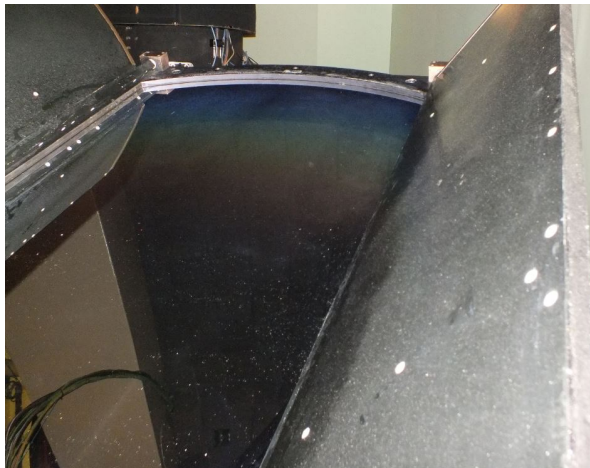
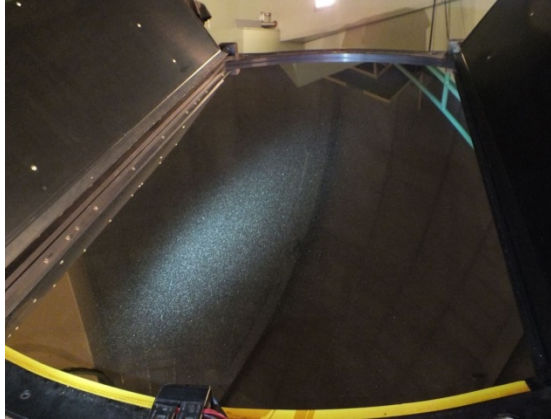


## Mt. Hamilton Optics Cleaning Trip 10/31/13

David Hilyard and Brian DuPraw

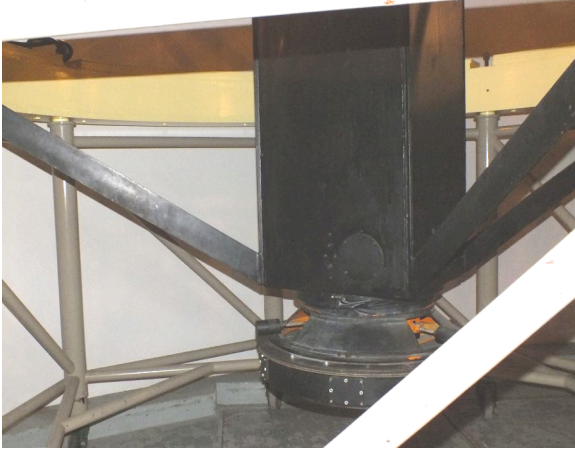
### Shane M3

This mirror was on the dome floor and was very dusty. Dave sprayed it with distilled water and squirted Orvus/acetone mix then dabbed that off. He followed up with ethanol and acetone. It cleaned up well but the surface showed a grayness, particularly at the top. After cleaning we measured the reflectivity to be 97% with the red filter and 88% with the blue.

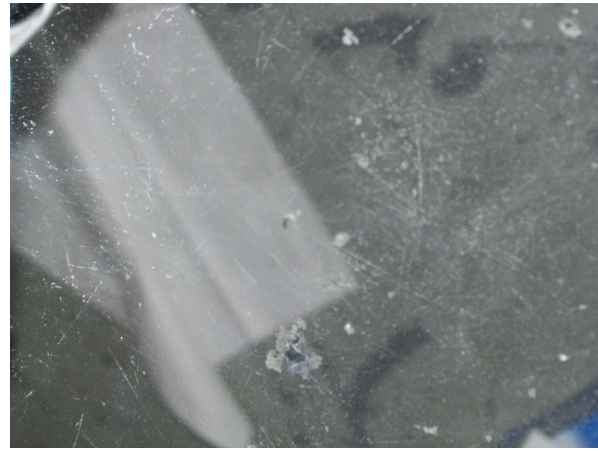


## Shane Coude Secondary

This mirror was on the dome floor. It has a sleeky surface with a number of pitted areas (see photos). The surface does not clean up with ethanol in a small test area. We measured 87% reflectivity with the blue filter and 85% with the red (relative to the reference mirror).



Overview



Surface



Surface Pit 1

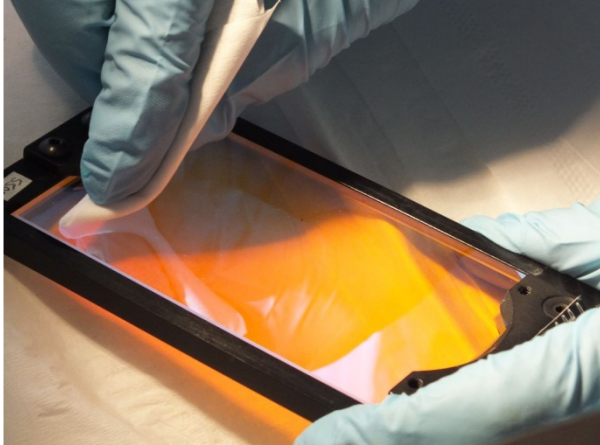


Surface Pit 2

## KAST

A box of filters and a filter wheel were had been brought to a side room off the dome floor. Three filter frames were empty and the others held a 4600 A and a 5500 A filter plus a flat mirror. They were cleaned by blowing the dust off with canned air and then wiping with ethanol on a TechWipe tissue. Except for a few stains on the 5500A filter they were pretty clean.

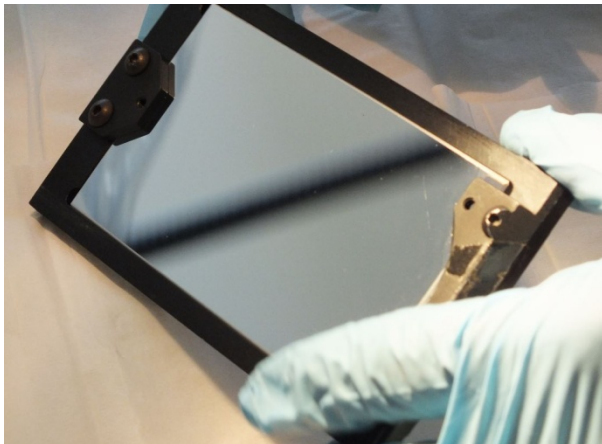
The filter wheel held four filters on the top wheel and 7 on the bottom. One filter had spots that ethanol didn't touch but they came off with distilled water.



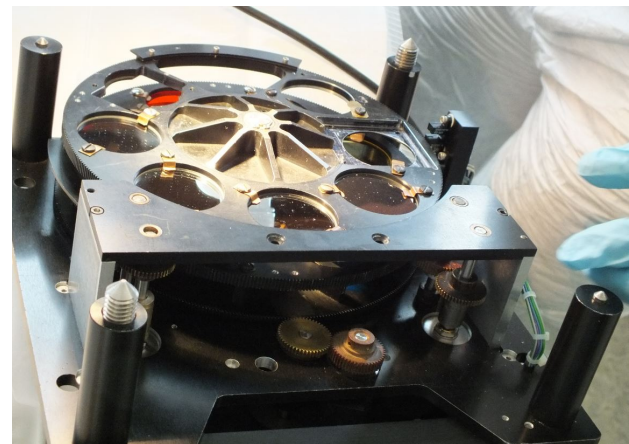
5500 A Filter



4600 A Filter



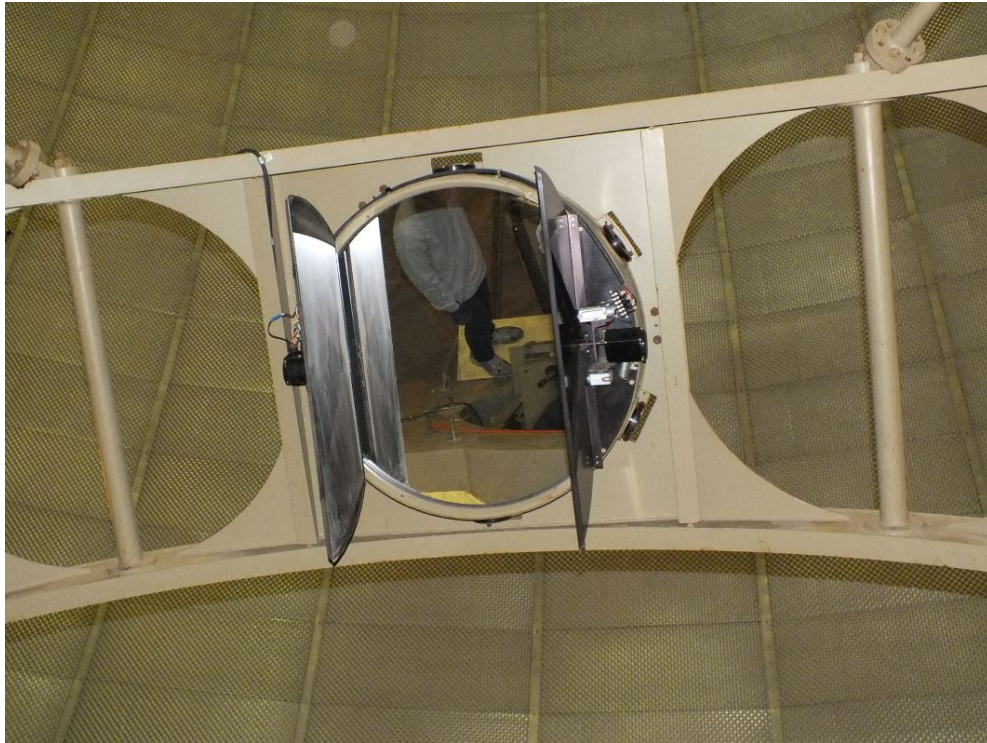
Flat Mirror



Filter Wheel

### Shane Coude M4

This mirror was mounted to a moveable carriage spanning the forks of the 120" telescope mount. The surface was not dirty but had an overall grayness to it that ethanol in a test area did not remove. We measured 94% reflectivity with the blue filter and 93% with the red.

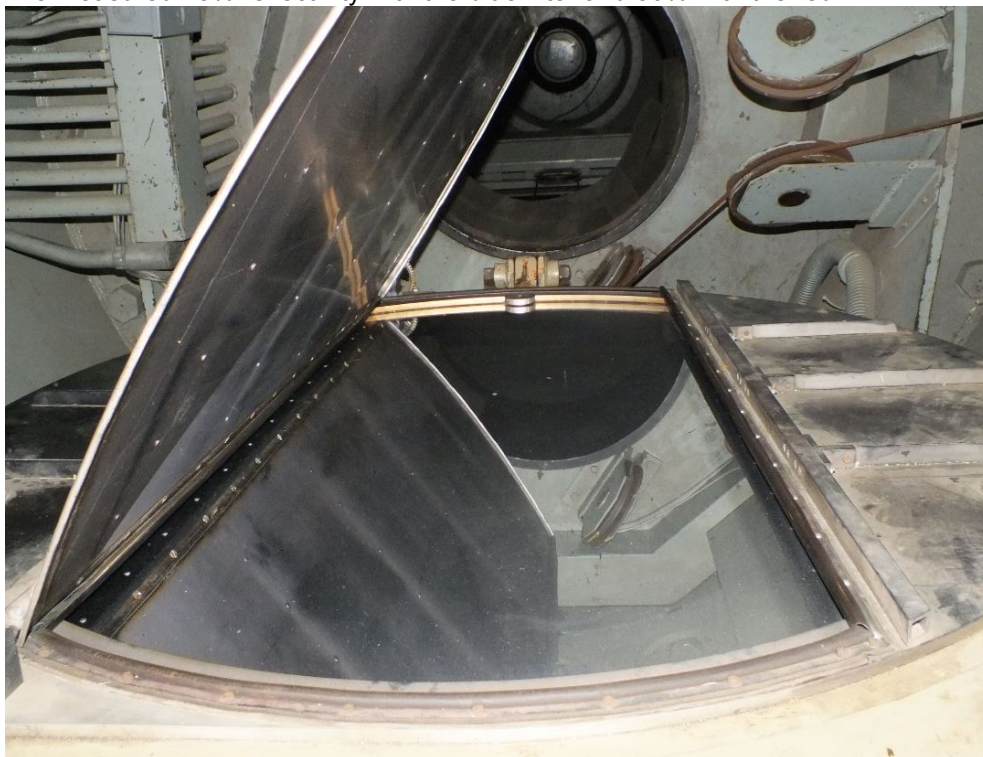




Coude #4 Mirror

### Shane Coude M5

This mirror was in a large hole between the forks of the 120" telescope mount. Ethanol in a test area had little effect. We measured 78% reflectivity with the blue filter and 80% with the red.



Coude #5 Mirror

## Slit Room

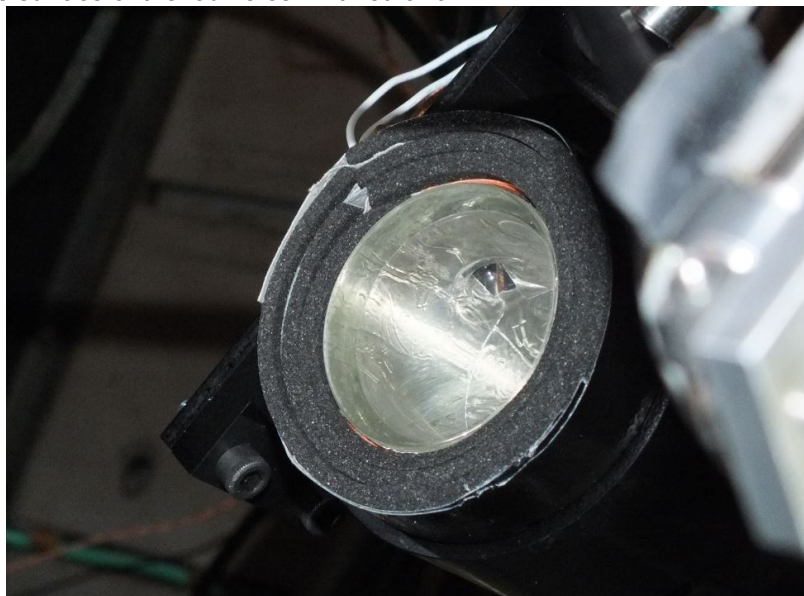
In the Slit Room below the dome floor of the 120" telescope we inspected a number of items. First Dave looked at the pick-off mirror. He blew the dust off but knew from past experience it was too fragile to wipe without sleeing.



Mirror  
Surface

Pick-Off Mirror

He wiped the glass surface of the iodine cell with ethanol.



Iodine Cell

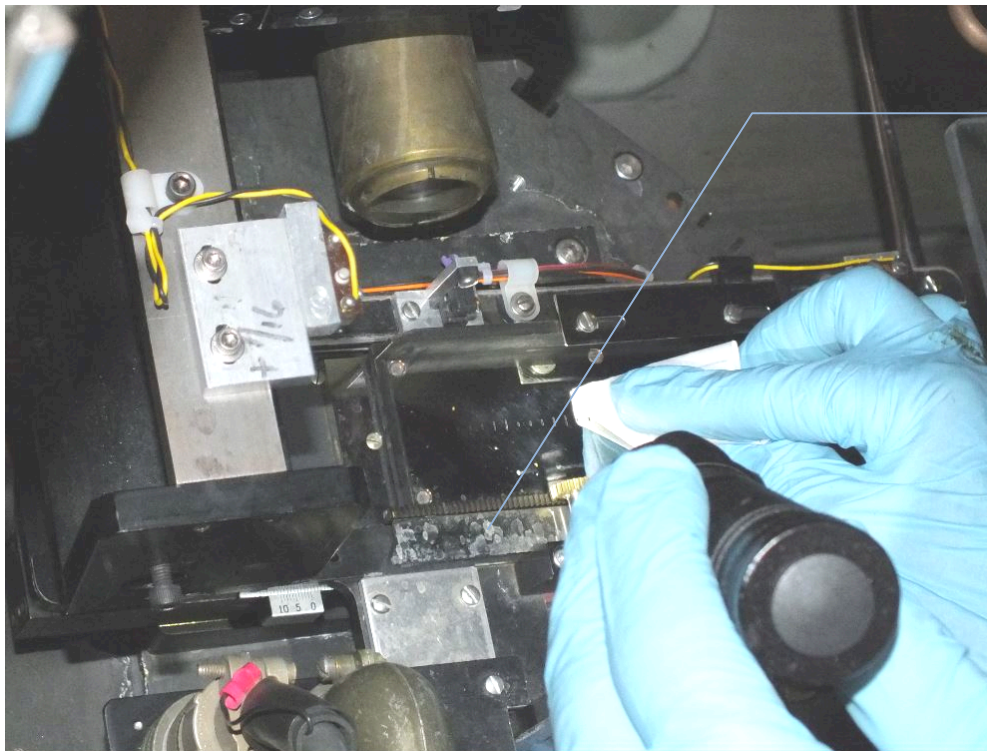
We looked at two different filter wheels, one easily accessible and one farther back. Dave removed a couple of clipped-in filters from the front wheel (Coude Guider Wheel) to clean them with ethanol. One, labeled "NG?" proved to be a sandwich made of two pieces of glass separated by a ring.

Dave reached back behind the aperture plate area to clean the #6 filter on the other wheel. Filters #2 and #10 couldn't be reached.



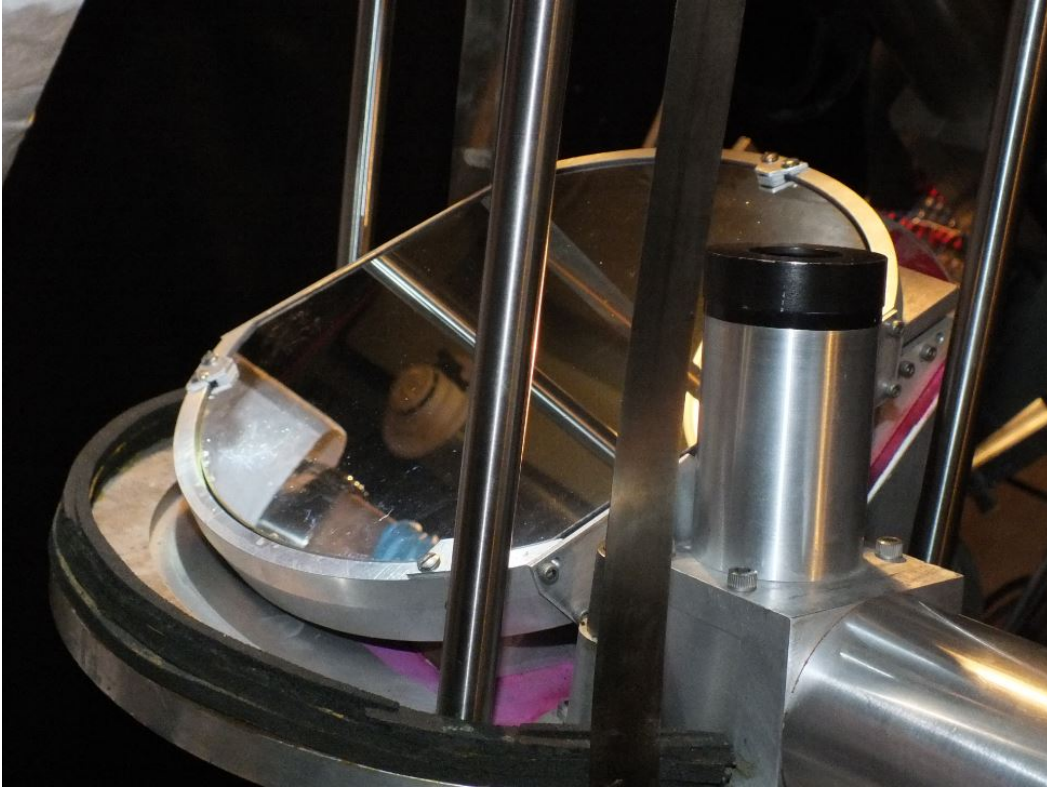
Back Filter Wheel

The Aperture Plate was cleaned with ethanol on a tissue. It has water spots from a long-ago leak that will not come off.

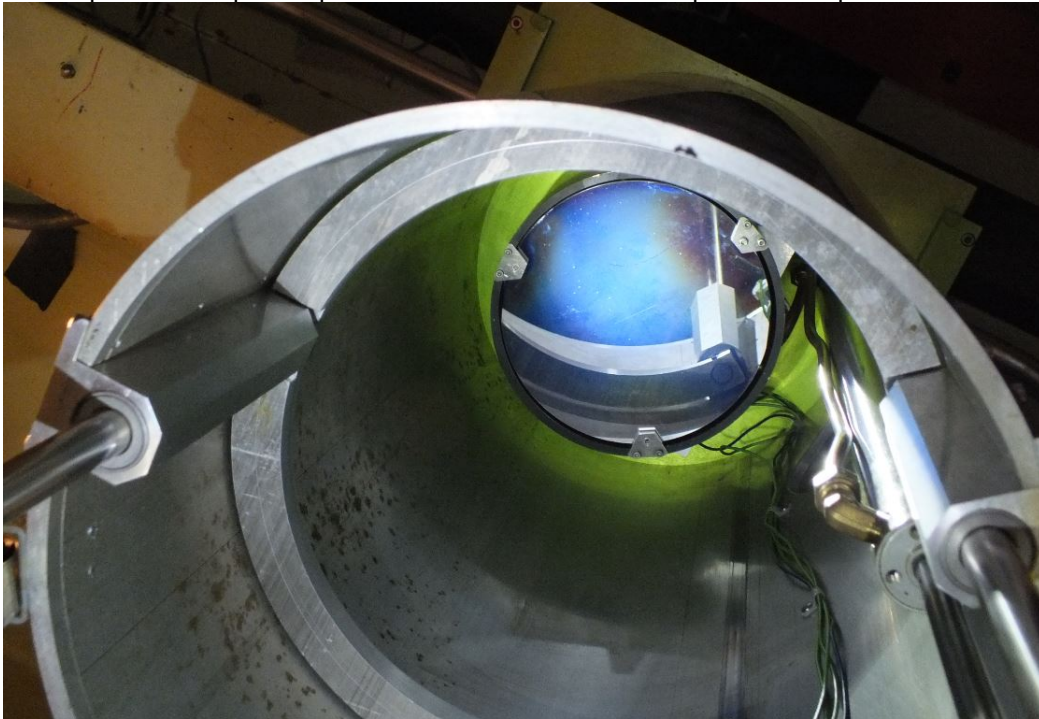


Permanent water spots

The periscope was lowered and the mirror checked. Dave tested cleaning it in a small area and found it too fragile for wiping, so he just blew it off with canned air.



We could look up inside the periscope tube but couldn't reach the optic at the top.





We looked at the image rotator, also in the slit room. After a motor lowers the assembly into a reachable position, there is a prism face accessible from each end. Dave inspected the face at the lower end and cleaned it with ethanol, then removed the upper cover and inspected the face at that end.

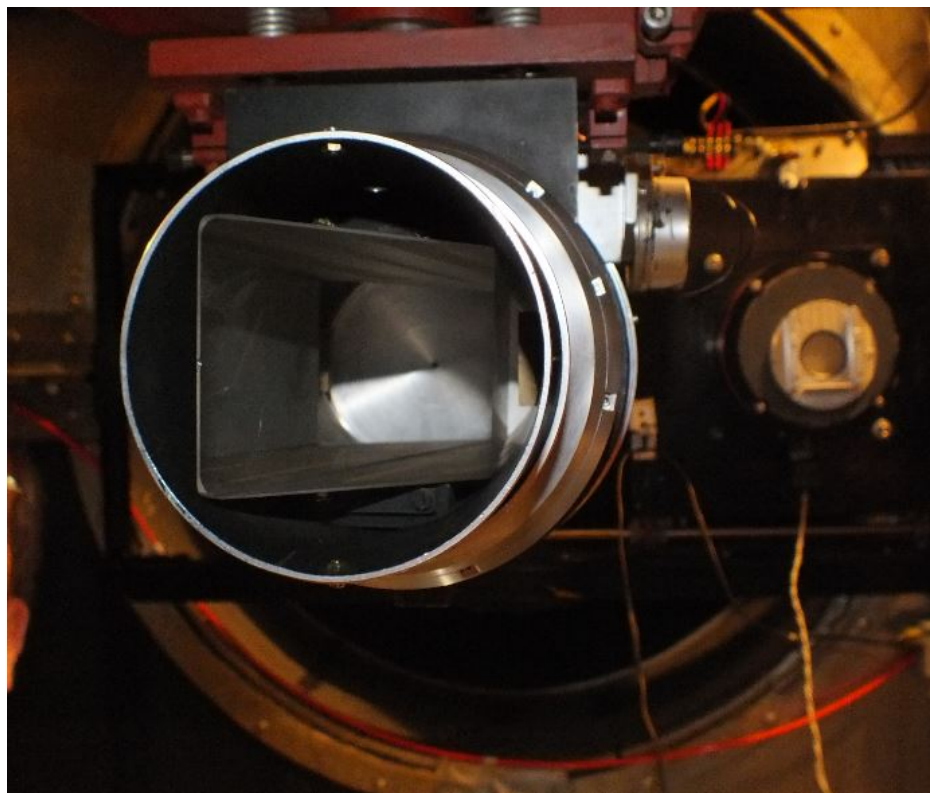
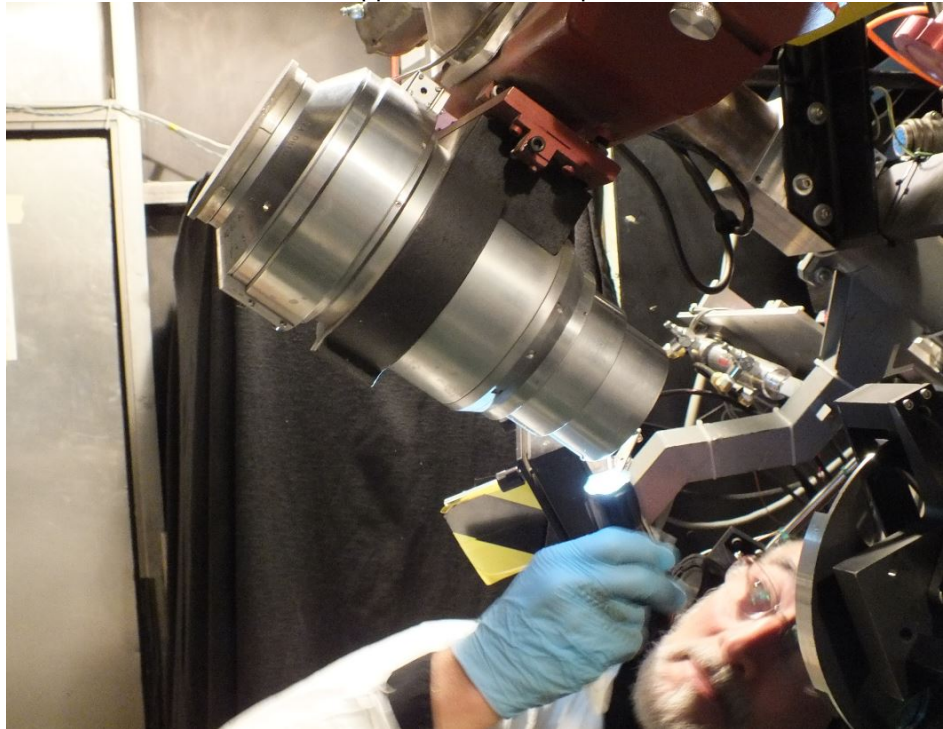


Image Rotator lower end when assembly is in accessible position

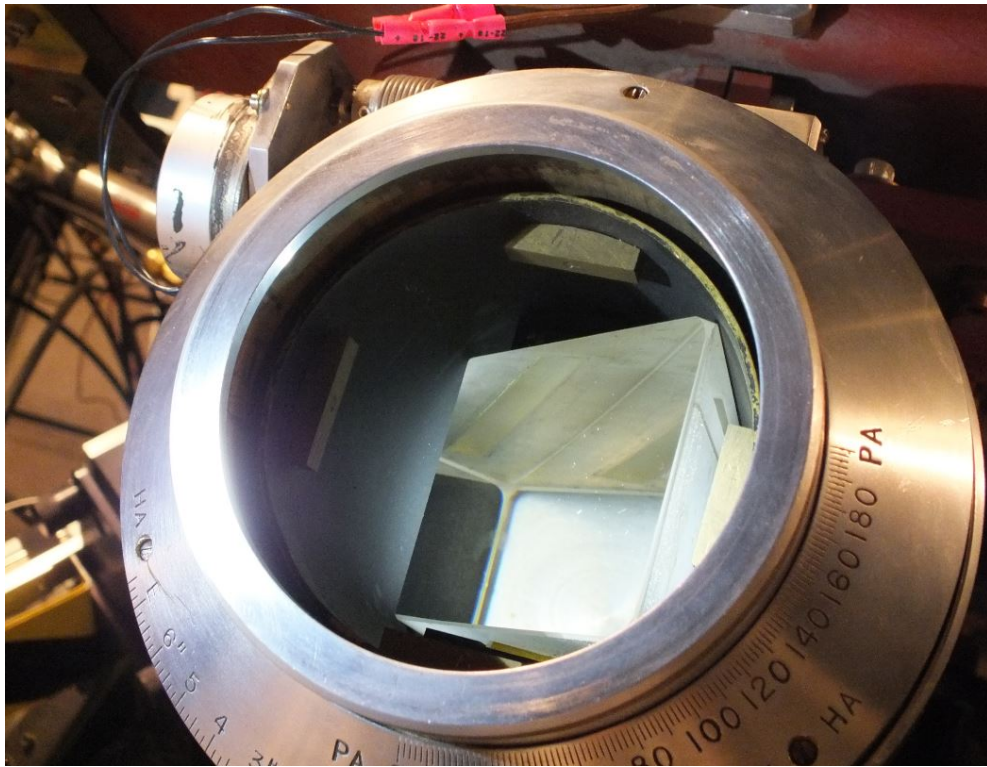
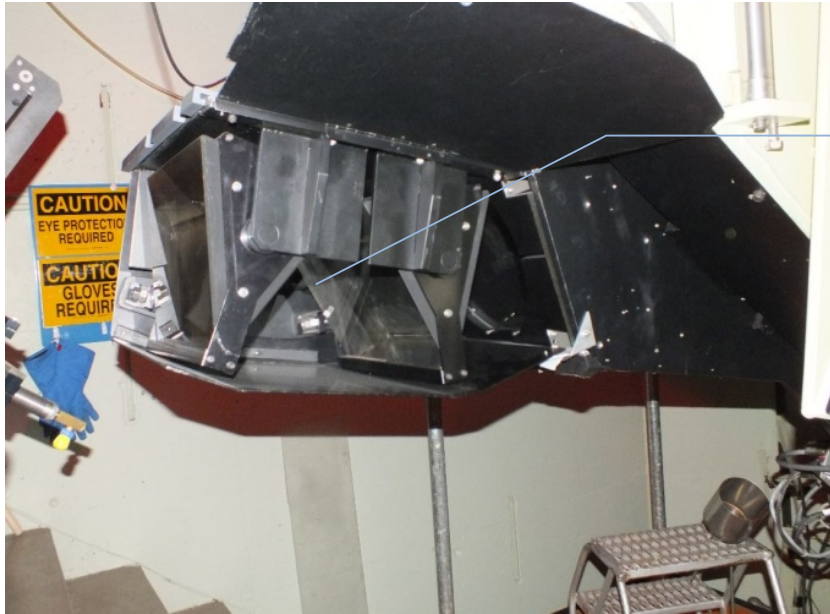


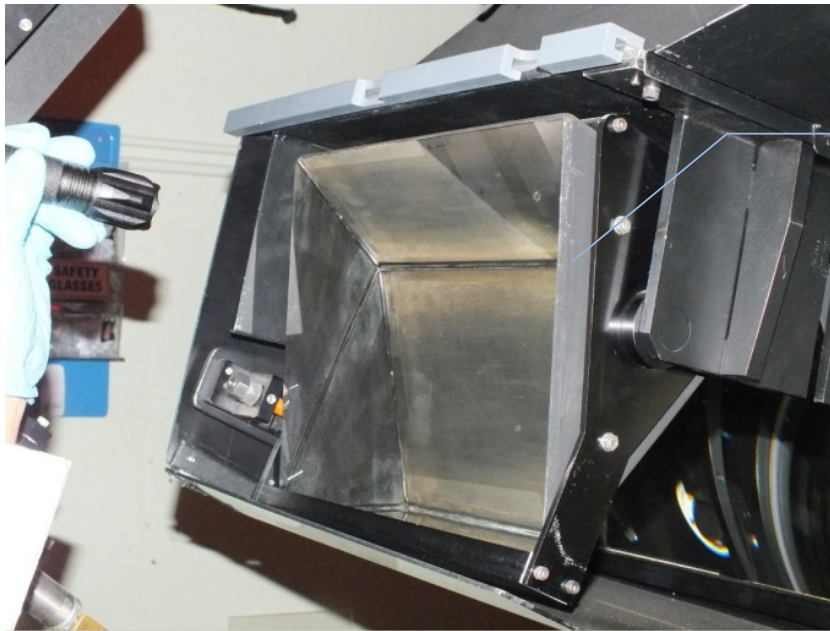
Image Rotator Upper end when in accessible position

## Hamilton Spectrograph

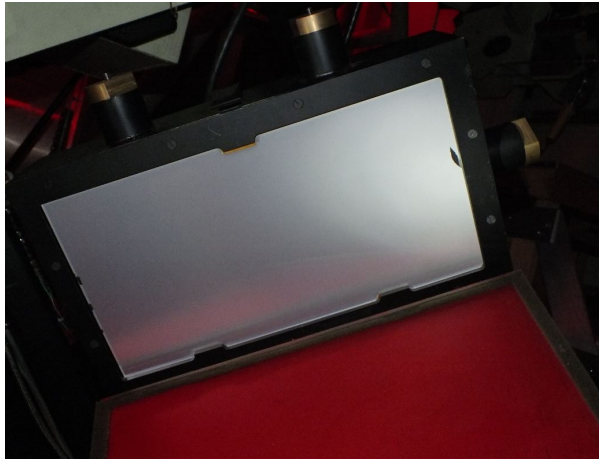
In the Hamilton Spectrograph room under the 120" telescope Dave cleaned the prism faces with ethanol. He used canned air to blow off the grating and a mirror. The grating had an existing tear and the mirror showed signs that it had been sleeted in cleaning sometime in the past.



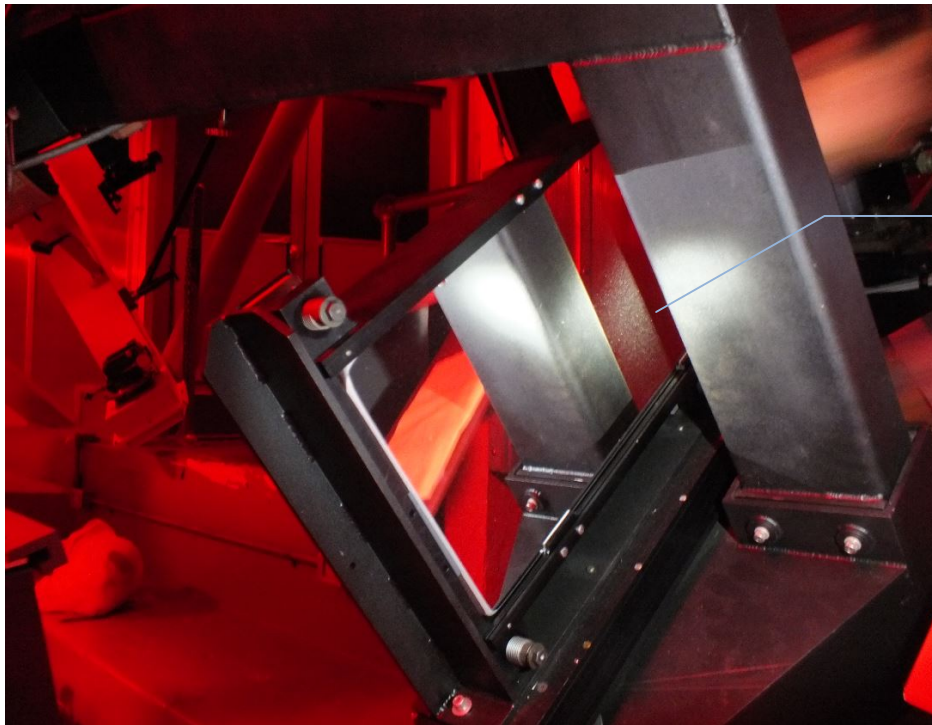
Prism Assembly  
With Cover  
Removed



Front Prism



Hamilton Spectrograph Grating with Tear



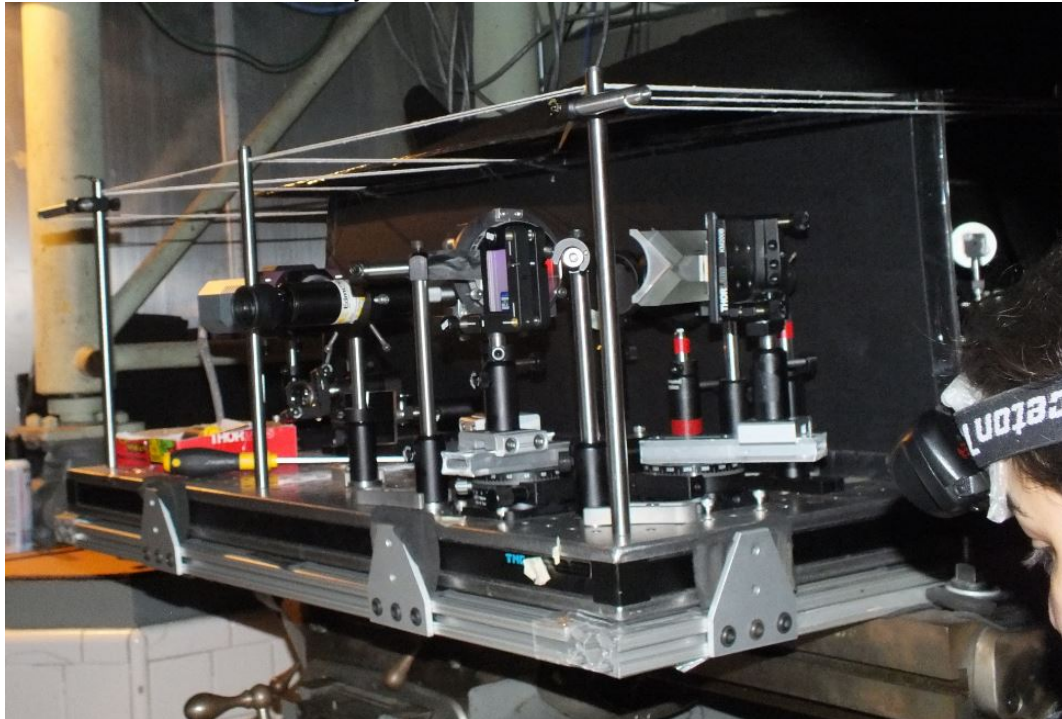
Flat Mirror



Collimator mirror with fragile coating and degradation at top and right side

### Sona's Project

Sona (spelling?) expressed interest in cleaning the mirrors of her PhD project and Dave volunteered to show her his process. The mirrors seemed robust, with at least one being an off-the-shelf Edmund Optics mirror. He used water first, followed by ethanol.



## KAST Red Collimator Mirror

This mirror was removed from the tub while we were there and Dave cleaned it on the shelf attached to the fork lift. After testing an edge he cleaned with distilled water followed by ethanol.



## Nickel 40" Telescope

The secondary mirror was not dirty, although the coating was hazy. It and the primary were inspected only. The primary has a known large water spot. For the secondary mirror we measured 84% reflectivity with the blue filter and 76% with the red. For the primary we measured 76% with the blue filter and 78% reflectivity with the red.



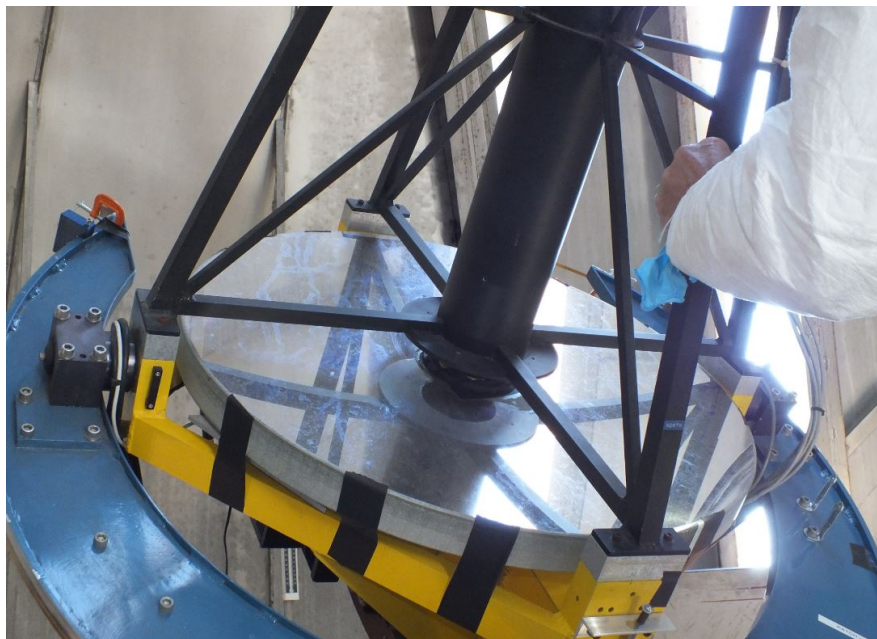
Hazy coating surface on secondary



Large water spot on primary

## Katzmann Automatic Imaging Telescope (KAIT)

This telescope is in its own dome just up the road from the 120" dome. A gate pass-code is required to enter the private drive to get to it. The primary mirror of this telescope was quite dirty with evidence of water condensation rivulets. Before cleaning we measured 76% reflectivity with the blue filter (relative to the reference mirror) and 86% with the red.







Dave cleaned the primary by dabbing it with Orvus/actenoe/H<sub>2</sub>O mix and distilled water spray. He soaked it that way a couple of times, then followed up with ethanol.



There was a water-etched streak directly under one of the structural elements of the mirror that will not come out until the mirror is recoated.



Permanently etched water streak

Overall, the cleaning was very successful. After cleaning the reflectivity was 87% with the blue filter and 98% with the red.



The KAIT secondary mirror had water spots that may be in the surface. It was fairly inaccessible and we didn't attempt to clean it.

