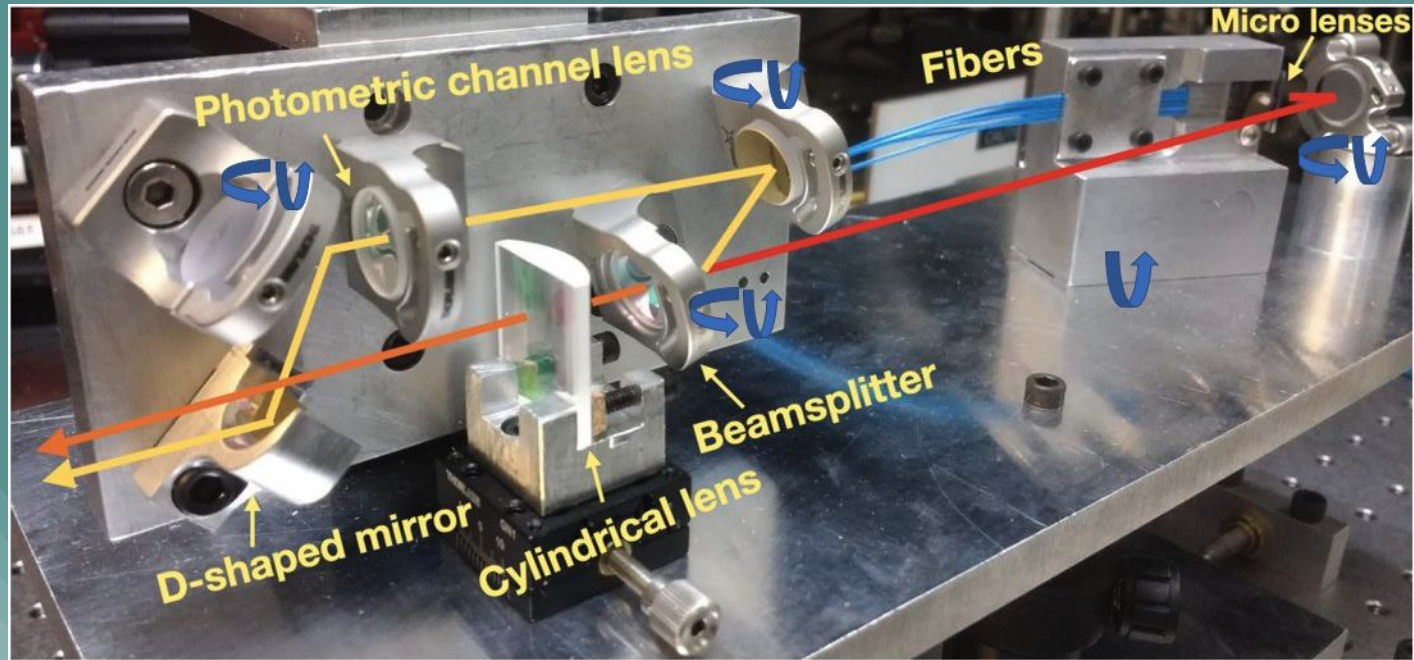
Adding Tip-Tilt to select optics
Center the beam to avoid aberrations



= Add Tip-Tilt

Next steps

Finalize and approve solidworks design
Order necessary parts
Recommission MIRC infrared camera at UM to carry out tests



= Add Tip-Tilt

Moving Mirror and Filter Wheel

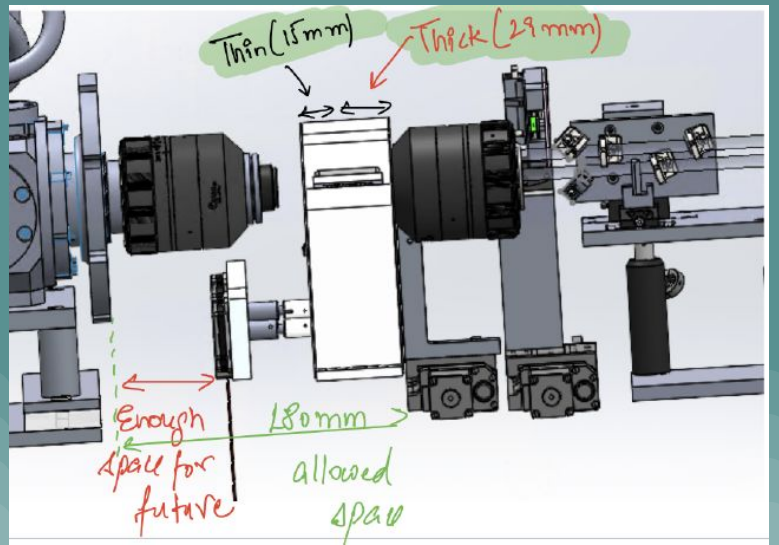
Work led by Sorabh Chhabra

Moving Mirror

Similar to MYSTIC design to switch between combiners, all-in-one MIRC-X and SPICA FT IO chip

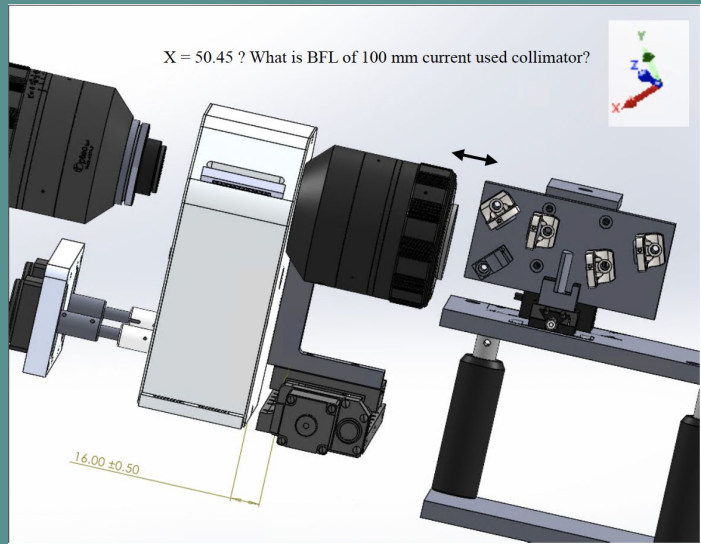
Potentially add 2 pickoff mirrors to allow for a third combiner in the future

Space is tight...CAD design in progress



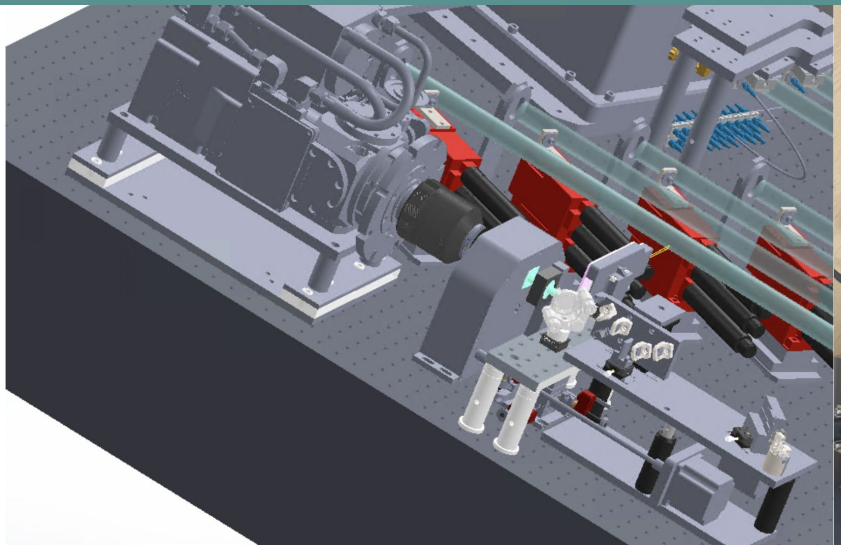
6T J-band update

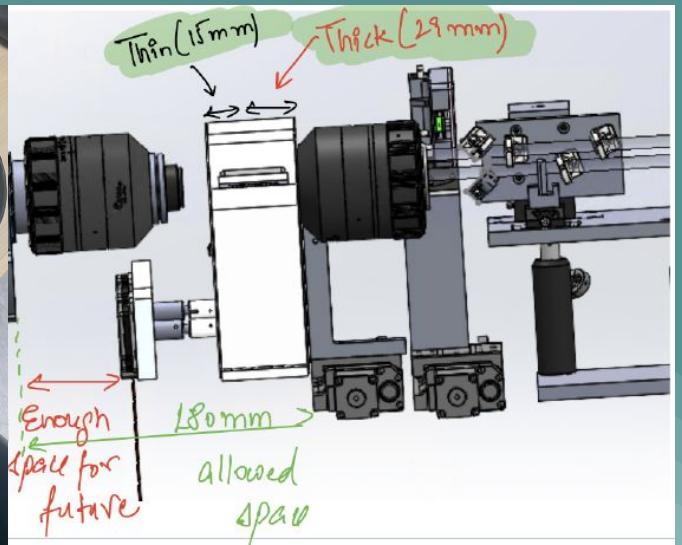
MIRC-X has both *J* and *H*-band imaging but not 6T
With new fibers it should be able to do at the same time but only 4T because fringes in J are undersampled to make H as sensitive as possible
Require 75 mm lens for magnification
    Difficult to source ~ $12K for 3 lenses
    Custom make one in-house?
Stage to switch between 100 mm and 75 mm lens
New 100 mm lens to reduce speckle effects*



MIRC-X filter wheel

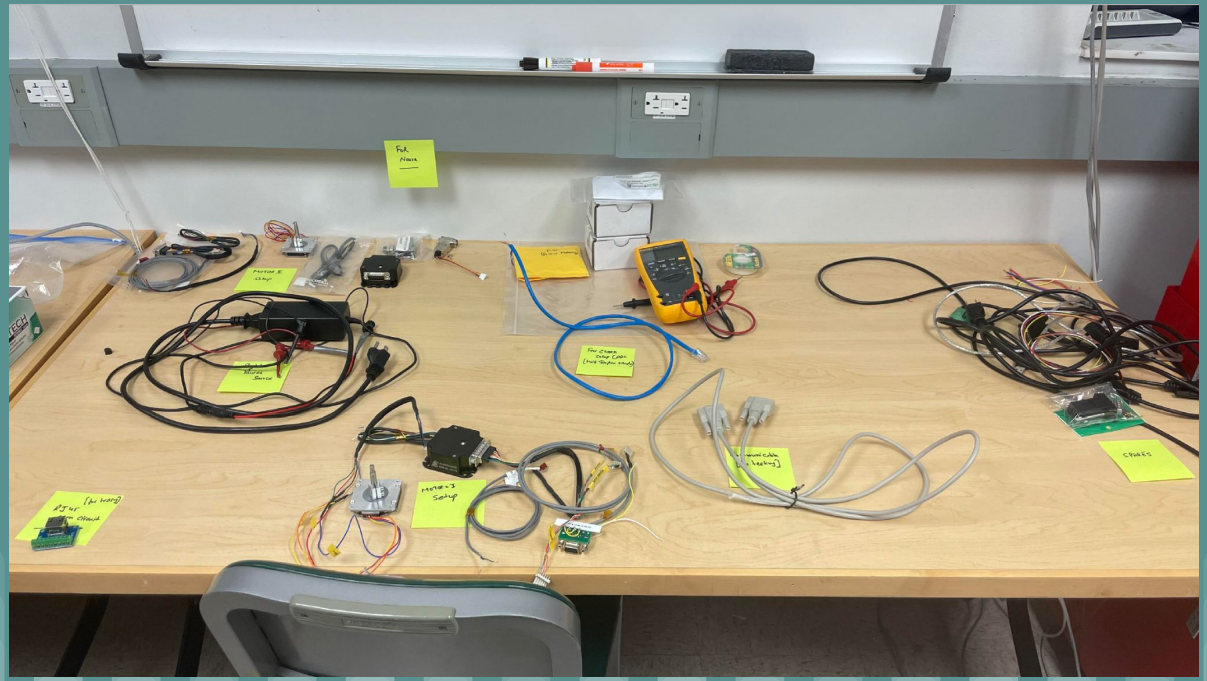
Assemble new stepper motors with filter wheel for testing at UM
How to arrange new diffraction gratings with slots?
Design holders for the gratings
Reduce user error
Reproducible and automated modes





Next steps

Assemble motors with filter wheel
Software installation and testing



Timeline

OAP and pickoff mirror for spica FT - This summer

Filter wheel and magnification - TBD

Fiber array J + H imaging 4T - TBD

Thank you!

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