

Positioning system prototype

V230227 Eric Fernandez
UVa

Design goals:

No metals above -10mm from crystal bottom.

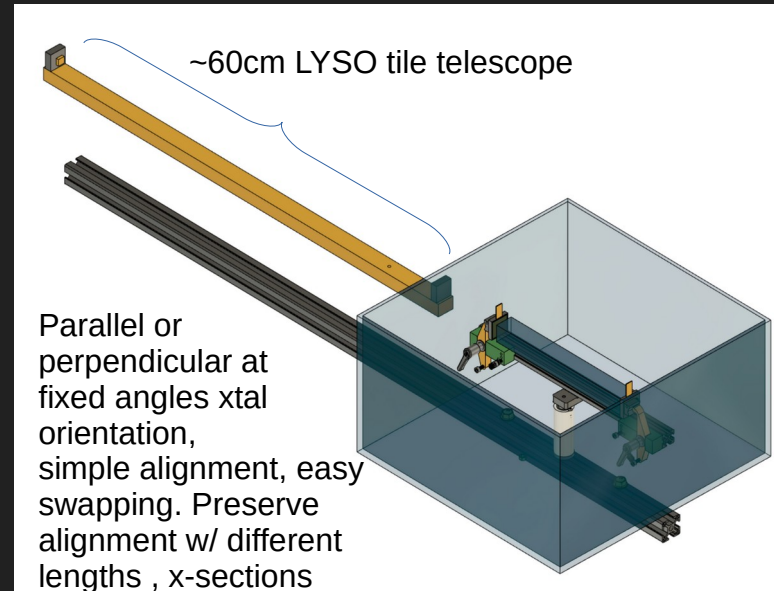
Rotation of the main crystal 360 deg.

Allow fitment of crystal from 60-220mm

Maintain ± 1 mm of precision about all locations

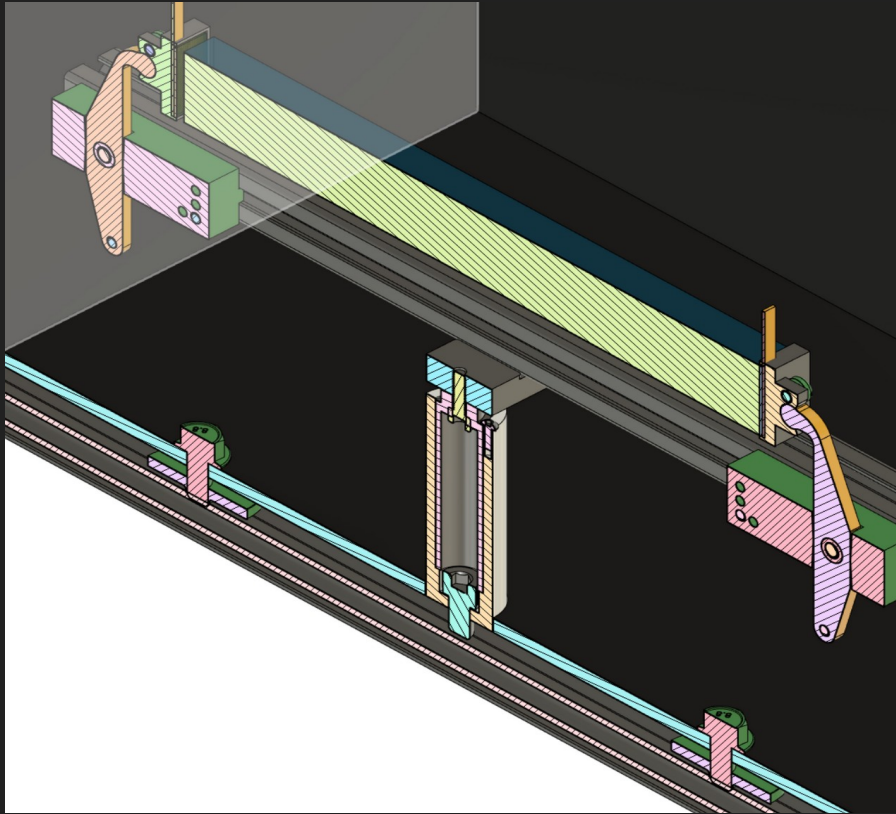
Fit in a dark box / pelican box

LYSO telescope section can be light isolated on it's own, or in the same box



Rotation

Can rotate the main crystal 360 deg. inside the dark box

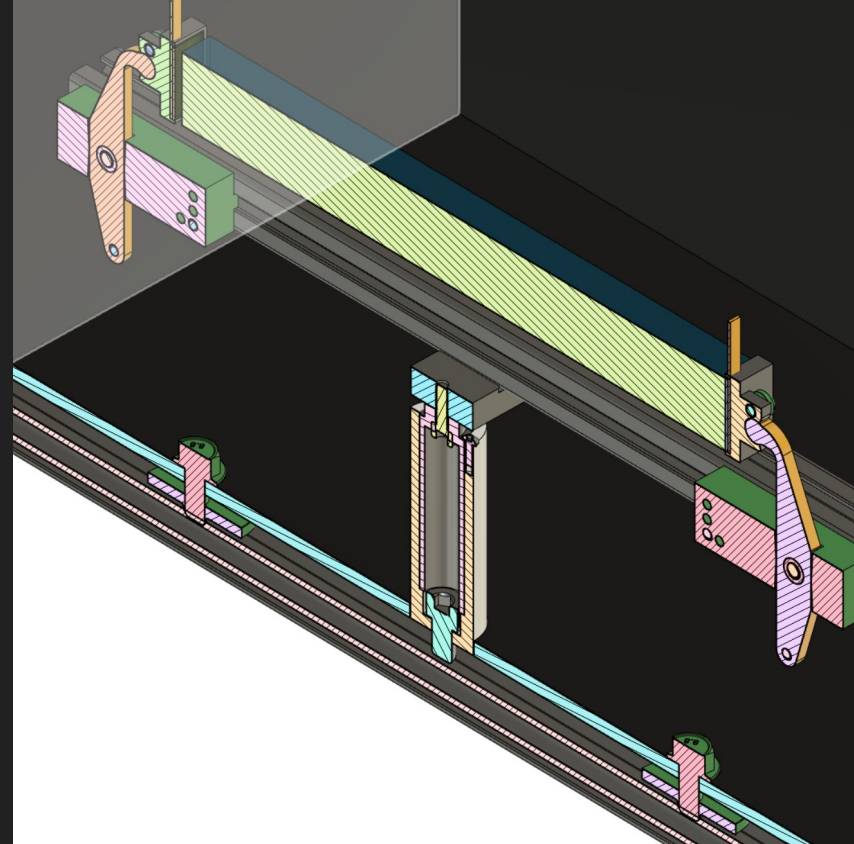


Rotation location

The rotation takes place at the desired center of the crystal.

Crystal is shown as a clear glass block in img.

(As of today the crystal is unconstrained in space, a proper cleat design is forthcoming)

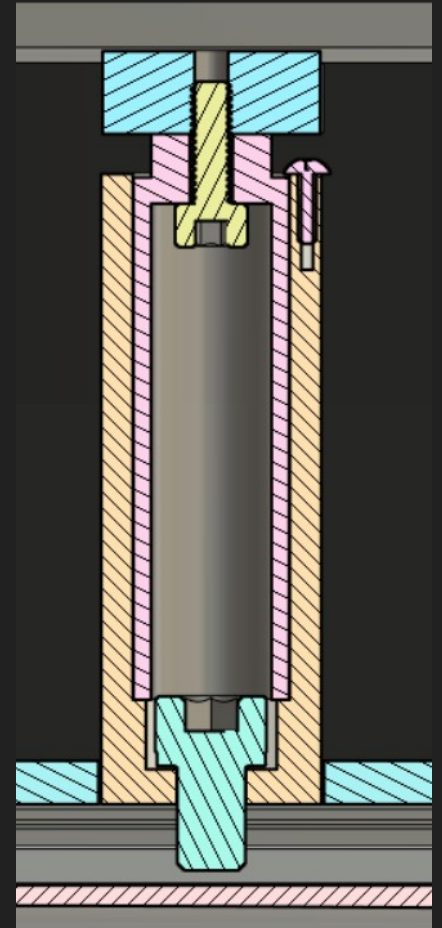


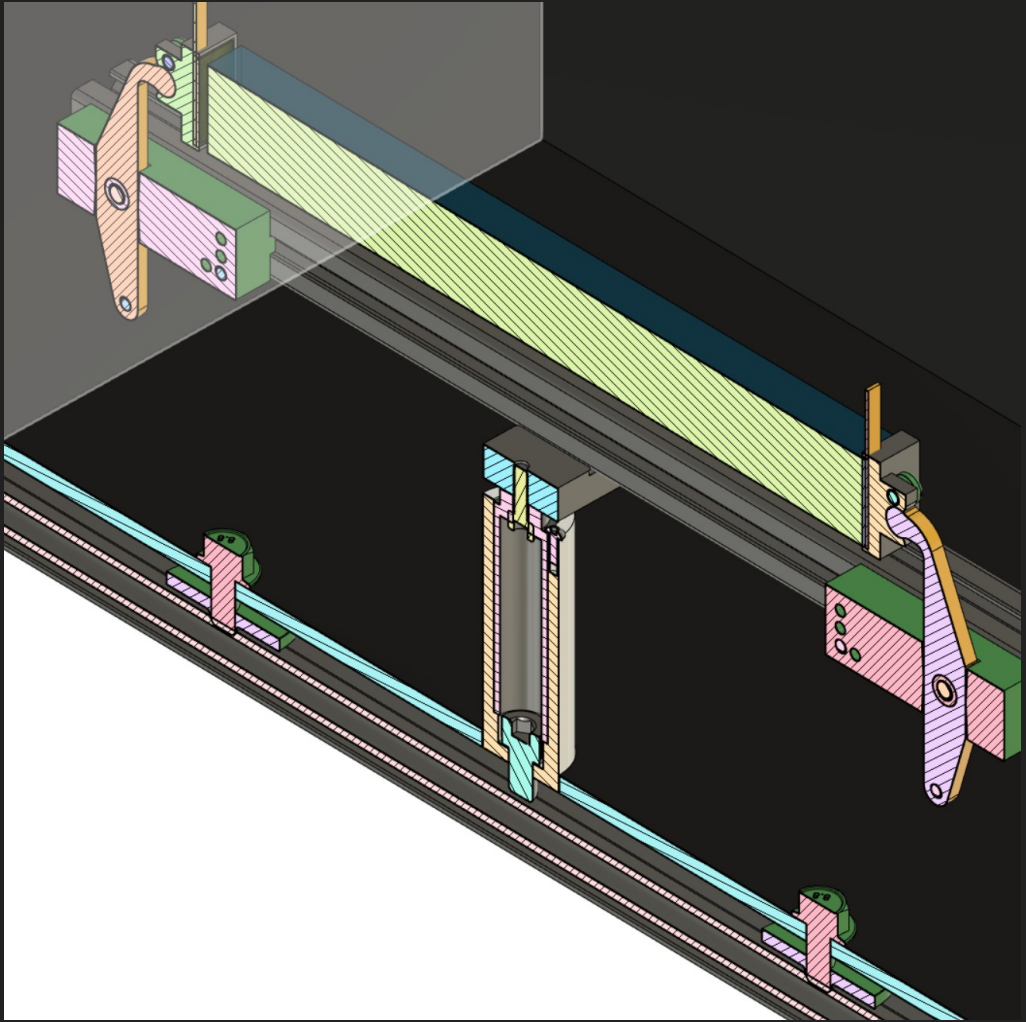
Rotation bearing

Acetal / Aluminum cup

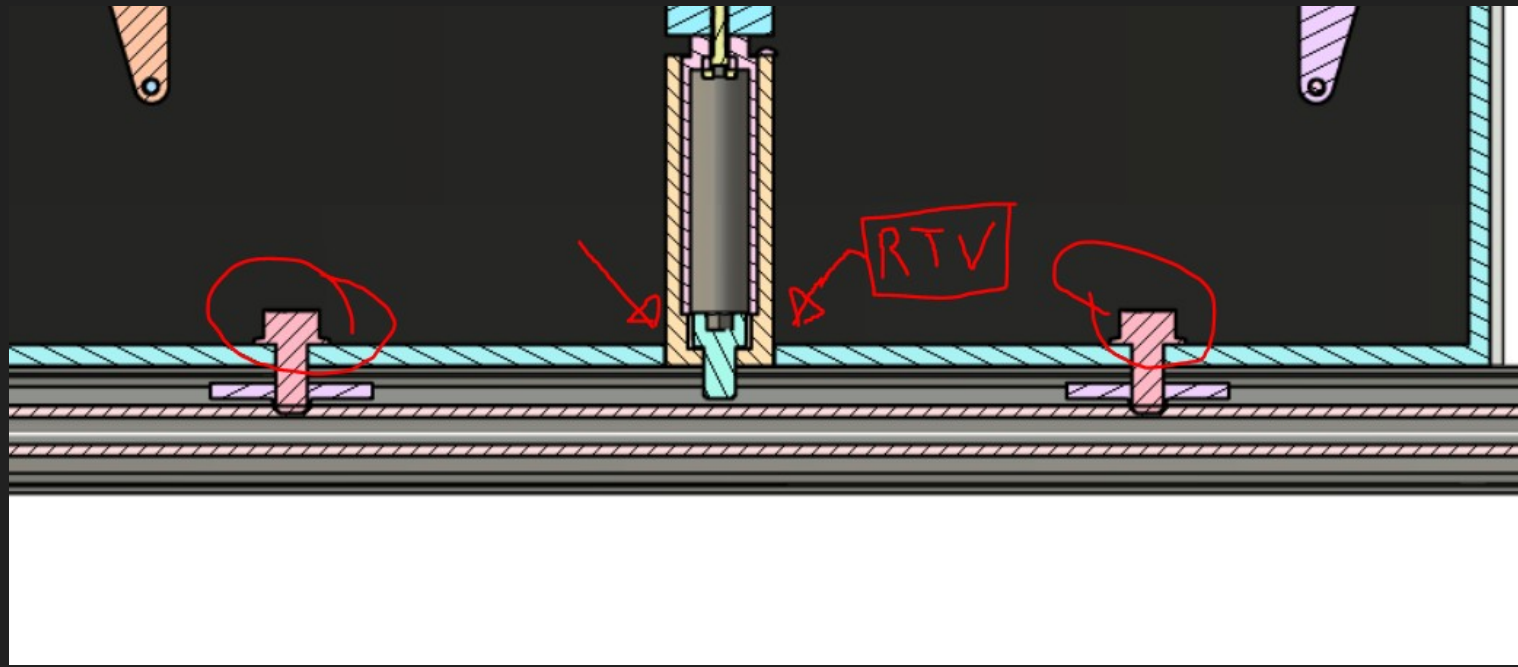
Constrained with one M3 screw shown top/right.

Allows 0.2mm of play radially & axially





Light tight

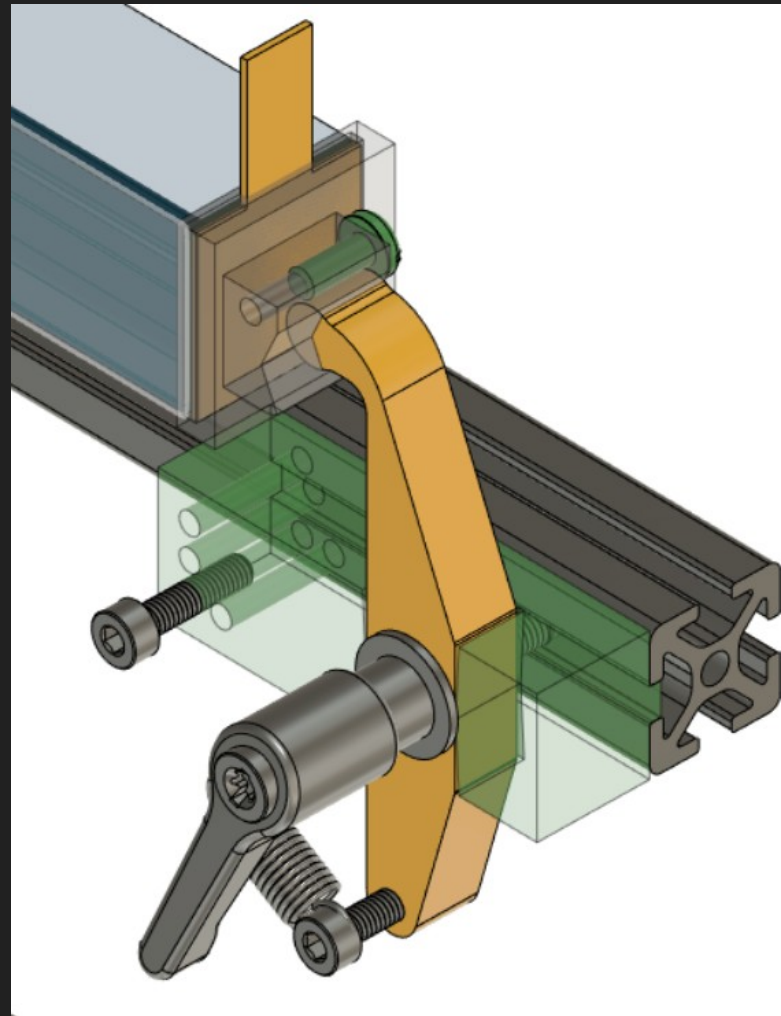


The enclosure bolts with two M8's those will not leak light.

The 25mm central (fixed) hub is mounted on the rail for accuracy, and RTV sealed for light tight.

Metal parts

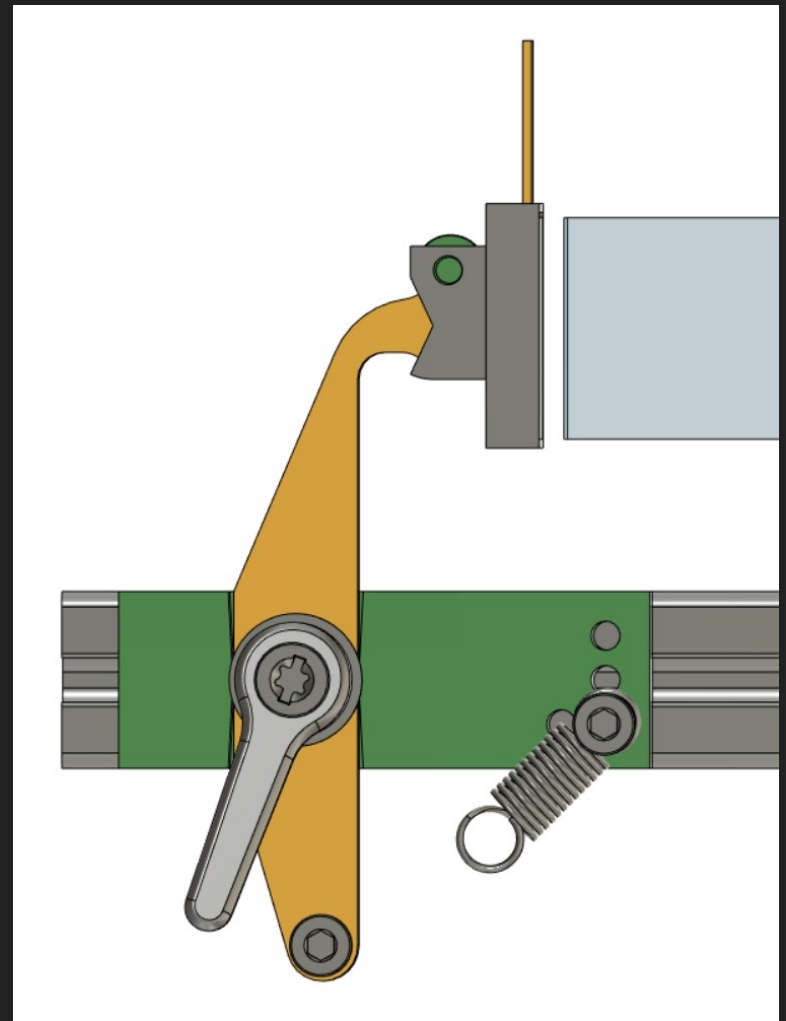
All metal parts are +10mm below the lowest plane of the crystal due to plastic elevated arms. Elevated parts are acetal, nylon.

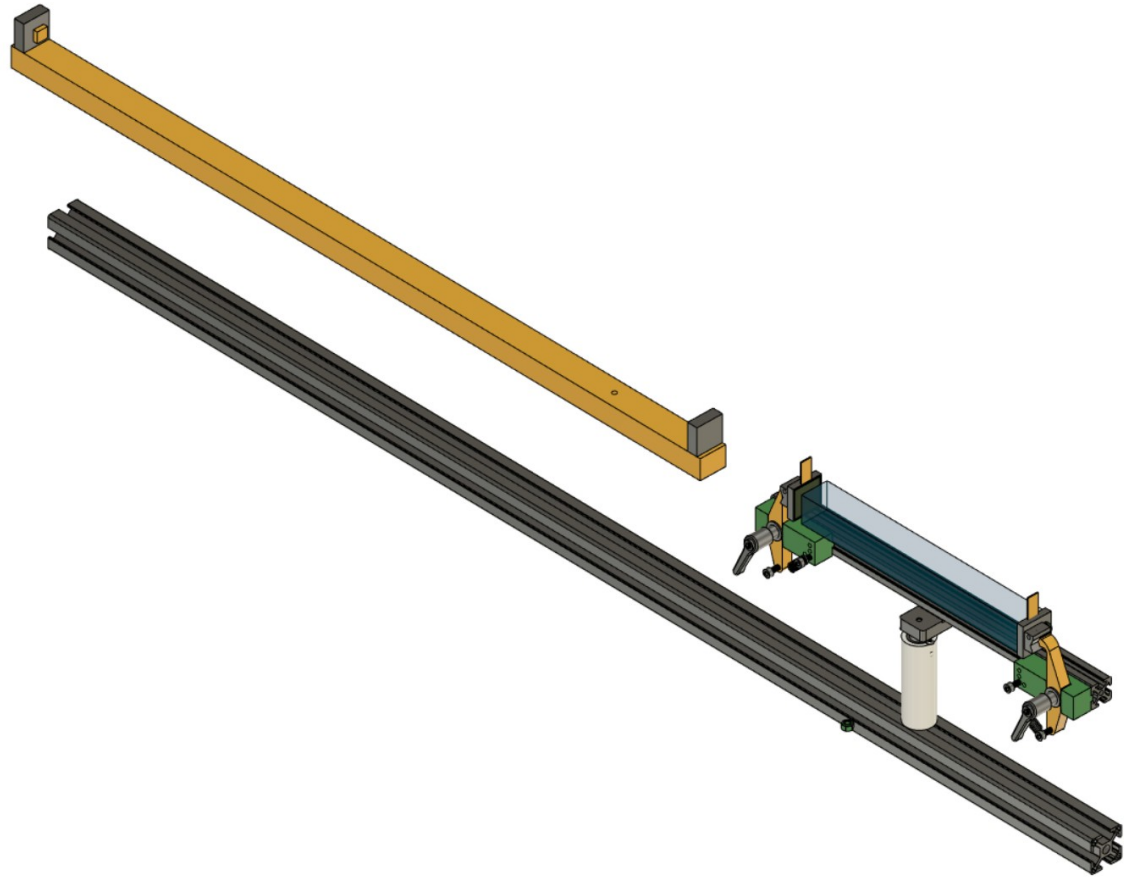


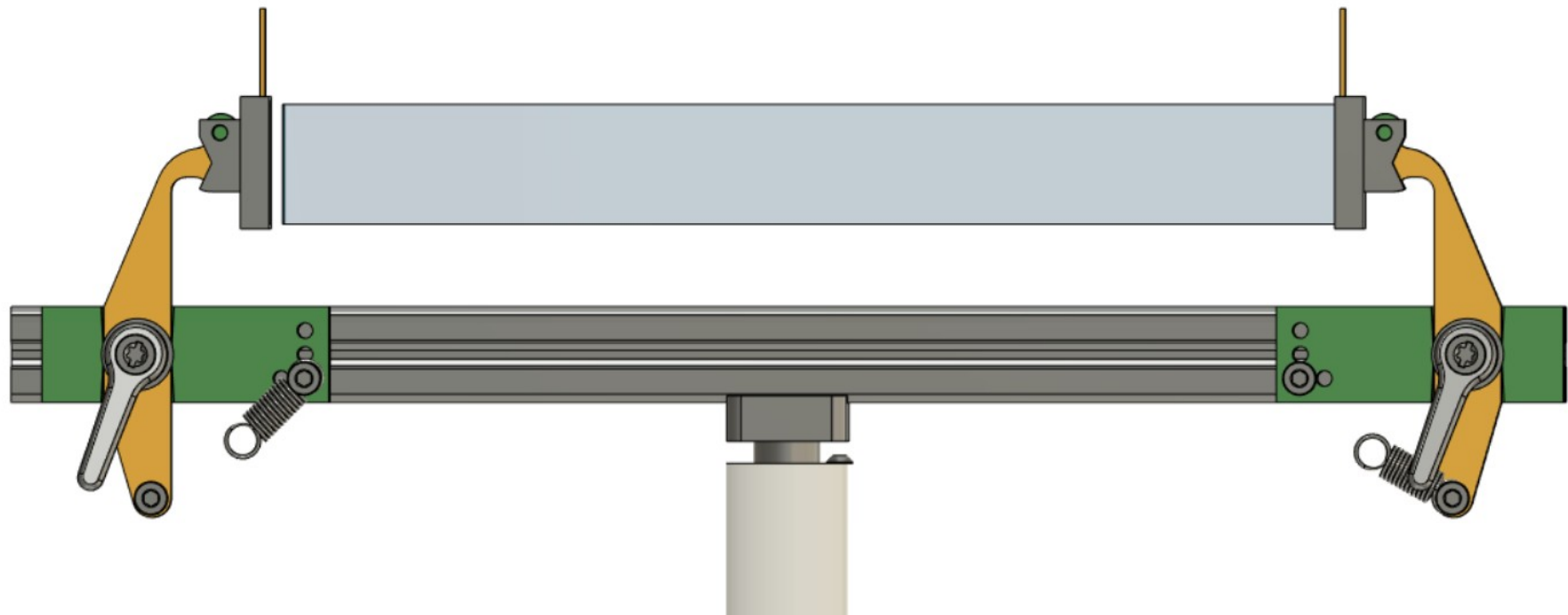
SIPM cleat

The tilting mechanism has a holder for each sipm board that defines the preset tension by allowing the operator to advance and lock it within a 6 deg range.

Pivoting points allow orthogonal engagement to crystal.







Next steps

Confirm dimensions, especially the 60mm telescope side

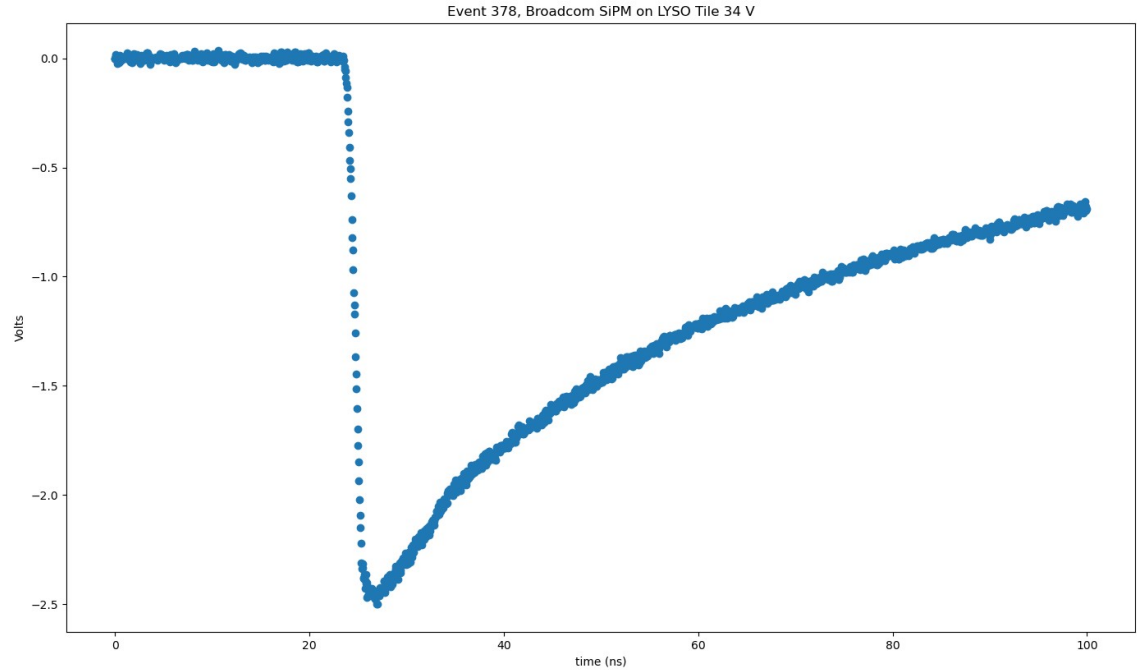
Decide on enclosure.

Decide if telescope shall be in pelican box or outside with it's own dark tube, etc.

Broadcom SiPM on Tile

6mmx6mm (40u cells) broadcom simp
on 1cmx1cm 3mm LYSO tile

Rise time ~ 3ns



Simulation w/ GPU

- Basic plan is to develop convenient fast single bar simulation
- Generate large samples of ray traced showers for different geometries and use these to develop and test fast parameterization models for S and \hat{C} light collection
- Ultimately aim for a turn key solution to use to tune full MC
- Working on Virginia HPC/GPU cluster
 - System level libraries installed by our cluster managers
 - Some issues building packages, due to bleeding edge code (+documentation) base
 - WIP (as we speak) with help from Hans Wenzel, working to replicate his build in our conda environment