

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Table of Contents

Blue Lab Notebook with photos & video links: pages 1-55

Appendix 1, text chat with Chris Portales re holo studio power outage: pages 56-60

Appendix 2, photos of removed 12" collimating mirror setup: pages 61-62

Appendix 3, May 5, 2024 Facebook post re: Michael Wang project: pages 63-68

Lab Notebook blue metal spiral bound

Start Date: Dec. 3, 2023

Chris Portales & 13.3" LCD & SLM+ v1.03

End Date: Apr. 5, 2024

Wang Project Exposure 96-01-2024

Pg 1: Dec. 3, 2023, Chris Portales overnight w/ SLM+ 1.03 & DuoBond LCDs

5:47pm Oasis 150 on – 16C & settled at 20C

7:29pm Genesis on & lasing

 Laser Ambient 67F/36%H

 Darkroom Ambient 71.2F/37%H

7:42pm Win7 OPSL on – Genesis on @ 25mw

- Cleaned wetsink Dec. 2, 2023

8:00pm Cleaned stuff in wetsink with Alcojet

- picked up Chris Syosset LIRR 8:45pm

9:25pm Chris here

- Shutoff laser studio dehumidifier 67.7F/36%H

12:02am Genesis off

- Notes on this evening's session w/ Chris to follow tomorrow

12:08am Oasis off 20C

12:11am Dehumidifier back on, ambient 68.6F/39%H

(Windows 11 laptop referred to in this notebook is Lenovo IdeaPad 5 Pro 14ACN6, mfg: 9/28/2021)

Pg 2: Dec. 4, 2023, Chris Portales & LCDs

11:50am Oasis 150 on 17C & settled at 20C

11:58am Genesis on 25mw

- No Win7 on

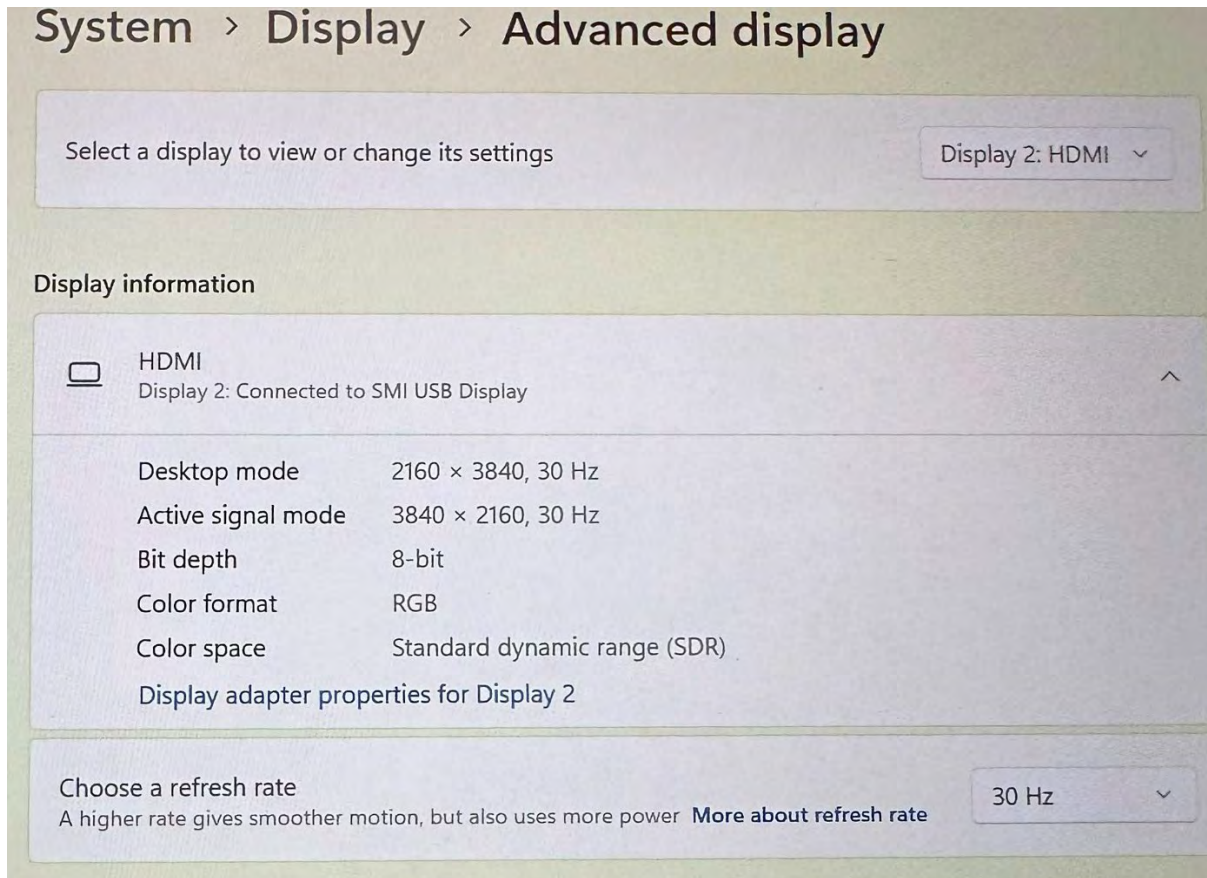
- Did complete SLM + 1.04 run through with video

 o Write up program operation using video

- See video: https://youtube.com/shorts/wVrLj_wXaSQ

DEC 3 notes:

About 10pm reset all 13.3" LCD cables & plugged into 4K OREI unit. Everything working & got 4K! I must've not had everything plugged in correctly or firmly enough.



Windows 11 Laptop Display setting for 13.3" monochrome LCD

- No problems switching modes.
- Spent some time figuring out sequencing the ON SCREEN controls – important to have set to “wide”.



4K 13.3" transmissive monochrome LCD



Diffraction transmissive ghosting in LCD

10:12pm observed that **LCD DIFFRACTs images that are viewed at a distance though the LCD – that is, there is undesirable ghost imaging.** This means that neither H1 slit nor H2 masking will probably work since images will be ghosted. (maybe angle depends on pixel pitch?).

- However, screens will still be useful for sandwiching to ground glass screen ala Patrick Boyd system.

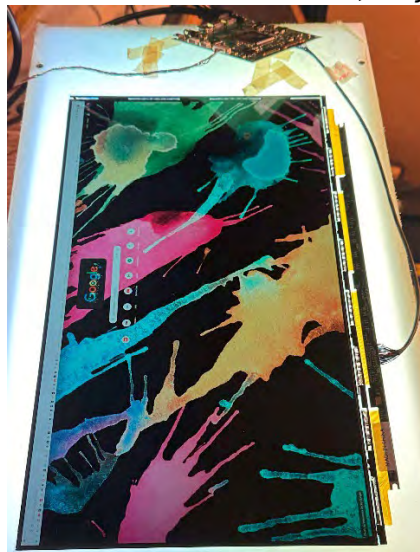
Pg 3: DEC 3 revisited

- Made videos of LCD slit moving.
- Part 1 of LCD as moving slit video: <https://youtube.com/shorts/L7Mhdf2JplU>
- Part 2 of LCD as moving slit video: <https://youtube.com/shorts/EUDBs243nd4>
- Part 3 of LCD as moving slit video: <https://youtube.com/shorts/5zdjH2MwSQc>
- Part 4 of LCD as moving slit, shows SLM+ demo controls video: <https://youtube.com/shorts/HW5odLiYT3Q>

- Screens are not 100% opaque which means that there will probably be an accumulation of noise in areas that I don't want to expose.
- Discussed with Chris the desirability of making the slit mask completely opaque during settling time if we want to use LCD as shutter also while SLM is cycling between images.
- **Need to work out minimum safe cycle time (rise time) between images on SLM.**
- **Need to ascertain if SLM has inherent aberrations like phase versions.**

11:50pm Setup 15.6" color LCD. When it boots up, it cycles between completely red, green & blue until connected to Win 11.

- Also gives full 4K. **Only 13.3" & 15.6" give full 4K.**
- **Might be possible to setup a full RGB H1 camera w/ Cobolt, Genesis, & 488 Sapphire lasers w/ combined beams.**
- Win 11 laptop sees 15.6" as primary screen throwing SLM program onto it. Chris needs to work on this. *SOLVED in v1.0.16., May 5, 2025.*



15.6in RGB LCD with control board

Pg 4: DEC 3 con't:

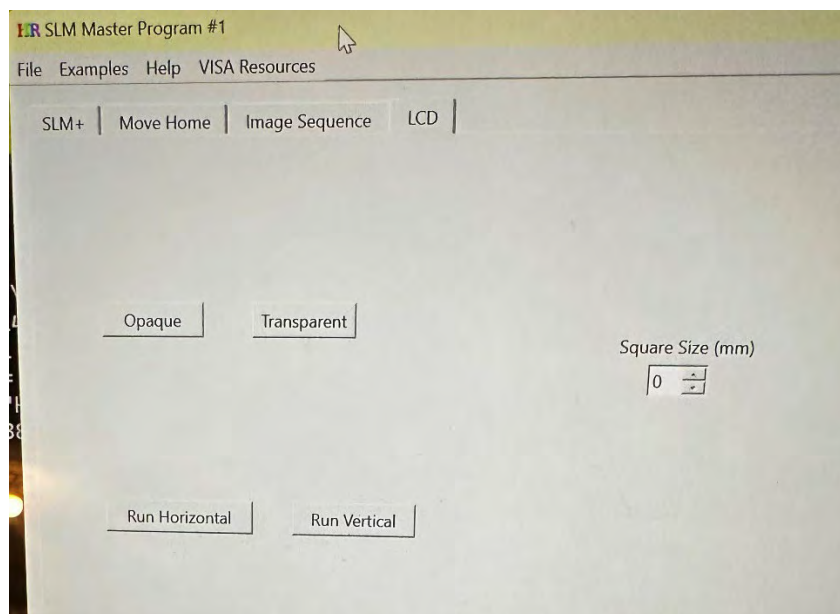
- The 15.6" screen crashed when Chris tried to run slit program on it.
 - o It was a PROFILE issue.
- Color LCD failed test with SLM+ video: https://youtube.com/shorts/Q_6eHg6OZYA

Back to Dec. 4:

- Worked all morning.
- SLM+ 1.04 set to 13.3" LCD profile only.

SLM+ Walkthrough:

- To change size of clear square in SLM LCD panel, simply enter?
- Part 5 of LCD as slit showing variable clear square video: https://youtube.com/shorts/_GpdYuTAong



SLM+ software LCD slit & square controls demo tab

11:56am Video: On "Move Home" tab, use "shutter" toggle to open & keep open.

- SLM+ Move Home tab shutter function & simultaneous LCD & SLM as external monitors video: https://youtube.com/shorts/e_R3dPe-A0w

2nd 11:56am video: in SLM tab

- Go to "file" then "open" to select image folder in "Joseph – Personal- Pictures" & click on pre-prepped image folder.
- At this point, LCD should be disconnected. Chris will fix this.
- In 4K, image stretches a bit.
- Shutter enable on
- X stage on & FUYU selected.
 - o Check settling time & exposure time.
- Set # of sequences.

- When ready, "RUN SEQUENCE".
- Can't switch LCD resolution hot. Have to switch between sequences.
- See video: <https://youtu.be/yhz-6gHDLM8>
- Slit "positive" movements AWAY from motor. "Negative" is toward motor.

Pg. 5: Dec. 4, 2023 con't:

Noon video re changed LCD rez:

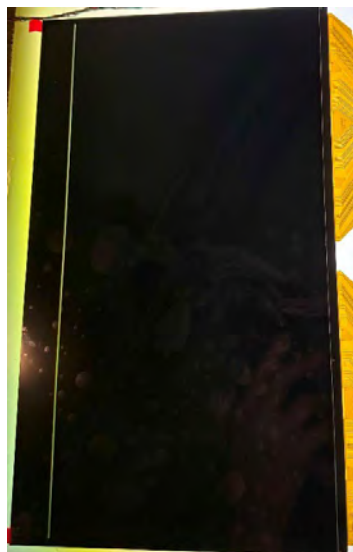
- Hz refresh rate is limited by which port is used on OREI.
- Right now, have to unplug LCD from Win 11 in order to get to SLM.
- LCD image is a little washed out. Might be able to improve on LCD by using ONSCREEN 13.3" controls.
 - o Need to compare image in Photoshop to image on LCD.
- *SOLVED Jan 25 2024: see video: Accessing SLM+ on Win 11 laptop and using LCD onscreen controls to control LCD contrast video: <https://youtu.be/kCuRxHDjdmw>*
- Took Chris to Syosset for 12:32pm train.
- Laptop display setting for LCD & SLM video: <https://youtu.be/yhz-6gHDLM8>



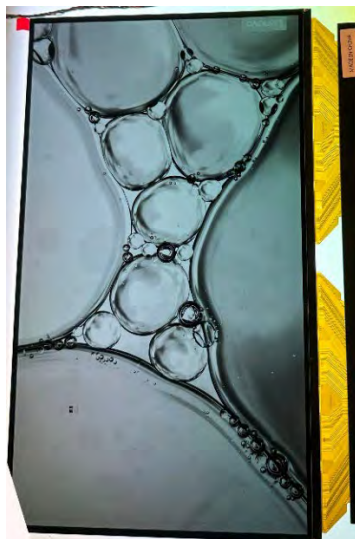
Clear 13.3in LCD with driver & control boards



Opaque 13.3in LCD with driver & control boards



LCD slit demo mode



LCD image grayscale



LCD square demo mode

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Dec. 7, 2023: overnight visit from Ira Tiffen

- Arrived around 11:30am
- Brought holograms & lights including original aluminum Tiffen hologram display with wood case which I used at 1982 ISDH.

6:00pm Ira setup aluminum 8x10" display

- I made videos of sequence of unpacking & setting up.
- Display light needs to be recentered so it is even & expands to fill entire plate. Still looks good regardless.
- We both made some videos & photos.
 - o Showed me the 3M 45 degree louvered film.

Ira Tiffen setting up display, video: <https://youtu.be/7c73pjmxiVo>

7:20pm We went to Carol Kingston pop-up gallery opening at Tamilou (121 Piping Rock Rd).

Pg. 6: Dec. 8, 2023, Ira Tiffen

- We talked old times & walked Miss P.
- Ira left ~ 11:40am.
- He would like a roll of the old embossed Tiffens.
- I asked if he knew what happened to the ~6K we sent to Tiffen Mfg back in 1983.
 - o No, he never saw them or doesn't remember. Regardless, I'm happy to give him some.

Pg. 7, Jan 25, 2024, Chris Portales

2:44pm Oasis on 15C

- Laser ambient 64F/37%H

2:49pm Oasis @ 20C

3:55pm Oasis @ 20C turned off. Don't need for fixing LCD software.

- Done around midnight and video made.

Basic How To for LCD w/ SLM+ video: https://youtu.be/gxEL_tG65Ys?si=TKSlb2a6zqNjZ_xG

Pg. 8: Feb. 15, 2024

10:09am Oasis 150 on 11C

- Laser ambient 64.4F/19%H

10:10am Oasis 150 PUMP FAILURE ~13C, turned off Oasis.

10:11am Oasis 150 back on 15C

10:15am Oasis at 20C – seems ok now

10:25am Red laser (Cobolt) laptop on (HB old Lenovo)

10:30am Genesis HP laptop on.

- Darkroom ambient 68.5F/34.5H

10:32am booted up OPSP

10:35am charging 840-C light meter

10:40am setup laptop for SLM controller (Win 11 lenovo)

11:31am Power on to Genesis power sply

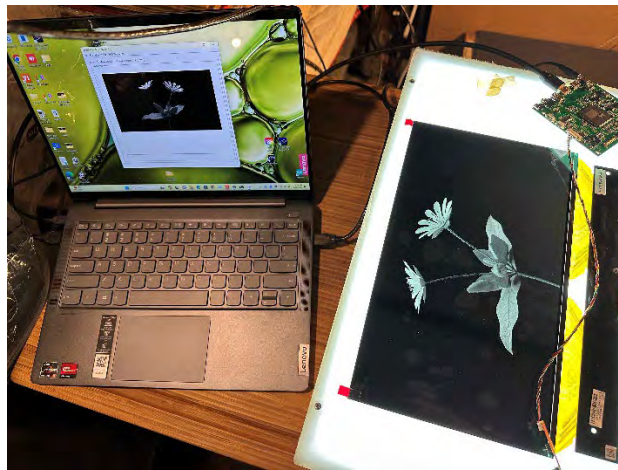
11:33am Oasis 150 ok @ 20C

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

- Laser ambient 65.8F/27%H
- 11:34am Genesis on ~25mw
11:35am darkrm ambient 69.4F/34%H
11:38am Cobolt laser on 525mw
3:30pm Cobolt laser turned off
4:05pm Cobolt laptop off
4:24pm all shut down

No Notes for LCoS test projection below Feb 15, 2024 or any notes at all for Feb 16 – just photos below.

- Feb 16, 2024 Chris P apparently updated SLM+ to v1.0.6

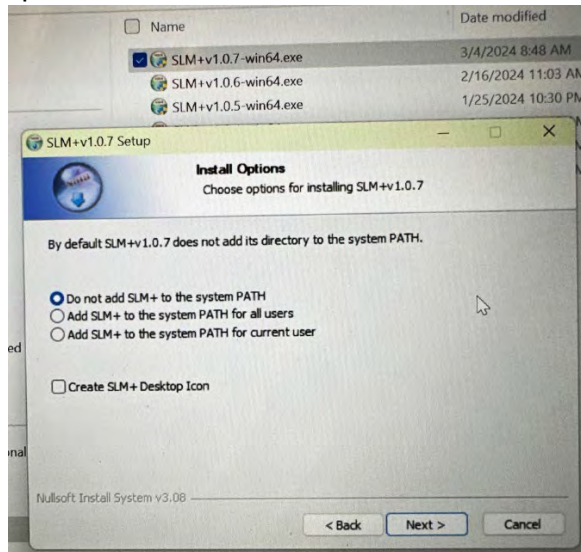


Stellaria LCoS SLM test projection Feb 15 2024 & 13.3in LCD Feb 16 2024.

Pg. 9: Mar. 4, 2024

1:56pm Win 11 laptop updated & Arduino & LCD connected.

- Chris P to update to SLM+ 1.07



SLM+ v1.0.7 install screen

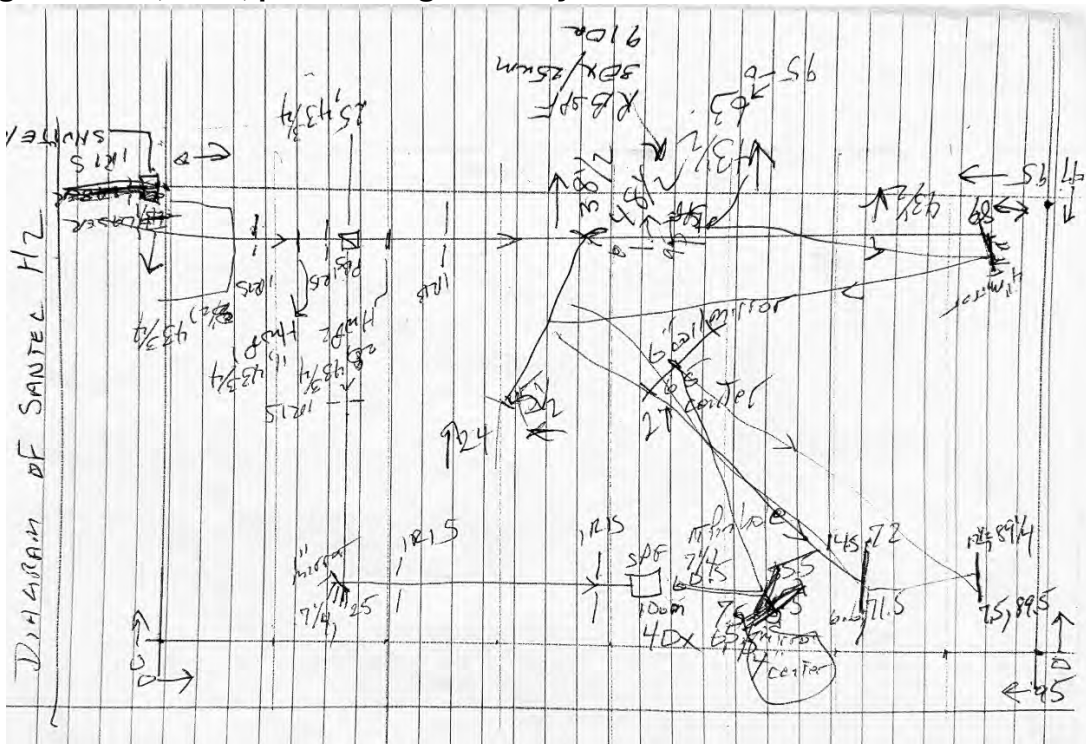
Mar. 6, 2024:

Cleaning darkroom & laser studio

Run HOLOMOD for 670-450nm

- Maybe cut 8E56HD 300x400mm in half to 300x200mm.
- Clear Newport 4x8ft table after making notes & photos of existing setup.
- Straighten up fume hood
- Check SPG (specific gravity) of ethanol
- Mix GP-61, F-24 fix, FNB bleach
- Make a diagram
- Disconnect OPPH cables.

Pg 10: Mar. 9, 2024, precise diagram w/ xy coordinates of Santec H2



Santec LCoS H2 setup XY diagram (photo of notebook page).

Pg. 11: Mar. 10, 2024, Wang Project (first entry)

6"x6" Achromat hologram (12)

6"= 15.24cm

6"x6" diagonal: 21.5526147cm= 8.485"

MWD= light distance: 1280cm= 50.3937" (4' 2.3")

MWA= 70 degrees

H1/H2 laser: 532nm

Color: H1 Red LC= 670nm, H1 Blue SC= 450nm or 500nm

IMG Screen= -0.1cm behind H2 plane

H2X,Y= 15.24cm = 6"

DVD calculated for 18", 15" 12"

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

- Going with 18" DVD
 - o For 70 degree MWLA + other settings, HOLOMOD H1 BLUE SC won't go below 500nm
 - So the calculated color range is 670-500nm.
 - In HOLOMOD, largest MWLA that will go below 500nm is 57.76 degrees with these other inputs.

H1 plates, 8E56HD, very old Canadian Research Council from Debbie Duston in 2009.

- 300x400mm
- Cut in half so H1 is 300x200mm
 - o 300mm= 11.8110236"H x 7.87401575"W
 - o H1= 11.81"h x 7.87"w

Optical axis= 8.5", H1 vertical center= 5.905"

Top of H1 plate= 14.405"

Bottom of H1 plate= 2.595" from table surface

DO5051 plateholder= 2 7/8" (2.875") – actual down to table surface 1/2" from table is ok.

- **Make sure FUYU cable is out of way of slit!**

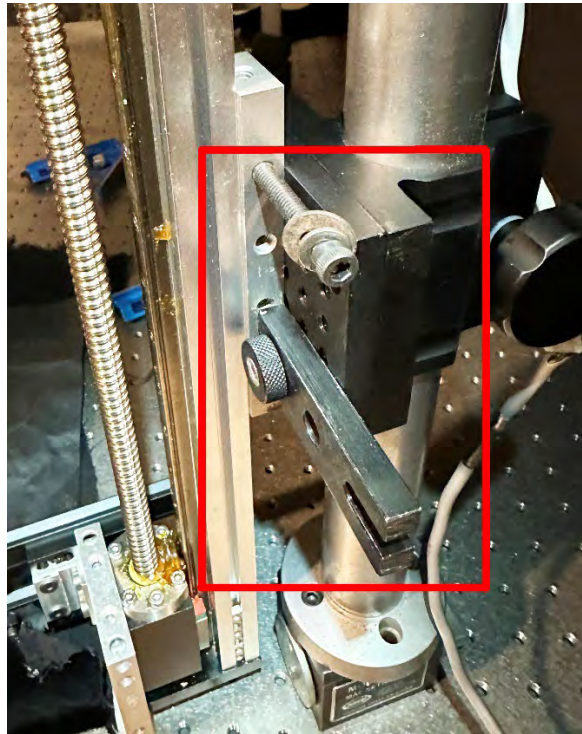


Customized DO5151 H1 plateholder with slit plate positioned at bottom

Pg. 12: Mar. 10, 2024, Wang Project

- Set slit bottom at 64mm from table surface
- Used B-2 NRC plate to square FUYU slit stage vertically to table.

- **Changed B-2 to B-1 & long screw to align FUYU vertically to table.**



New mechanism for straightening FUYU slit translation stage

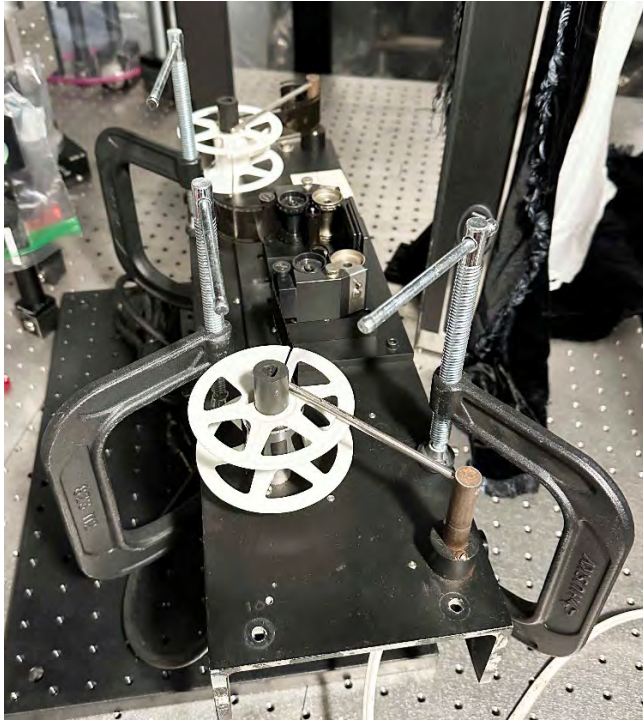
Making H1PH, slit, & FUYU slit translation stage straight & parallel video:

<https://youtube.com/shorts/OJGU5sRCnoI>

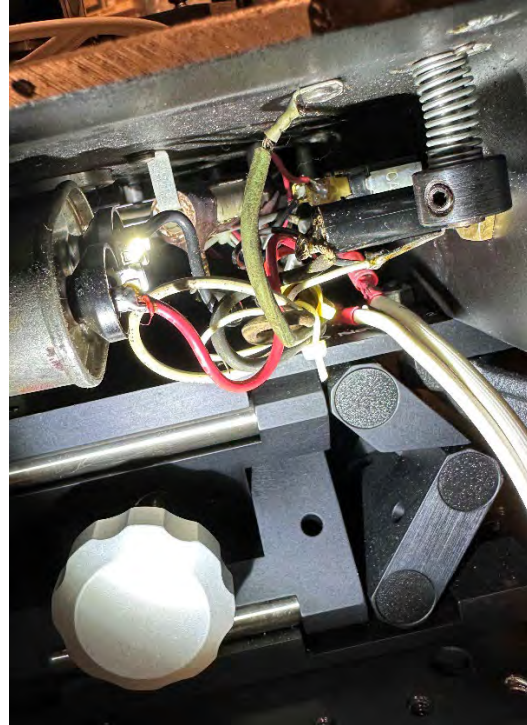
- Changed slit to 2mm slit plate
 - o 150 frames abutting = 300mm
- Vertical plate 11.8" = 299.72 frames or every other frame of 600 frames
 - o 2mm slit means every fourth frame of 600
- Took out Opal glass
 - o Matches 13.3" LCD well.
- Need to work out mounting of LCD & lighting

Mar. 11, 2024 Wang Project:

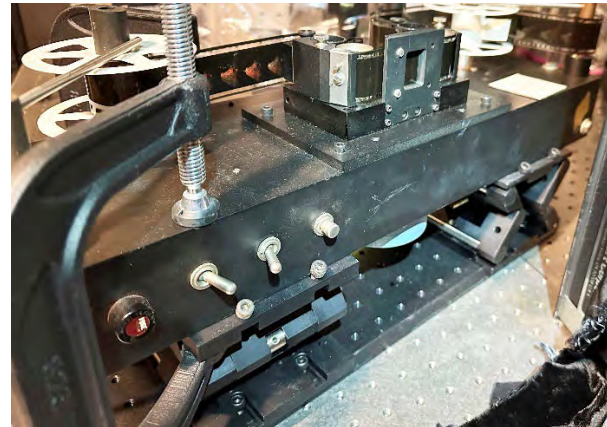
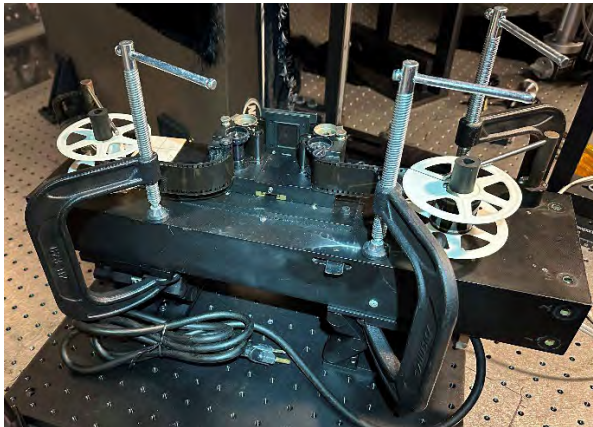
- Removed electric cord from OPPH & labeled "A" & "B" & put safety tips onto electric cable on top of 4x8' table hood.
- Removed c-clamps from OPPH & marked positions w/ white pencil & stored c-clamps (after also photos of positions).



Overview 1 OPPH before disassembly



Closeup Electrical connection OPPH before disassembly



Overviews showing C-Clamp & labjack positions from front & back before disassembly.

Video discussing disassembly of OPPH: <https://youtube.com/shorts/2RV-Obfu8ks>

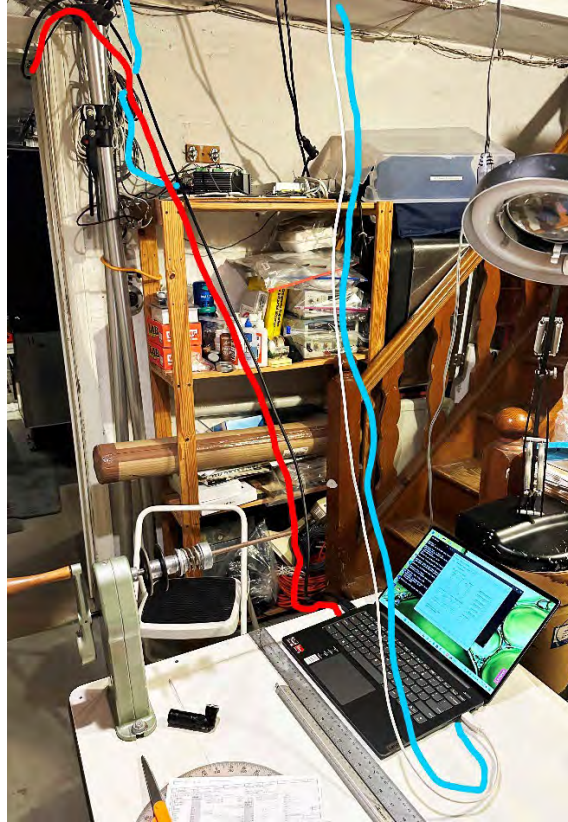
1:18pm laser ambient 66.1F(19C)/31%H; dkrm ambient 69F/28%H

- Oasis 150 on 15C

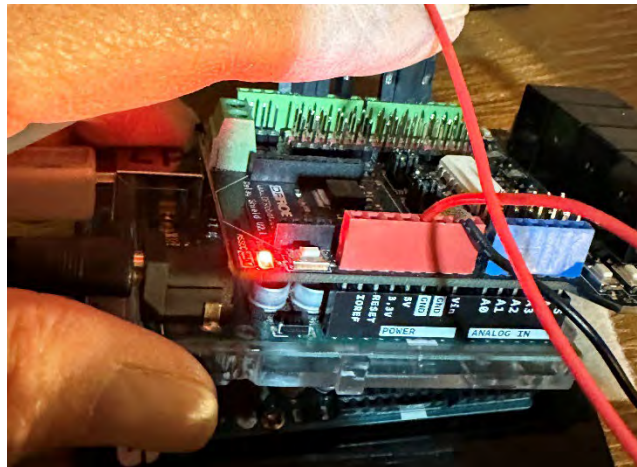
1:19pm Oasis at 20C, oscillating from 19020C for ~ 1'

1:20pm Oasis at 20C

- String 30 ft HDMI cable for LCD (frm dkrm)
- Test laptop w/ slit & LCD from darkroom



Laptop in darkroom connected to holo studio via 30ft HDMI (red) & to Arduino via 15ft USB (blue).

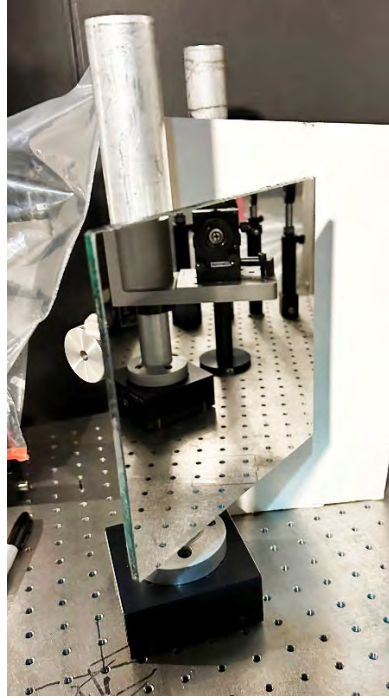


Closeup dedicated Arduino for SLM+ software

Pg. 13: Mar. 11, 2024 Wang Project con't:

If 300mmx400mm cut in half, (diagram of cut), Cut white cardboard 11.81"x7.874"

- Setup card on H1PH
- Setup 7.5x7.5" Crown mirror as OB bounce
- 1st need to get a good angle on H1 collimator & **setup H1 location consistent with non-wobbling slit**. This will also determine centerline normal to H1 & LCD screen.
- Then set screen distance per HOLOMOD



7.5 in square OB SPF bounce mirror for LCD

Removing SLM collimator from OB path video: <https://youtube.com/shorts/an9ZTM3OYds>

- Make sure foamcore by laser is well sealed (hood).
- H2 will have to be on second table
- **Use NRC BUP-2 units for equipment positions**

Mar. 12, 2024 Wang Project:

1:07pm Oasis 150 on 15C

1:08pm Oasis @ 20C

1:09pm Oasis steadied at 20C

- Laser ambient 67.7F/32%H

1:13pm power on to Genesis power supply

~50" green light on pwr sply turned on, then ~10-15" Genesis lasing.

Pg. 14: Mar. 12, 2024, Wang Project:

1:16pm HP laptop for Genesis turned on

1:21PM OPSSL GUI on ~23.5mw

3:27pm Oasis @ 20C, lasr @ ~ 24-25mw

- Removed 10X & 50um from OB SPF.
- Removed protective cover from 7.5x7.5 mirror
- Aligned OB mirror to H1PH center
- Swapped 4" RB bounce mirror for 6" bounce mirror & it now fills 16" collimating mirror & covers H1 card fairly evenly.
- Swapped OB SPF 10X for 20X – will probably have to go to 30X or 40X.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

- Moved H1PH closer to RB collimator along RB line to get centered even fill from RB.
 - o Means that OB screen will have to be moved further back.
- Find 3M 666 doublestick tape & order more.

10:20pm laser ambient 66.4F/31%H

10:22pm laser off

10:26pm Oasis off

10:29pm Win 11 laptop & Arduino off

Pg. 15: Mar. 13, 2024 Wang Project:

9:43am laser ambient 66.5F/31%H

9:44am Oasis 150 on ~15C

9:46am Oasis steady @20C

9:50am Laser on

- Better sealed back hood by laser

10:08am Win 7 laser laptop on

10:09am Win 11 Arduino laptop on

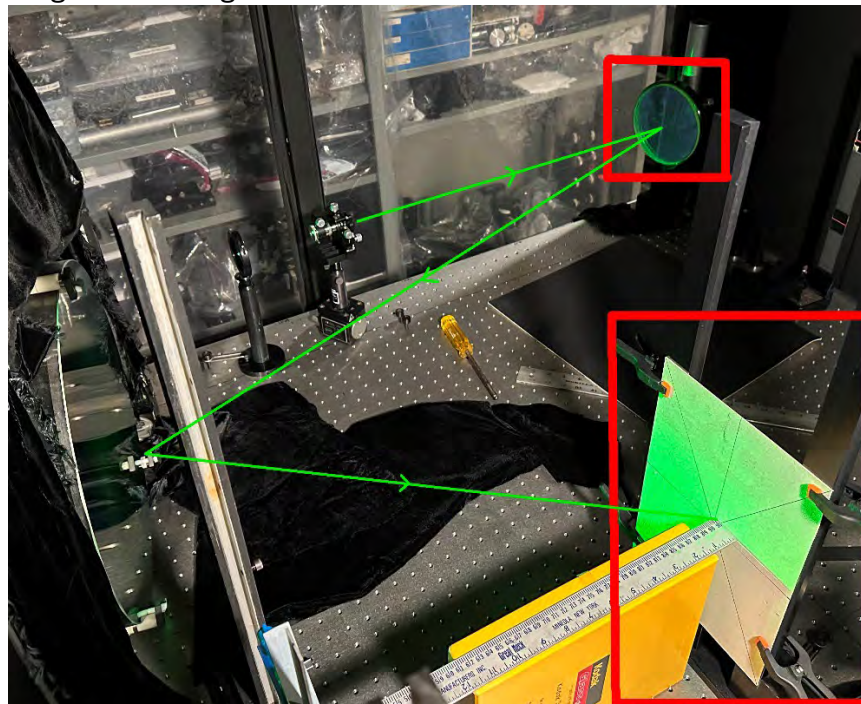
10:10am Arduino on

10:11am Win 7 OPSP Genesis controller on 23.44mw

- Put good 40X in OBSPF

12:18pm laser ambient 67.9F/32%H, Oasis is good

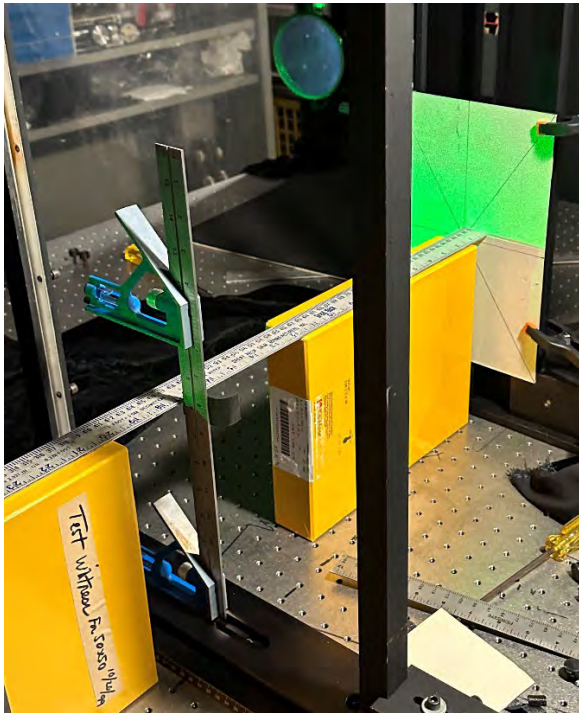
- Laser 24.39-25.88mw
- Yesterday, after swapping 4" RB bounce mirror for new 6" bounce mirror, adjusted H1PH to center of RB collimator (did not move 16" collimating mirror) & tightened down H1PH & clamped H1 cardboard to H1PH.
- RB to H1 angle is ~40 degrees.



H1 RB 6in bounce mirror & H1 setup cardboard, showing RB path

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- Going to use 18" DVD for H2 so LCD distance will be about 17.4" (44.19187cm).



Setting & checking OB H1 plane to projection screen plane distance.

- Needed smaller NRC lab jack so stored OPPH on floor under laser of 4x8' table in jumbo Ziplock bag.



OPPH labjack support arrangement & right front labjack top screw arrangement & breadboard attachment closeup.

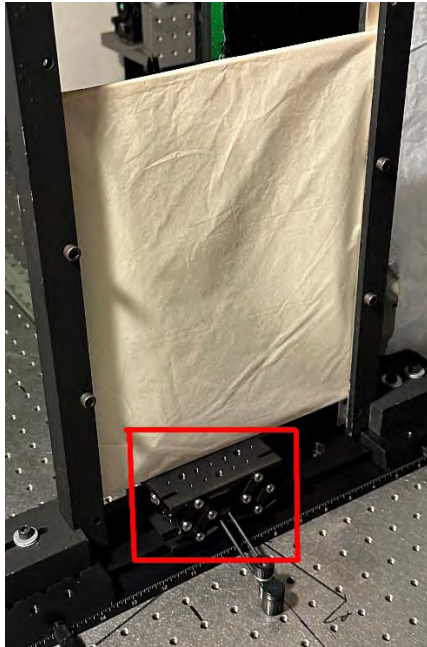
- Put Thorlabs breadboard under TMC table with other breadboards – it's in jumbo Ziplock bag.

Pg. 16: Mar. 13, 2024, Wang Project:

- Put LCD screen distance at $\sim 17 \frac{3}{8}$ " from H1PH.
- LCD size: $11 \frac{7}{8}$ " x ~ 7 "W.
- Image center height should be 8.5" from table surface (optical axis), $\frac{7}{8}=0.875$

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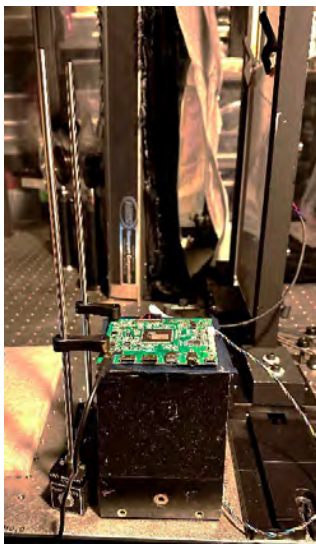
- $11\frac{7}{8}$ " (11.875")/2= 5.9375"
- 8.5" (optical axis)-5.9375" (image center on LCD)= 2.5625" (bottom LCD) from table surface (2 9/16)
- Using Thorlabs L200 labjack on center line of PRL to adjust height of LCD &/or ground glass screen.



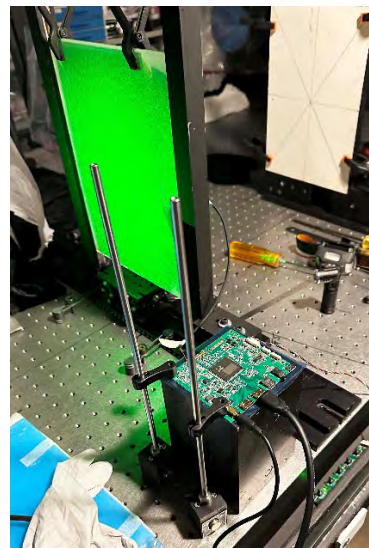
Thorlabs L200 labjack for vertical adjustment of projection screen.



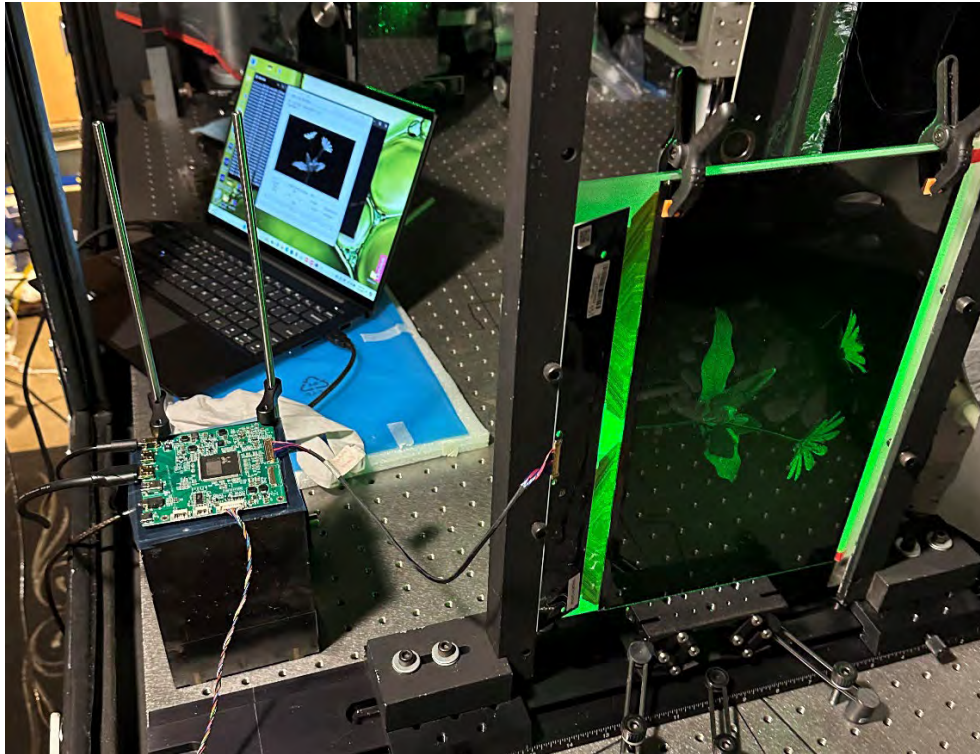
- Used Crown 5.5" epoxy block to mount LCD driver board & two Thorlabs PM4/M prism clamping arms on 1"x6mm thin posts w/ 4-40 setscrews w/ 4-40F/1/4-20M thread adapters (2 Thorlabs MSA25) screwed into NRC MMBs to hold LCD driver board (see photo).



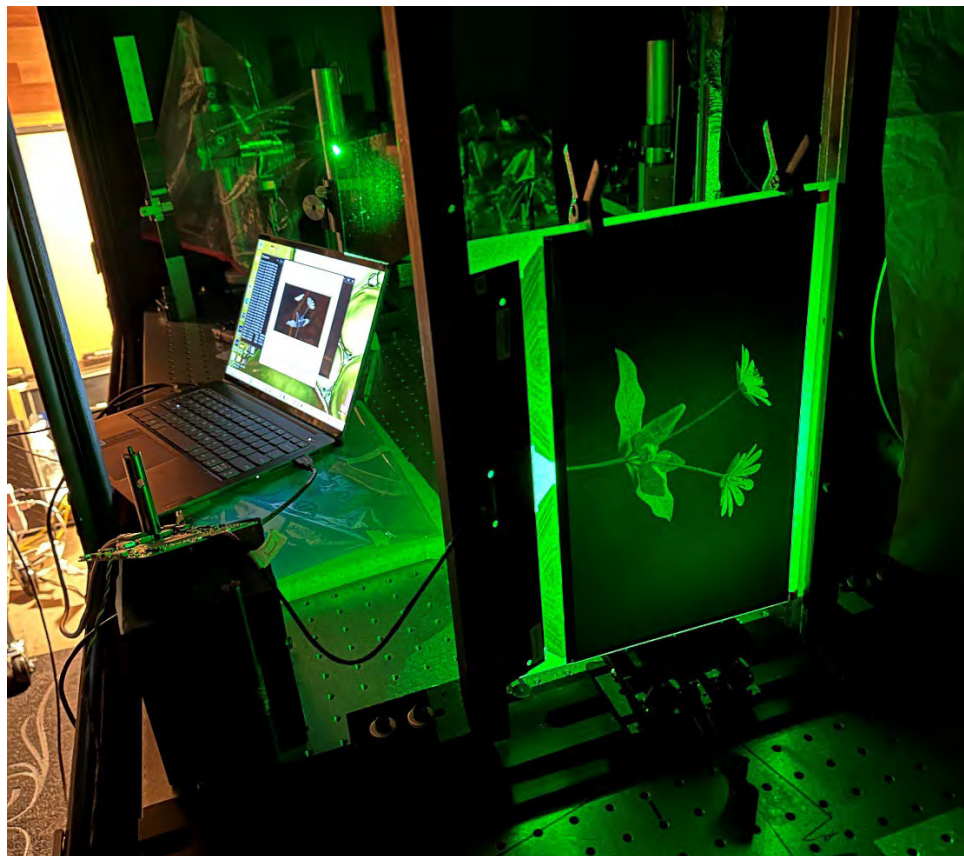
LCD driver board mount sideview



LCD driver board mount rear top view



LCD driver board mount front top view



Wang OB path lined up

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

10:47pm laser off
10:49pm Win 7 OPSSL laptop off, laser ambient 67.9F/34%H
10:57pm Oasis 150 ok & off
11:09pm Win 11 laptop & Arduino off

Pg. 17: Mar. 13, 2024, Wang Project:

- TO DO:
 - 1- Peel plastic protector off LCD
 - o Clamp all four corners of LCD (*wound up not doing – just used top two*)
 - 2- Set up light meter & adjust beam ratio
 - 3- Setup cards
 - o Make custom cards for 6” diameter mirror & 7.5x7.5” mirror (used iris instead)
- Black velvet & black construction paper
- Setup for 4x5 H1 test
- Thread HDMI under table edge
- Turn down studio heater

Mar. 14, 2024, Wang Project:

10:22am Arduino on, laser ambient 66.7F/32%H
10:23am Oasis 150 on 15C
10:25am Win 7 laptop on
10:26am win 11 laptop on
10:30am Oasis stable at 20C
10:31am power to laser pwr sply on - ~42” to green LED
10:33am pwr to laser on - ~11.5” to lasing
10:35am darkroom ambient 69F/30%H

- o Win 7 OPSSL on for Genesis 24.90-25.24mw

2:53pm laser ambient 67.8F/32%H, Oasis good
2:54pm raised Genesis to 300mw from 25mw

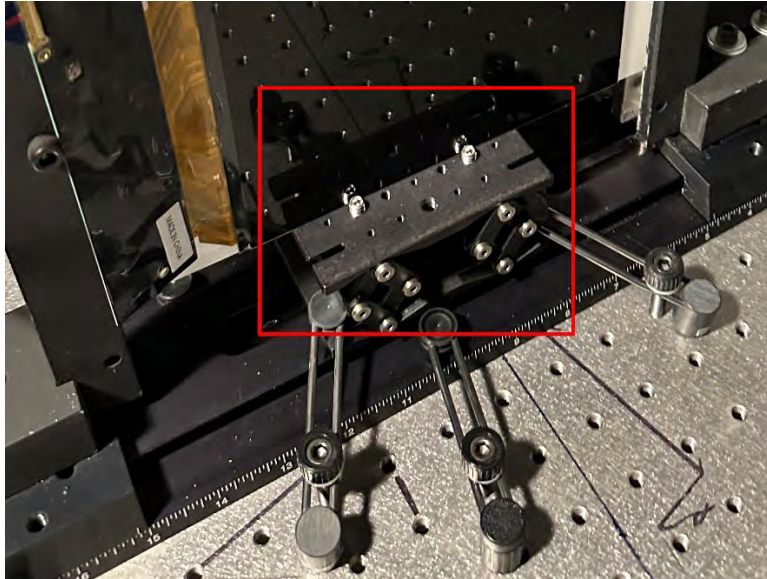
Pg. 18: random notes?

8.5+3=11.5 12x10
8.5-3= 5.5 5x10

Diagram for construction paper carding measurements & cutting

Pg. 19: Mar. 14, 2024, Wang Project:

- Took protective cover off both sides of LCD
- Used two ¼-20 setscrews in L200 lab jack to prevent bottom of LCD from slipping out off labjack.



Two setscrews on L200 labjack to hold LCD bottom against projection screen.

- Mostly masked LCD w/ black construction paper
- 11:44pm laser power off
11:48pm win 11 laptop off & Oasis ok & off
11:49pm win 7 laptop off
11:50pm laser ambient 66.2F/35%H
- LCD needs black tape since it has internal glow

Mar. 15, 2024, Wang Project:

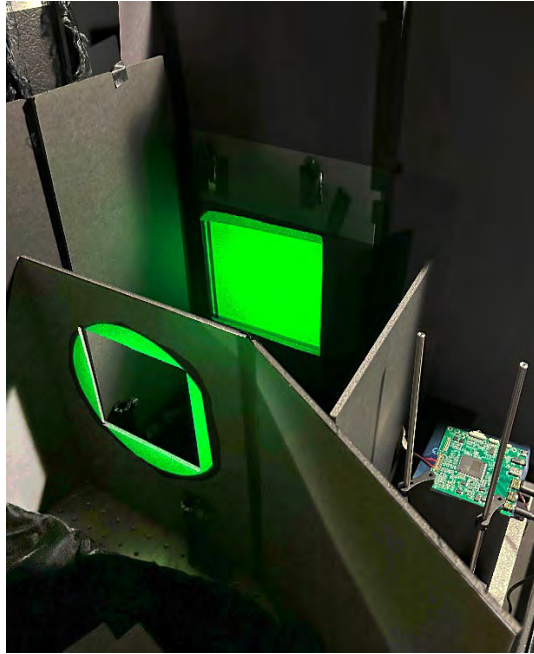
- 9:59am Oasis on, Win7 laptop on, Win 11 laptop on
11:13am laser on, laser ambient 66F/36%H
3:15pm Win 7 OPSEL laser controller on, Win 11 Arduino controller on
- Black type 235 tape on opal glass front & back & top & right-side edge of LCD for light blocking.



LCD with image & needing more masking at right & along bottom.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

- Everything is carded off & velvet laid.



Opal glass screen showing OB carding, velvet & masking from rear.

11:15pm laser at 200mw. Reading is about 20+nw OB to ~90nw RB. Need to boost power &/or reduce OB microscope objective to ~20X.

Pg. 20: Mar. 15, 2024, Wang Project:

11:31pm lowered laser power to 25mw

11:38pm Win 11 laptop off

- Need to use RB 6" bounce mirror to raise RB (center on large H1).

11:43pm laser off

11:46pm Arduino off

11:47pm Win 7 OPSL off, laser ambient 67.7F/37%H

11:48pm Oasis ok & off

Mar. 16, 2024, Wang Project:

9:55am Oasis 150 on 16C, steady after 2' @20C, laser ambient 66.9F/36%H

9:58am laser power on

9:59am lasing

10:02am Win 7 laptop & win 11 laptop on

11:40am Arduino power on

11:43am laser ambient 65.9F/38%H, win 11 SLM+ on & LCD on

- Changed OBSPF to 30X instead of 40X. Tried 20X but coverage of image too dim at edges. Surprisingly the 10um pinhole works better with this 30X than a 15um pinhole.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

LCD OB path walkthrough explanation for MW first tests with S & P polarization:

<https://youtu.be/GP2m7cwpDqk>

4:40pm almost ready to make a test exposure but 1st some notes – see next pg.

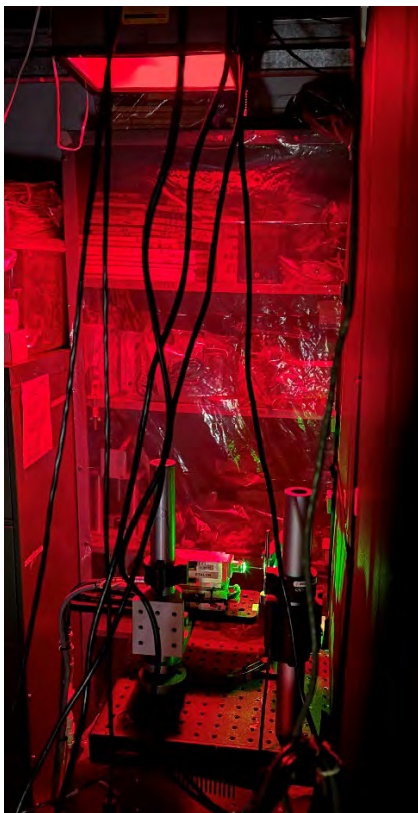
- Changed RB SPF to 60X w/ 5um pinhole – it's much more even.

Pg. 21: Mar. 16, 2024, Wang Project:

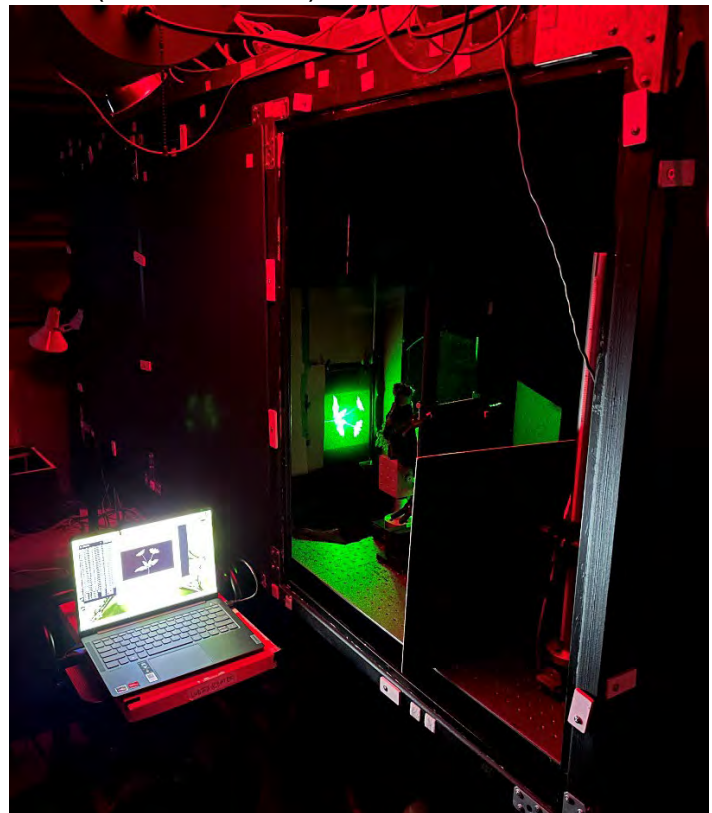
- Need black tape at top & bottom edges of opal/LCD
- Adjust H1 ratio to 7:1 – will give shorter exposure
- With laser at 500mw:
 - o OB: ~50-62nw
 - o RB: 2-2.6uw
- Need to setup 4x5PH for test
- The OB seems to stay the same –maybe pinhole? 360nw=.36uw=3.6ergs
- Replaced OBSPF 30X with 20X & 20um

New Readings:

- OB: 90-110nw
- RB: 650-800nw
 - o ~7.5-9 ergs, 2 minute exposure
- Swapped out green #3 safelights for #1A & #2 reds.
 - o One 8x10" 1A + one 10x12" 1A in laser studio
 - o One 10x12" #2 + two 5" rounds (one 1A & one 2)



Genesis laser in red safelight.



H1 setup in red safelight, LCD screen & laptop.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

8:25pm transferred 2/4x5" 8E56HD NAH plates to transfer boxes.

- First exposure will be w/ S-pol, second exposure will be w/ P-pol.
- Need to test ratio after moving HWP2 for P-pol.
- Exposures will be 2 minutes@.



Masked 4K LCD single frame image for 4x5in single exposure tests.

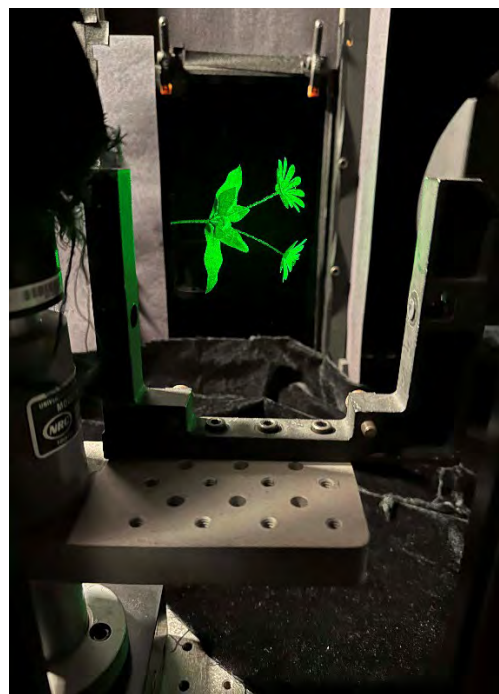
Pg. 22: Mar. 16, 2024, Wang Project:

9:02PM Plate in 76-01-2024, 4x5" 8E56HD NAH, S-pol, 10'+ settling, 120" (2') exposure, OB ~170nw RB ~750nw, LOT# 592301 Expiration 12/2000

- Since 4x5" is a few inches in front of main PH1, OB is hotter ~4.4:1



H2PH front for 4x5in single exposure test.



H2PH rear 4x5in towards LCD image screen.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

9:45pm Plate in **76-02-2024**, as above except **P-pol, 10'+ setting**.

10:01 pm opened Oasis sound proof cover

10:02pm laser ambient 65.8F/38%H

10:04pm turned down laser to 25mw from 500mw

- Forgot velvet on 6" bounce mirror rod

10:15pm laser off

10:17pm Win 7 laptop off

10:18pm Win 11 laptop, LCD & Arduino off

10:19pm Oasis OK & off

Mar. 17, 2024, Wang Project:

10:50am Win 11 laptop on for Chris P to update SLM+ software

11:41am Oasis on 15C

11:46am laser on

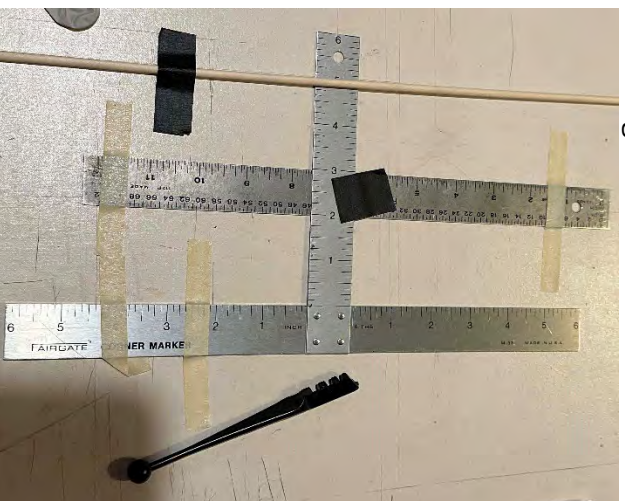
12:05pm tested SLM+ 1.09 for slit direction

Pg. 23, Mar. 17, 2024, Wang Project:

12:54pm laser ambient 66.7F/35%H

12:57pm dkrm ambient 68.9F/38%H

1:35pm cut both 4x5s from last night in half for dev tests



Cutting setup for exposed 76-01 & 76-02 4x5in plates in half.

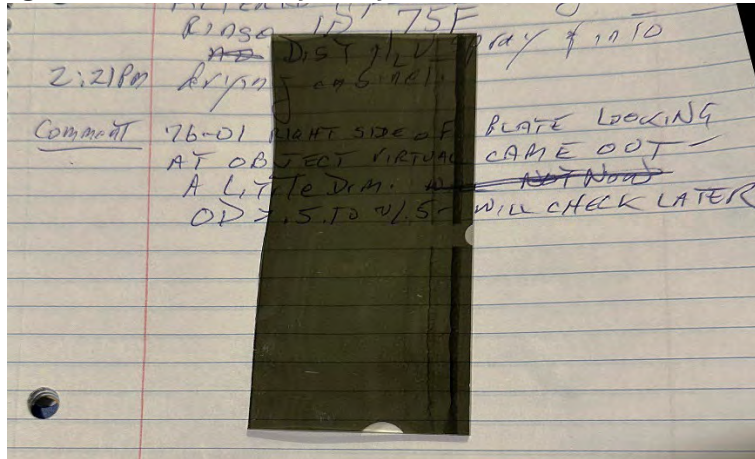
1/2 of 76-01 processed – very old D19 which is dark tobacco juice brown out of stoppered amber glass bottle of full to top. Was mixed & used once Jan 16, 2022 (so 2 years 2 months old). 4' dev @70F, very dilute Stop 30", dist H20 rinse 30", F24 fix 2' (fix mixed 12-23-21 & used once) & stored as D19 above. Filtered running H20 rinse 10' 75F, dist spray & 2:21 pm into drying cabinet.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Comment:

76-01 (s-pol) right side of plate looking at object virtual came out – a little dim. OD > .5 to ~1.5 – will check later.

Other 1/2 of 76-01 (s-pol) left side, processed 70F – tried BB ascorbic acid dev for 4' & nothing came up so plunked into D19 for 6' then stop 30" then dist rinse 30" then running H2O wash 10' then FeEDTA bleach – cleared in 15" +30" & then running H2O rinse 10' & E#1 (50/50) 5', E#2 (75/25) 4', E#3 (90/10) 3' & ES spray
4:08pm into drying cabinet – looks very noisy.



76-01 4x5in s-pol cut in half & processed.

Pg. 24: Mar. 17, 2024, Wang Project:

Processing for two halves of 76-02, both p-pol:

1st- Part A & B Nick's #5 for Agfa, Dev 5', dilute Stop 30", stop rinse 30", FeEDTA 45" + 30" (2/28/2020), running H2O (no time written down), no ethanol dry.
5:35pm into drying cabinet.

2nd- as above except dev 8', Bleach 50"clear+40"
5:50pm into drying cabinet.

Comment:

No image in either P-pol

Need to check LCD with polarizer & also both beams (see method described below)

Tested both vertical & horizontal polarization of LCD – it prefers vertical but likes something other than either. NO PHOTOS OR VIDEOS OF THIS

- Set polarizer at optimum power angle for LCD & reset collimator polarization to match by moving HWP2 into OB since it's OC (?).
- Method used was to put 840-C light meter on up high above H1 plateholder where I could see it from other side of table (RB side) & putting detector in H1PH position facing collimator.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

- Then took polarizer that had been rotated to angle for maximum LCD brightness and put in front of diverging beam from RBSPF so light meter detector could read the RB from collimator.
- Then slowly rotated new HWP (Edmund Optics multiorder HWP) in undiverged RB before it's entry into RBSPF until light meter gave maximum reading & then removed polarizer from in front of diverging RBSPF. This way, RB polarization now matched best polarization coming from LCD to H1PH.
- Reset laser to 600mw.
- OB ~210-240nw
- RB ~950-1000nw
 - Estimated 11-12 ergs/cm²

Pg. 25: Mar. 17, 2024, Wang Project:

8:01pm Plate in 77-01-2024, 4x5" 8E56HD NAH as before, 10' settling, 150" exposure.

- 70F dkrm ambient
- Old D19 dev -5.5', 2 step dist H2O tray rinse (vs. Stop), Fix 2.5', 70F running water 12', dist H2O spray & into drying cabinet.

Comment:

Looks like polarization tweak worked well. Nice even low noise bright clean image. There's surface noise on plate. Could be the NAH or projection of opal glass striations. Can't fix unless it's NAH plate issue by putting backing on it. (could also rearrange collimated RB at 34 degree angle to H1PH). (*didn't do any of this because H1 plates used had built in antihalation*)

Tomorrow – cut a 12x16" plate – they may have AH!

Mix fresh GP-61 & FNB, 1 liter each.

- Setup & run a master
- Setup laptop & cabling in darkroom.

11:01 laser turned down to 25mw from 600mw.

11:11pm laser, Arduino, & LCD off.

11:25pm Win 7 laptop, Oasis OK & off

11:31pm Win 11 laptop off

- For above LCD polarization tweak: the UO OC (optically contacted?) HWP (HWP2) was taken from RB & put into OB since it's the much hotter beam. The HWP put into RB side to match LCD polarization is an EO multi-order M-17.5-D- .500-B-532, R220740-11203. Probably cemented but seems to be working – **mount needs to be labeled.**

Pg. 26, taped in printout of available in-house Union Optic waveplates & PBS cubes for 532nm with UO stock numbers and prices.

Union Optic

532 OC half wave plates: WPZ2312-532-M25.4 (\$348 for four)
532 OC PBS cube: PBS1312-515-532 (\$90 for one)

532 OC half wave plate: WPZ4325-532-M30 (\$135 for one)
532 one air spaced zero order quartz waveplate for 532nm, 25.4mm diameter, 30mm mount: WPZ2425-532 (\$130 for one)

532 one polarization beamsplitter cube (PBS), 25.4mm per face, 532nm: PBS0125-515-532 (\$89.50)

532 One 12.7mm Polarization Beamsplitter Cube, 532nm, BK7, optically cemented: PBS0112-515-532 (\$90 for one)

532 one cemented true zero order quartz halfwave plate for 532nm, 25.4mm diameter, 30mm mount: WPF2225-532-M30 (\$135 for one)

UO list of in-house waveplates & PBSs with prices & SKUs.

Pg 27, Mar. 18, 2024, Wang Project:

10:03am Oasis 150 on 15C, laser studio ambient 62.7F/35%H

- Dkrm ambient 66.5F/39%H
- Turned up laser studio heater to take the edge off

10:15am laser lasing

10:17am Win7 & Win 11 laptops on

10:20am Win 7 OPAL on – laser @ 25mw

- Cleaned up 4x5 darkroom from last night
- **Advice from Peter Miller re squeegee w/ TEA.**
 - o **If using a “cut” plate (& any plate) make sure all dirt & glass chips are gone before TEA step.**
 - o **When squeegeeing a “cut” plate, have the “cut” edge at bottom of squeegee direction or squeegee blade will get damaged.**

9:23pm laser, win 7 & win 11 off

9:27pm Oasis ok & off

TO DO:

- Cut plates
- Mix GP-61, FNB concentrate, FeEDTA
- Tape on H1PH legs
- Remove 4x5 PH
- Test ethanol 1, 2, & 3
- ~~Take down TMC setup~~

Pg. 28: Mar. 19, 2024, Wang Project:

- Morning & afternoon
 - o Mixed fresh GP-61 dev 1 liter
 - Had to raise temp on stirrer to ~85F to get all to dissolve
 - o Mixed fresh FNB bleach concentrate
 - It's been stirring for at least an hour & ferric nitrate is still not dissolved.
 - Raised temp to 85F for a while but no change
 - Will leave it running – ran until 10pm & then poured into bottle – looked ok.

2:00pmish Win 11 on & Chris P updated to SLM+ 1.0.11

- Laser ambient 65.9F/33%H

3:23pm Oasis 150 on 15C

3:47pm laser on

9:35pm turned laser up to 200mw

- New FNB had still not completely dissolved.

10:55pm Win 11 Wi-Fi & notifications turned off & Arduino & LCD on

Mar. 20, 2024, Wang Project:

Same session continued

- Cut one 300x400mm in half – it worked well!

1:26am laser turned down to 25mw – too late to shoot tonight.

1:36am laser off

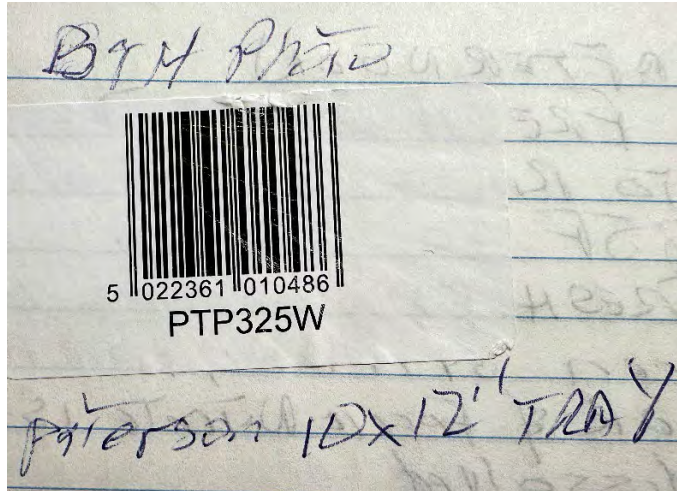
1:50am Oasis good & off, Win 7 & Win 11 off, Arduino off.

- **Marked slit base location**
- **Added tape/construction paper to slit front to block light from coming into plate edges.**

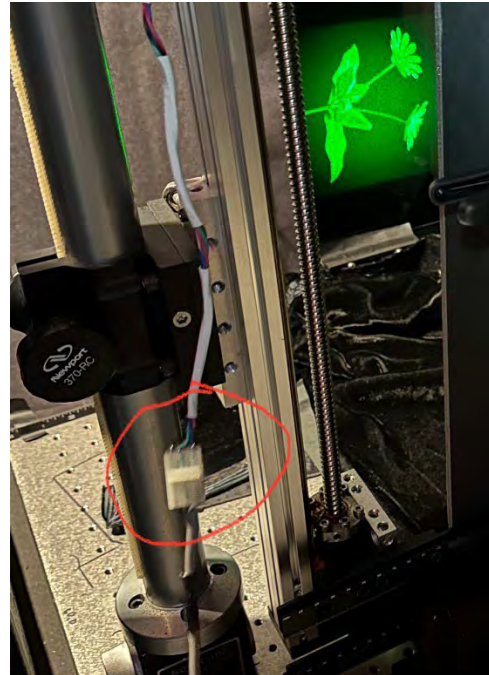
TO DO:

- Put doublestick tape (type 666) on H1PH
- Vacuum glass chips
- Reverse image sequence in SLM+
- Remove plate stops after loading H1PH (*comment May 13, 2025: For 80-01-2024, put DO5151PH plate stops at top because I thought they'd interfere with slit plate movement. The idea was to put top of plate against bottoms of plate stop edges to precisely position plate vertically on the double stick tape. After 80-01-2024, I realized that doing it that way might allow the plate to slip down during the multislit exposure sequence. I realized, more importantly, that the plate stops were only 3.28mm wide and therefore would not interfere with the free movement of the slit plate against the emulsion of the plate after all. Putting them on the bottom of the DO5151PH insures that the plate is level side to side and also insures that the plate is supported along the bottom edge of the plate.*)

Pg. 29: B&H Photo 10"x12" Paterson tray sticker:



Paterson darkroom tray 10x12in B&H sticker.



FUYU slit cable connector vulnerability.

Pg. 30: Mar. 20, 2024, Wang Project:

TO DO:

- Vacuum glass chips off cutting table
- Make sure no glass chips on plate

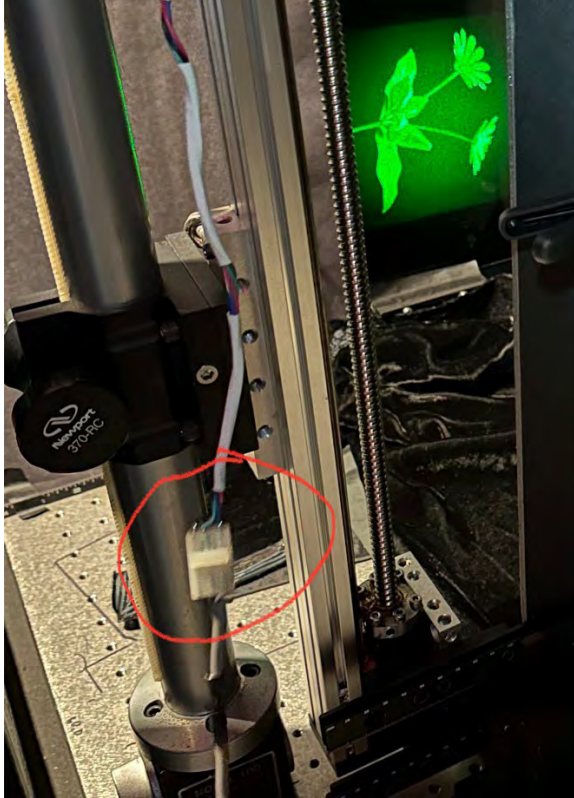
For darkroom:

- Test ethanol 1, 2, 2
- Clean new trays
- Maybe mix fresh FeEDTA bleach for H₂s? (NO) (which dev?)
- Set laser to 800mw
 - o Take readings
- Study direction of images with slit movement
- Setup laptop in darkroom (not done)
- **What about Win 7 laptop light blocking? (box? NO), Used large folding black foam core. (comment May 13, 2025: Have decided going forward to put laptop in darkroom as originally planned but not done until now. I was insecure about not seeing the laser go on for the first exposure (through "crack" in hood) and also wanted to hear the slit make the first move. Now, with the SLM+ software option to set an initial settling time separate from the slit sequence exposure settling time, I can do both).**

9:30am Oasis on 15C – Laser ambient 65.5F/32%H

- Win 11 laptop on & reconnected to wifi.

9:35am Win 7 laptop on



FUYU slit cable connector vulnerability. FUYU with attached light blocking with slit lowered to start height.

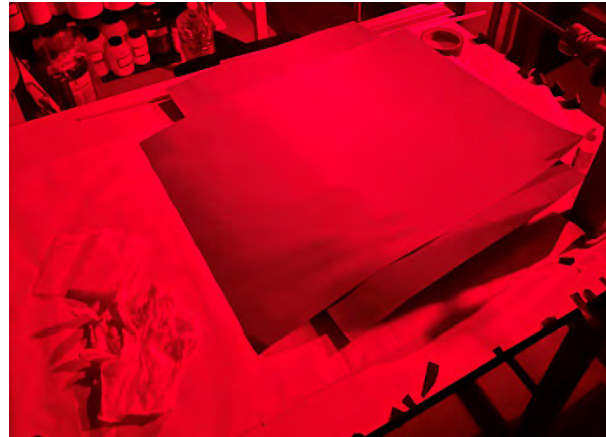


Plate cutting area with graph paper cutting grid & transfer box under construction paper.

10:18pm Plate in **80-01-2024, 8E56HD 200x300mm cut plate**

10:51pm started "Run sequence" – should be finished 5:07am

Pg. 32: Mar. 21, 2024, Wang Project:

~6:30am turned laser down from 800mw to 25mw

- Opened Oasis damper box – all normal

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

- Removed plate from H1PH doublestick & put into box after taking slit mechanism away.
 - o Slit mask was in final exposure position at top of plate.
- Plate definitely skewed slightly on plateholder but hadn't fallen off or unstuck from tape. See comment bottom of pg. 28 here.
- The SLM+ software said 0 at sequence.
- After taking laser down to 25mw, checked & baseplate was very slightly warm
- Will process plate later this morning.
- Going to presoak plate in distilled water for 2' before processing (*didn't do*)
- While checking setup before shutting laser off, noticed that I had left the RB blocked so no way the hologram can come out.

7:30am removed old doublestick tape from H1PH & took apart plateholder leg & fixed (due very slight wobble). An 8x10" glass plate now sits flush on the two legs.

- Put stops on bottom now which raises plate center.
- Realigned slit so it just starts at plate bottom – bottom edge of slit is now 3 5/8" (~92mm) from table surface.

Pg. 33: Mar. 21, 2024, Want Project:

Was going to use 8x10" 8E56HD but they are NAH so will try the second 300mmH x 200mmW plate instead again. 300mm H (11.811") x 200mm W (7.874") (1/8" less than 8").

- Plate center is now 9 9/16" vs 8.5".
- So 1 1/16" higher. $9/16=0.5625$ $1/16=0.0625$; $3.625-1.0625=2.5625$ WAS OLD bottom edge. (2 9/16")
- Plate stops are 3/8" high, ~1/8" or 0.1280" thick=3.28mm

9:40am laser ambient 65F/30%H

9:49am laser from 25mw to 300mw

- Cleaned glass chips as much as possible.

10:02am laser to 600mw

10:06am added a few ml of Koolance to Oasis 150 20C.

- Checked OBSPF & RBSPF – ok so far

10:15am Oasis 150 ok

10:16am laser to 800mw

10:23am checked OB & RB SPFs – look ok.



Doublestick tape applied to H1PH legs and plate stops (outlined in red) in better position.

Video: Moving slit plate back to start position after recording an H1 hologram master plate https://youtube.com/shorts/OkSDEJzke_o

11:02am plate in place 81-01-2024 & hood closed

Going to start sequence in ten minutes.

11:20am started 150 slit run sequence

- Heard slit move twice & saw laser turn on through crack in hood.

~5:55pm plate out.

Pg. 34: Mar. 21, 2024, Wang Project:

Same session continued:

7:20pm **just noticed that I left hood panel 8 off – shouldn't be a problem hopefully.**

- Laser ambient 60F/29%H

7:25pm darkroom ambient 66.2F/29%H (w/o dehumidifier on).

- Checked ethyl SPG – at 19C ambient
- #1 ~50/50, #2 ~75/25, #3 ~90+/10

Bottle #	Name on bottle	SPG	%E/H2O
1	Ethyl 50/50	.921-.922	~48%
2	Old Ethyl #1	.915	~50%
3	Ethyl 75/25	.880	~65%
4	Old Ethyl #2	.855	
5	Ethyl 90/10	.815	~90+%
6	Big bottle w/ post it	.835	~80%

- Checked 10x12” tray minimum volume – at least 1 liter

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Set up for Dev (GP-61 fresh), Stop, dist H2O rinse, Fix (F-24 old), 10' running filtered H2O + dist H2O spray, E#1, E#2, E#3, ES

9:39pm darkroom ambient 66.7F/30%H

Dev: 1'15", dilute stop: 30", dist H2O rinse: ~30", F-24 fix" ~2.5', filtered running water wash ~19C(~70F): not noted but probably 15', dist H2O spray, E#1: 5', E#2: 5', E#3: ~4.5', ES

10:45pm 81-01 into drying cabinet.

11:01pm laser ambient 60.5F/32%H

Laser good at 800mw & Oasis steady at 20C

*(COMMENT May 13, 2025 re **81-01-2024 H1** test: the 150 slit exposure image sequence was run backwards so H1 hologram image counter rotates and is inside out (pseudoscopic). Regardless, this test demonstrated good exposure/development and made a clean bright image and allowed me to check that projected image showed good focus depth).*



81-01-2024 H1 in ethanol tray.



Close-up of 2mm slit exposures of 81-01-2024 H1 integral master.

Video showing 81-01-2024 H1 counter rotation & good depth projected onto a white card:

https://youtube.com/shorts/_ZeTSw4-OcY

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Pg. 35: Mar. 21, 2024, Wang Project:

- Took doublestick tape off H1PH legs w/ fresh single edge razor blade & wiped down legs w/ 90+% ethyl to remove any residue.

Mar. 22, 2024, Wang Project:

1:42am plate in 82-01-2024, 8E56HD 200x300mm vertical (Oasis box closed)

1:52am started "Run Sequence", will be done 8:20am

- Possible issue upper right quadrant of plate due to imperfect contact with H1PH leg closest to collimator (stage right).
- This is one more thing I now always have to check is both H1PH leg alignment w/ 8x10" plate.
- Thought in the night – the doublestick tape need to run the full length of the plate on both H1PH legs.

10:55am removed 82-01-2024 from H1PH.

11:05am darkroom ambient 68.3F/31%H

- Cleaning up darkroom in preparation for processing 82-01 plate.

12:45pm 82-01 into drying cabinet.

Dev: 1', dilute stop: 30", dist H2O rinse: 30", F24 fix: 2.5', running H2O wash: 15', dist H2O spray, E#1: 5.5', E#2: 5', E#3: 4+', ES



Darkroom & workshop just after processing 82-01-2024 H1 integral master plate.

Comment:

Looks good in "flashlight test" & more even. *(Comment May 13, 2025: this was the first good master of the series of 12 images and was the H1 used for the final H2 achromat).*

Video of laser viewable 82-01-2024 H1: https://youtube.com/shorts/Yp133_eQRNk

Pg. 36: Mar. 22, 2024: Wang Project:

Same session continued:

- w/o laser look, maybe a few misses but more even.

2:02pm laser ambient 63.7F/27%H

- removed doublestick tape & ES clean H1PH legs.
- **Make sure to always use a fresh razor blade for this.**

5:18pm turned laser studio heater on – getting really cold.

- Starting to set up for transfer attempt on TMC with red Cobolt laser.
- Have to change process table safelights back to green

6:20pm turned Genesis down to 25mw from 800mw

6:25pm Cobolt on

- Need to put 20um pinhole back in H2 RBSPF.

6:33pm Genesis off

6:35pm Win 7 laptop & Oasis 150 ok & both off.

6:37pm win 11 laptop off & Arduino off.

- Cleaned darkroom trays etc.

Pg. 37: Mar. 23, 2024, Wang Project: 1st Stellaria H2 Test

3:10am **Plate in 83-01-2024, 8x10” 8E75HD NAH, laser at ~500mw, 660nm, Stellaria**

- OB: ~4-10uw
- RB: ~48-100uw
- Total: ~52-110uw = 520-1100 ergs, 5” exposure

Going to expose but not process

- Image somewhat larger & closer to plate than would be in green laser light.
- Even though ratio seems high, the brightness areas are still very obvious.
- **Diverging RB instead of collimated ~10-12’.**
- Interbeam angle is ~70 degrees w/ RB ~20 degrees to plane of plate so higher ratio than normal may be ok (due increased reflectivity off plate surface).
- Won’t process tonight.
- Furnace on so will wait until it goes off to expose.
- Left plate in box on table (TMC).

3:26am Cobolt turned off.

- Darkroom ambient 68F/38%H
- Laser ambient 63.8F/33%H

11:40am setup darkroom for H2 process.

- Mixed FNB 4:1 for bleach (4 parts dist H2O: 1 part FNB concentrate).

12:17pm darkroom amb 70F/38%H

Dev GP-61: 55”, dilute stop: 30”, dist H2O rinse: 30”, F24fix: 2’55”, running H2O wash: 15’, dist H2O spray, FNB: 2’40”+1’20”, running H2O wash: 17+”, dist H2O spry, E#1: 5.5’, E#2: 5.5’, E#3: 4.5’, ES, into drying cabinet.

Pg. 38: Mar. 23, 2024, Wang Project:

Need for Wang visit:

- Box for hologram (Kodak & red plastic plated edge protectors & white cotton gloves)
- Light stand w/ holo holder
- Light stand w/ light
- Tape measure
- Digital protractor
- 2 black foam core & plastic clamp & maybe 3rd stand

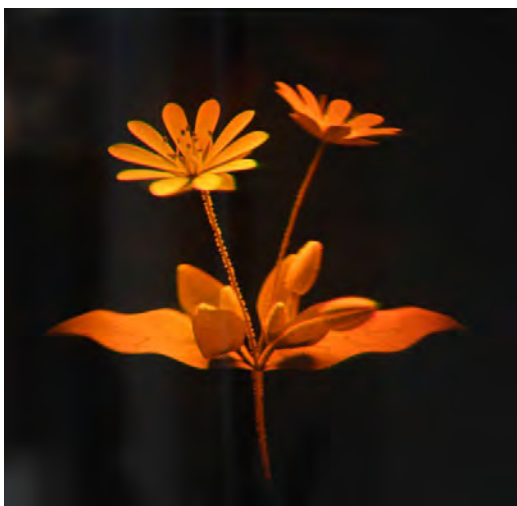
Mar. 24, 2024, visit to Michael Wang (MW), Nyack studio, to show first H2 white light proof, *Stellaria*, (no notes from this date in lab notebook):



Stellaria shot from iPhone in full daylight, full plate.



Shot by MW, Nikon Z7 & 100mm lens & black background, full plate.



Stellaria shot by MW, Nikon Z7, reddish.



Stellaria shot by MW, Nikon Z7, greenish leaves.

Video, Michael Wang's studio: <https://youtube.com/shorts/TG3TLYc5rNI>

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Pg. 39: Mar. 25, 2024, Wang Project:

All went well with MW. Loved hologram.

7:37pm Oasis 150 on 13C

- Win 7 laptop on & OPSL on

7:42pm laser power supply on

7:44pm laser lasing ~25mw

- Win 11 laptop on & Arduino & LCD

9:45pm laser to 500mw

10:30pm laser to 800mw

- Change to a letter image (?) & did 180 horizontal flip
- Set slit move to "-2.00mm"
- Settle 60000ms, shutter 90000ms
- Initial settle 99999ms



Reject order of 666 tape from ULINE due dirt on tape side. They replaced NC (not in Notes).

Can LCD be cleaned with isopropyl? Check emails from Jatrick!!!

- Adjusted far H1PH leg to be more "True" – glass plate lying very flat. – 666 tape extended ~1/2" beyond top of plate.

11:48pm plate in 85-01-2024, 8E56HD cut to 200x300mm, Alopecurus

- Oasis box closed

11:54PM went back in – forgot to adjust slit velvet at bottom -added 5' to settle time.

12:00am 150 exposure sequence started

Pg. 40: Mar. 26, 2024, Wang Project:

12:55pm dkrom amb 67.3F/33%H

- Laser & chiller OK

~1:08pm 85-01 removed from H1PH

- Slit looked ok. Some small "bits" on H1 - thought I had cleaned it completely with small brush.

~2:15pm 85-01 into drying cabinet. Looks good with "flashlight" test.

Dev: 1', & all the rest wash same as previous H1 – wash was 16'.

TO DO:

Need to cut two new masters.

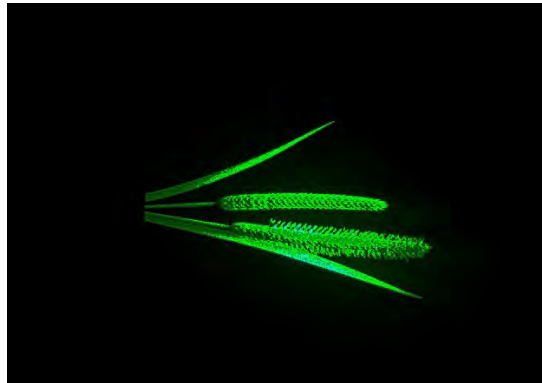
Need to check ethanol SPGs.

Need to remove tape from H1PH.

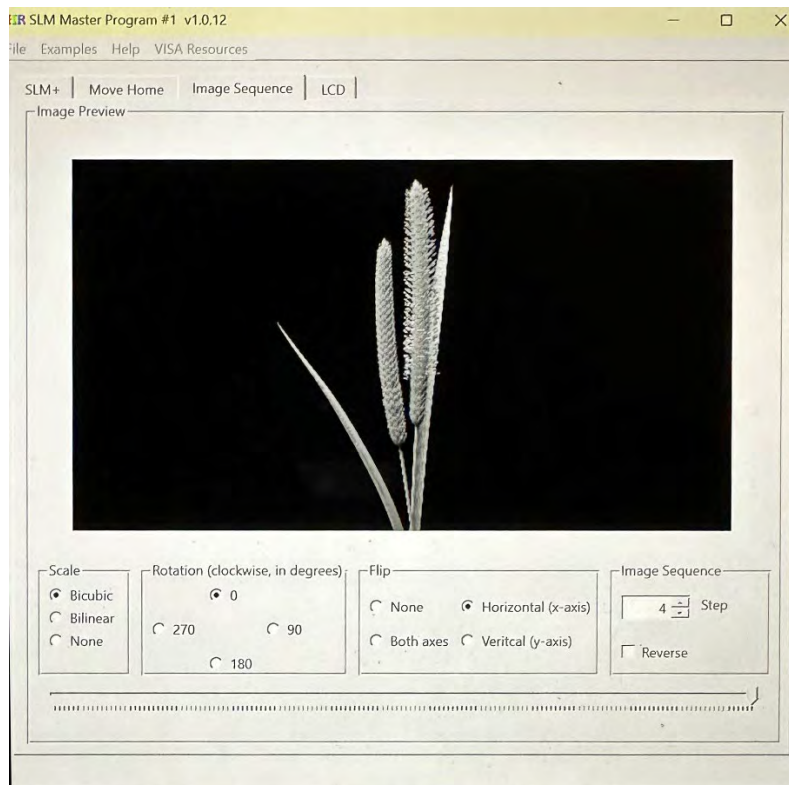
- Just realized that I forgot to put the velvet on the table behind the plate.
- Came out nice & clean
 - o Alopecurus



Alopecurus frame on LCD.



Alopecurus photo of H1 image.



Alopecurus in SLM+ software v12, Image Sequence tab, showing settings.

Video of Alopecurus H1: <https://youtube.com/shorts/qGbrcrw8oYs>

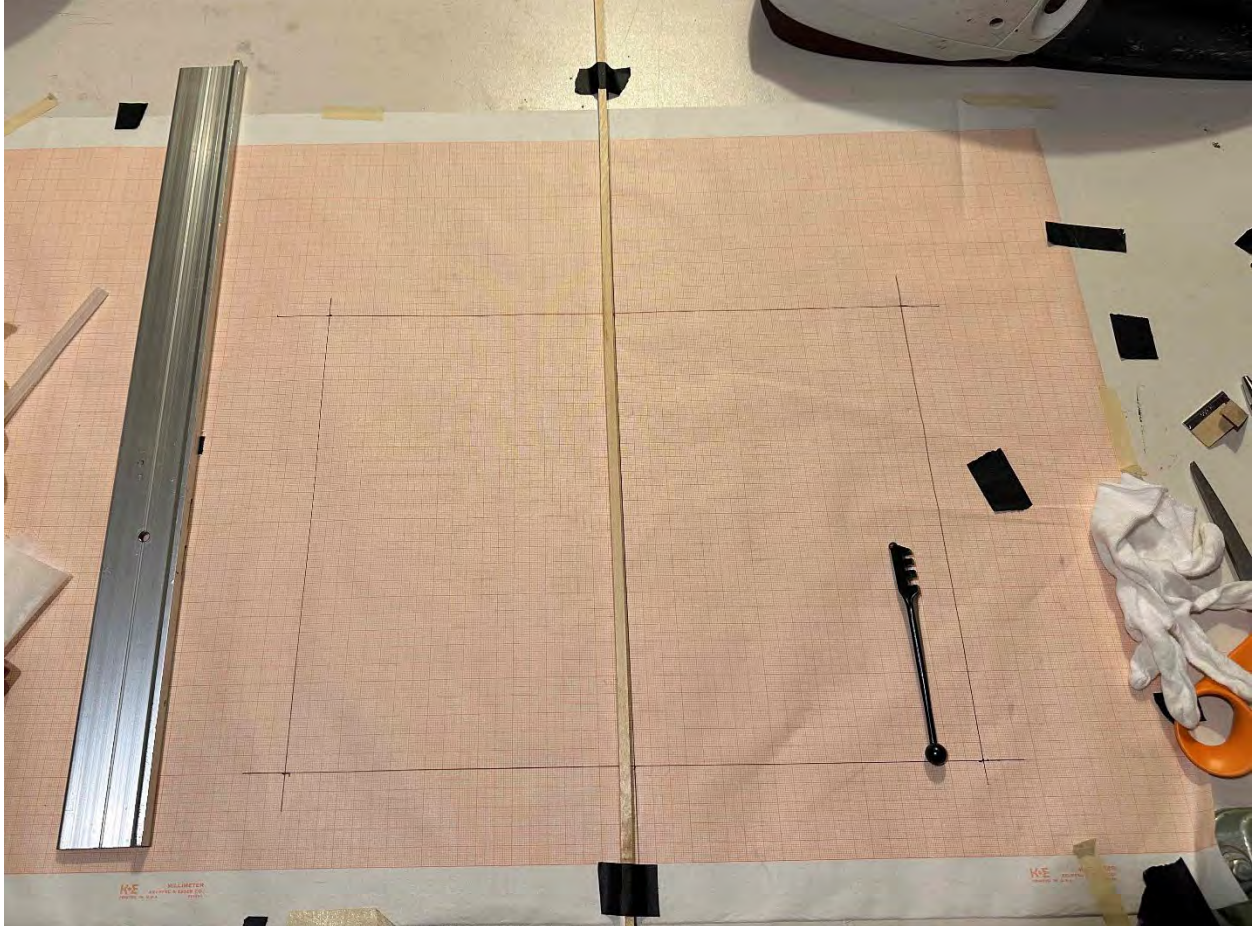
Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

4:03pm turned laser to 850mw – we'll see

Laser ambient 61.9F/38%H

- Going to cut new master plate

4:38pm plate successfully cut.



H1 master plate cutting graph paper set up.

9:19pm laser ambient 61.4F/35%H

- Dkrm 65.2F/38%H

10:15pm vacuumed glass chips from cutting plate

Pg. 41: Wang Project H1 Checklist:

New item: Turn Furnace temperature down to 54F at 3 thermostats & :Hold” & turn “Heat” to OFF.

- Laser power
- Chiller temperature
- Image sequence direction (counterclockwise)
- Slit repositioned
 - o Velvet stretched out in front but not covering image screen velvet
- Velvet behind H1PH

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

- SPFs ok
- No obstructions in beams
- All hood panels closed
- Safelights on
- Glass chips off H1
- H1PH legs “true” & tight & cleaned w/ 100% alcohol
- Doublestick tape evenly applied to H1PH legs
 - o Tape liner removed
- Slit in position against plate
- Slit at correct start position viewed through plate
 - o No removeable dirt or chips on plate

In SLM+ software:

- MOVE HOME tab
 - o Shutter closed
 - o X disabled
- Image Sequence Tab
 - o Correct sequence
 - o Correct direction of rotation
 - o Flipped 180 degrees horizontal
 - o Correct number of steps (4) for 150 slits
- SLM tab
 - o # of sequence steps correct (150)
 - o Shutter enabled
 - o FUYU & X enabled
 - o Settling & exposure times correct

Pg. 42: Mar. 26, 2024, Wang Project:

- Image sequence chosen
 - o This image brighter than previous
- Slit repositioned, Tape applied, SPFs checked, Hood closed



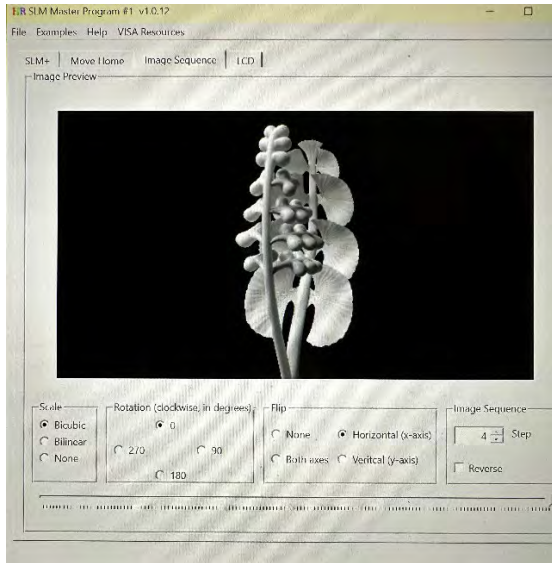
FUYU stage slit & H1 light blocking method.



H1 slit side.



2 light blocking fabric layers.



Botrychium in SLM+ software v12, Image Sequence tab, showing settings.



Botrychium image frame on LCD.

11:08pm Plate in 86-01-2024, 8E56HD 200x300mm, Botrychium

There's a mark on the plate that won't come off, laser at 850mw.

11:35pm 150 slit sequence started – should be done by 5:50pm

Mar. 27, 2024, Wang Project:

1:26pm going to remove 86-01 from H1PH

- Dkrm ambient 66.8F/40%H

1:40pm plate removed & put into Archival Methods 2" ONYX portfolio box, 9.25 x 12.25" – perfect for this 200x300mm plate.

- Masters now being stored in another of these boxes also.
- Emails, texts & phone calls w. Ira, Michael W about mirrors & BB plates & Mike M about possible plate pickup UK by MW.

4:20pm SPG of E#1 (~49%) ~.919; E#2 (~80%) ~.841; E#3 (90+%) ~.812; ambient 20.1C

- At some point soon, will have to open old 5 gallon metal can to transfer some 99+% Ethanol – did it for two bottles fresh, ~.795 >95%.

Pg. 43: Mar. 27, 2024, Wang Project:

5:11pm chems ready, dkrm ambient 68.9F/37%H

Process 86-01: GP-61 Dev: ~52" and the rest as before.

5:53pm 86-01 into drying cabinet

- Looks good

6:53pm laser studio ambient 63.2F/37%H

- Tape removed from H1PH legs & legs wiped w/ ethanol
- 86-01 looks a little hazy compared to previous & definitely noisy compared to them.
- Going back down to 800mw

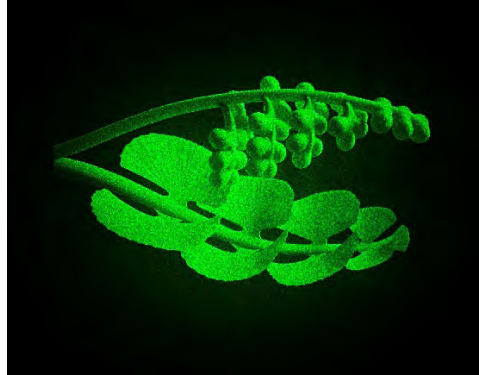
8:30pm mixing fresh GP-61

- Took one hour

9:40pm lowered slit to 92mm

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

- Sequence to lower slit is 90+90+90+28 in MOVE HOME tab
- 10:46pm tape liner removed from H1PH legs
- Laser ambient 61.7F/42%H
 - Put wrong plate in but at least caught it before starting!



Botrychium H1 master.

Video of 86-01 Botrychium H1 integral master: <https://youtube.com/shorts/QAmnY0klePg>

11:27pm Plate in 87-01-2024, CLADIUM, 8E56HD 200x300mm cut plate

11:47pm 150 slit sequence started

Pg. 44: Mar. 27, 2024, Wang Project:

156 seconds x 150 exposures = 23,400" +99" = 390 minutes= 6.5 hours

- 11:47pm - 11:49pm actual start, at midnight ~660"

Pg. 45: Mar. 28, 2024, Wang Project:

11:00am removed 87-01 from H1PH & put in ONYX box.

- After testing pH of F-24 (>4.5) decided to dump it & mix fresh liter.
- Fixed MiniMag lite w/ red filter by exchanging corroded end of red one w/ black one. Ordered a new one just in case.
- Fresh GP-61 & F-24 fix (~pH 6) for 87-01



Fresh GP-61 developer.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Processing trays for MW H1 masters, video: <https://youtube.com/shorts/qHWxqsRzpYQ>

3:20pm dkrm ambient 69.4F/47%H

3:40pm start process 87-01

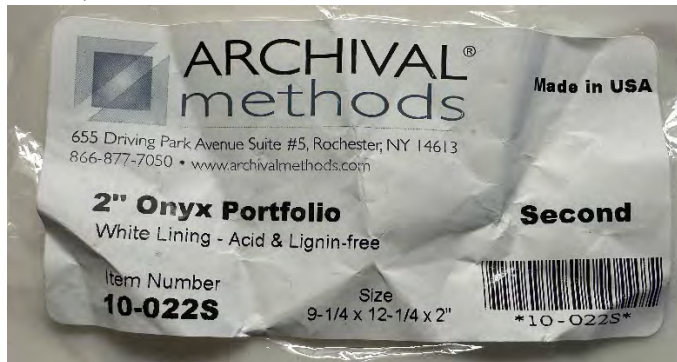
- In “flashlight” test, looks good except some serious sequential misses for 1st time. Don’t know why – suspect furnace.
- Can calculate pretty much exact time & for how long based on location & start time.
- May still be useable.
- Topped off dist H2O spray & ethanol spray.

Dev: 55”, Stop: 35”, dist rinse: 30”, fix: 2’ 15”, running wash: 16’, dist spray, E#1: 5/30”, E#2: 5’, E#3: 4.5’, ES

4:15pm 87-01 into drying cabinet.

- Need to lower furnace temp to 55F to prevent it rom going off during exposures.

Pg. 46: random notes, Archival Methods 2” ONYX Portfolio sticker



Archival Methods Onyx box for MW 200x300mm H1 masters.

Pg. 47: Mar. 28, 2024, Wang Project:

Going to cut five 300x400mm 8E56HD plates for ten 200x300mm masters & store in a 3rd ONYX box in film/plate cabinet.

6:25pm dkrm dehumidifier back on, dkrm ambient 67.2F/48%H

6:28pm tape removed from H1PH legs & legs ethanol wiped.

6:34pm laser ambient 64.8F/40%H

- Opened shutter & blocked OB
- 87-01 looks beautiful except for misses.

Video of Cladium H1: <https://youtube.com/shorts/tcpSQcu8A8Q>

87-01 misses:

Sequence #123 at 5.33 hours (27 from end) is miss

Sequence # 117 (33 from end) is miss

38-42 from end are misses (5.07 hours)

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Sequence #112-108 are misses (4.40.8 hours) ~ 4:30am

Make sure to take Cladium OB/RB readings to get ratio

- Emptied two holo studio plate cabinet cubbies that had old 5 gallon H2O boxes of made holos to have place to store new cut masters & transfer boxes.

9:30pm setup to cut 6/300x400mm 8E56HD plates in half to make 12/200x300mm H1s.

- 4 of 6 were well cut & the other two are useable.
- Finished 10:35pm – 12/200x300mm stored w/ edge guards in Onyx boxes.

Pg. 48: Mar. 28, 2024, Wang Project:

- Take Cladium OB/RB ratio.

Mar.29, 2024, Wang Project:

1:01am Plate in 89-01-2024, 200x300mm 8E56HD, NARTHECIUM

- Was going to do LUZULA but it only has 488 images & sequence gaps.
- Turned all house thermostats down to 55 w/ HOLD & turned off “Heat” button to try to prevent furnace from turning on.
- Added brace to top of H1PH in case the misses at top are vibration related.



H1PH views showing front, rear, and velvet covered new stabilizing top brace.

- Slit connector needs firming up – blue wire was sparking when I was positioning it. Tested & seems ok now.

1:30am 150 slit exposure sequence started.

2:00pm downloaded new version of LUZULA from MW via WET TRANSFER

- Needs to be installed on Win 11

3:40pm plate 89-01 removed from H1PH. All still going OK – laser, chiller, slit.

3:50pm dkrm ambient 67.1F/40%H

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Dev: 50", Stop: 30", stop rinse: 30", F24: 2'15", H20wash (~67.5F): 16', dist spray, E#1: 5.5', E#2: ~5', E#3: ~5', ES.

5:00pm 89-01 into drying cabinet.

- Ethanol SPG: 19.8C ambient, E#1: .925 ~45%, E#2: .862 ~72%, E#3: .820 ~88%

Pg. 49: Mar. 29, 2024, Wang Project:

89-01 looks fairly even overall in "flashlight" test.

Narthecium H1 master video: <https://youtube.com/shorts/b44J3-PMZ5Q>

6:48pm laser ambient 62.8F/38%H

- Removed tape & ethanoled H1PH legs.
- Lowered slit to 92mm above table
- Going back to 1' develop instead of 50"
- Looks like additional bracing at top of H1PH legs and/or furnace turn down helped.

7:35pm applied doublestick tape to H1PH legs.

- Trays and funnels cleaned.

8:35pm turned off all thermostats

8:37pm laser ambient 59.9F/43%H, dkrm ambient 67.9F/41%H

9:07pm Plate in 89-02-2024, 200x300mm cut 8E56HD, LUZULA

- Slit positioned – tiny bit of schmutz on bottom left emulsion – hopefully won't get dragged along by slit.
- Hood closed up

9:46pm 150 slit exposure sequence started.

Pg. 50: Mar. 30, 2024, Wang Project:

10:59am plate 89-02 removed from H1PH.

- Laser & Oasis running ok, laser ambient 62.1F/36%H, dkrm ambient 67.8F/37%H

11:08am setup to process 89-02

Dev: ~1'2", Stop: 30", stop rinse: ~30", fix: 2'20", running wash (~68F): ~16', dist spray, E#1: ~5.5', E#2: ~5'10", E#3: ~5', ES

11:52am 89-02 into drying cabinet

- Topped off all three E# with fresh from can before processing.
- There are two sets of ~4-5 misses.
- The exposures are even so it's not the amount of laser light.
- The exposures are in sequence so the slit is moving correctly.
- The furnace thermostats were all off & turned down to 54F.
 - o Possibly furnace went on anyway
 - o Possible studio heater went on – turn it down more!
- Possible laser went multimode
- Possible some other source of vibration.
- Win 11 Wi-Fi is off so shouldn't be any software interruptions.

Pg. 51: Mar. 30, 2024, Wang Project:

Sam G says he doesn't think it's likely that laser is multimoding.

- Turned studio heater thermostat all the way down.

2:45pm removed tape from H1PH & ethanoled legs.

Video showing tape & residue removal: https://youtube.com/shorts/Upy_s15OSg0

Video object beam blocking & 1st eval of Luzula: <https://youtube.com/shorts/s2QEgtms984>

Video second eval of slit miss clusters: <https://youtube.com/shorts/mojxCOrJvMA>

LUZULA:

OB: 200-240nm

RB: 1.00-1.30 μ s ~5:1

1200-1540nm over 90" exposure

108,000-138,600 ergs/cm²

HESPEROCODON:

OB: 250-320nm

RB: 1.30-1.90 μ s ~5-6:1

1580-2220

68.35" 62" so make it 65-70", 65"

5:18pm doublestick taped H1PH legs

- Reset SLM+ shutter open time to 65000 from 90000.

5:27pm dkrm tray & funnels cleaned

Ethyl SPG 20.3C ambient: E#1: ~.912 (~51%), E#2: ~.850 (~75%), E#3: .811-12 (~92%)

10:17pm dkrm 67.2F/57%H

10:18pm Oasis box closed, dehumidifier off, laser ambient 60.0F/41%H

10:40pm Plate in 90-01-2024, 200x300mm cut 8E56HD, HESPEROCODON, (see OB/RB above)

- Slit positioned & velvet behind H1PH & Hood closed.

Pg. 52: random notes, re H1/H2 FOV calculations REVISIT

Calculate FOV

8x10" H2 vertical

12x16" H1 horizontal

Long side= 400mm

Included angle=90 degrees

Short side= 200mm

Find angles & hypotenuse

I can draw it out & figure it out geometrically

Side=127mm

included angle=3.430 (or 34) degrees

other side=447.2mm

with 400mm H1 & 254mm (10") H2

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

FOV easiest quick way: H1 size, two string, H2 size. Use a ruler or draft paper on cork board with pins & bring to focus after H2 & use protractor to read angle – if using MUX footage, use 3 frames per degree X angle w/protractor – gives total frames for that FOV. Divide 400mm X # of frames to get best slit width. (See pgs 54 & 56 for more)

Pg. 53: Mar. 30, 2024, Wang Project:

CONTINUED FROM PG 51:

Before putting plate 90-01 in H1PH:

- Firmed up far (closest to collimator) H1PH leg
- Turned off sound on desktop in office above
- Removed a half dozen glass chips (looking at plate in safelight – all are on glass side except one).
- Turned furnace thermostats down to 45F & turned all 3 to “off”.

11:14pm 150 exposure slit sequence started, 5.4583 hrs, (5 hrs 27.5 minutes), should be over 4:41am.

11:35pm multiple jets have been going overhead in landing pattern for JFK – don't think it's been the problem since times of groups of 4 misses have been much later, e.g., between 2-5am.

- Plate, plateholder, & slit are about as solid as I can make them.
 - o Only things I haven't turned off are refrigerator upstairs and hot water heater in studio adjacent furnace room.
- **Should have checked back of slit plate.**

Pg. 54: random notes, continuation of Pg. 52 H1.H2 FOV calculation discussion

REVISIT

The objective is to have the most real & sharp looking image for a given plate size calculation.

Continuing FOV Calculation:

- The current available slit widths are 1, 2, 3.2, & 6mm.
- Slit width needs to match as closely as possible available mm in H1.
- H2RB needs to be best interbeam angle that can get through gap between H1 & H2.
- Once a good compromise is reached between FOV angle & slit width, then need to figure best H2RB angle based on that.
- Which will give more real & deep image? Collimated or diverging H2RB?
- Diverging will be cleanest but may not have most depth of field (DOF) in achromat.
- See if I can make AutoSketch model &/or Excel model.
- **After this notebook was finished, realized that Brewsters Angle (~34 degrees angle to plane of H2) will be necessary to avoid “woodgrain” when exposing NAH plates. This is actually good since it will allow H2 to be closer to H1 if desired. Another interesting insight is that exposing an H2 in 660nm (red), using a Brewsters Angle H2RB, from an H1 made at 532nm (green), will give a 42 degree white light playback angle to H2 normal.**
- **Additional insight is that. For an integral hologram, there are actually two FOV calculations that need to be considered – 1) is the FOV of an image sequence,**

and the other 2), is the optically projected window formed by the projection of H1 from H2.

Pg. 55: Mar. 31, 2024 (Easter), Wang Project:

11:28am Getting ready to remove plate from H1PH

11:44am setup darkroom for processing , dkrm ambient 68F/39%H

12:34pm 90-01 into drying cabinet.

- Looks in the “flashlight” test like it may be the best yet in terms of low noise & misses.
- Did the glass chip removal before putting into the H1PH in bright safelight & was thorough unlike before so going to do this going forward.
- Aldo the “thunk” test on H1PH legs after applying doublestick tape but before removing liner so I could loosen & tighten suspicious H1PH legs.

8:30pm remove tape from H1PH legs.

- Ethanoled H1PH legs.

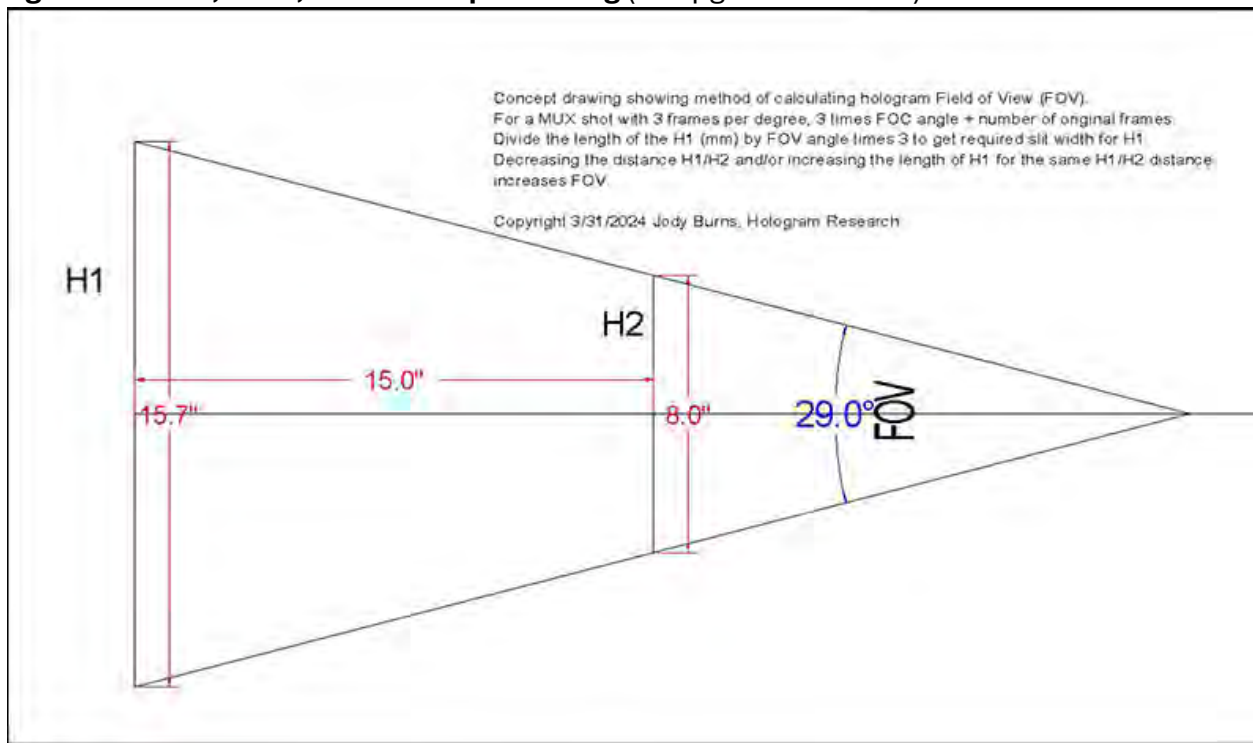
8:31pm laser ambient 62,8F/40%H

- Repositioned slit to 92mm above table surface.

8:42pm 90-01 very clean & even & NO MISSES!

Video of Hesperocodon H1 evaluation: <https://youtube.com/shorts/GtKltzzjw4>

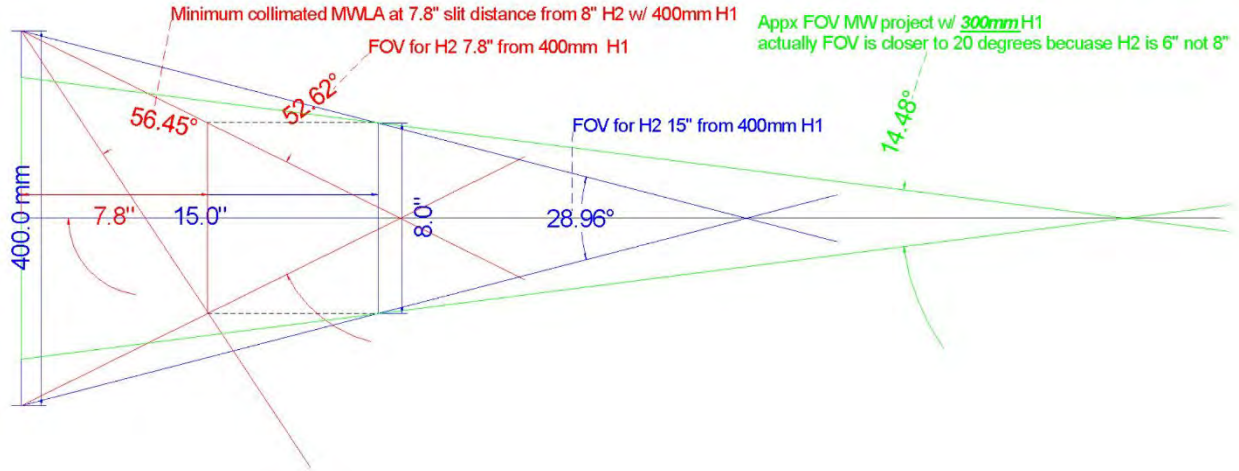
Pg. 56: Mar. 31, 2024, FOV concept drawing (see pgs 52 & 54 also)



Not true FOV. True FOV is the projected image of H1 from H2. That is, the opposite side from drawing above. There is also a MUX FOV which is the number of degrees imaged in H1.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

That can be very different from the FOV window provided by looking through projection of H1 from H2.



Not in Notebook but done right after above. Brewsters Angle...

Pg. 57: Mar. 31, 2024, Wang Project:

9:50pm applied fresh doublestick to H1PH legs & checked with "thunk" test.

10:20pm Plate in 91-01-2024, 200x300mm cut 8E56HD, HYPERICUM. Velvet behind H1PH

OB: 180-220nw

OB: 170-208nw

RB: 1.63-1.93uw ~8.77-9:1

RB: 1.12-1.36uw 6.5:1

1290-1568

83.7" 88" using 85" exposure time

11:05pm 150 exposure slit sequence started.

Apr. 1, 2024, Wang Project:

3:09pm darkrm ambient 64.8F/48&H

- Darkrm dehumidifier turned on

3:18pm 91-01 removed from H1PH, laser ambient 62.5F/38%H

4:20pm getting ready to process, dkrm air temp ~66-68F but chem temps around 62.5F.

- May wait a little longer for them to warm up

5:57pm waited for darkroom to warm up a little - air temp ~68F, dev temp ~66F.

Pg. 58: Apr. 1, 2024, Wang Project:

6:45pm After processing, dkrm ambient ~71F

Ethyl SPG: E#1: ~.915(~50%), E#2: ~.855 (~75%)

Dev: 60", Stop: 35", stop rinse: 30", fix: 2'20", running H2O wash: ~16+', dist spray, E#1:

~5.5', E#2: ~5.5', E#3: ~5', ES



Hypericum H1 slit master in 90% ethanol to 10% water bath.

6:40pm 91-01 into drying cabinet.

- In “flashlight” test, looks clean with no misses.

7:40pm removed tape from H1PH& ethanoled H1PH legs.

- Checked flush face of face of 2mm slit & looks unblemished.
- Previously checked inside ONYX transfer box for glass chips with flashlight & magnifier – there were none.
- Laser power steady via OPSP on Win 7 laptop.

7:49pm laser ambient 63.4F/40%H

7:55pm 91-01 HYPERICUM looks good in laser light, low noise, very clean & no apparent misses.

Video of Hypericum H1 evaluation: https://youtube.com/shorts/apSh_ab3qXQ

OPHRYS

OB: 140-166nw

OB: 141-165nw

OB: 140-164nw

RB: 1.10-1.39uw

RB: 760-880nw

RB: 800nw-1.04uw

1100-1370

901-1045

940-1201

7.86:1-8.373:1

5.4:1- 5.3:1

5.7:1 – 6.34:1 THIS ONE

Pg. 59: Apr. 1, 2024, Wang Project:

10:04pm Plate in 92-01-2024, 200x300mm cut 8E56HD, OPHYRYS

- Cleaned extensive glass chips in safelight.
- Going to be 114” per exposure, 7.5 hours – hopefully the last of the long ones.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

- I could easily up laser to 950mw but its been steady for days now at 800mw so why mess with it...
 - o After this project, I'll try higher power.

10:29pm 150 exposure slit sequence started.

Apr. 2, 2024, Wang Project:

3:25pm ONYX master storage box checked for glass chips – OK.

3:35pm 92-01 removed from H1PH, laser ambient 63.2F/40%H, darkroom ambient 68.1F/41%H, dehumidifier turned on. According to IR spot thermometer, more like 65-66F & metal says 66.4F.

4:42pm 92-01 OPHRYS into drying cabinet – looks good in “flashlight” test.

4:52pm removed tape & ethanoled H1PH legs.

10:30pm OPHRYS looks good, no apparent misses.

Video of Ophrys H1 evaluation: https://youtube.com/shorts/uJ3jY_MW64s

Pg. 60: Apr. 2, 2024, Wang Project:

HELLEBORUS

OB: 465-541nw

OB: 471-540nw

RB: 2.1-2.9uw

RB: 2.4-3.16uw

2565-3441, 4.5:1- 5.3:1

2871-3700, 5:1- 5.8:1 THIS ONE 37” exposure

11:35pm **had to rewire slit stepper motor connector!**

Apr. 3, 2024, Wang Project:

12:06am Plate in 94-01-2024, 200x300mm cut 8E56HD, HELLEBORUS

12:35am 150 exposure slit sequence started.

12:55am furnace kicked on in spite of my turning heat down to 45F & heat “off”!

3:00pm 94-01 out of H1PH.

- Had Apple watch on - usually take off 1st...

5:20pm dkrm ambient 73F/35%H, chem temp ~65F

~5:30pm Dev: 1/, Stop: 30”, stop rinse: 30”, fix: 2’15”, running H2O wash: ~15’,

E#1(~.915,~49%): ~5’5”, E#2 (~.850, ~75%): ~5’5”, E#3 (~.810, 90+%): ~5’, ES

6:10pm 94-01 HELLEBORUS into drying cabinet – looks good in “flashlight” test.

Pg. 61: Apr. 3, 2024, Wang Project:

6:30pm tape removed & ethanoled H1PH legs

6:36pm laser ambient 65F/40%H

- Reset slit to 92mm position

6:37pm checked win 7 OPSL – laser power good, checked OASIS 150 @ 20C & tank coolant – all good.

HELLEBORUS 94-01 looks good in laser light.

Video of Helleborus H1 evaluation: <https://youtube.com/shorts/6Jz8ltCkHek>

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

8:45pm darkroom trays & funnels cleaned.

GENISTA

OB: 690-808nw

RB: 4.18-4.76uw

4870-5568

6.06:1 – 5.89:1

22.17” – 24.8” 23” exposure time

10:33pm Plate in 94-02-2024, 200x300mm cut 8E56HD, GENISTA, velvet in, hood close.

11:04pm 150 exposure slit sequence started.

11:12pm uhoh – thunder & lightning. This will be a challenge to the system.

Apr. 4, 2024 Wang Project:

12:20am Extremely windy – maybe should have made sure garbage can outside studio was lying down...

12:25am power went out first time – see APPENDIX 1 text exchange below with Chris P.

8:33am Oasis 150 turned on 13C

8:40am turned power on to laser pwr sply

- Turned win 7 laptop on & OPAL – it automatically had 25mw as start output.

8:44am started laser & laser lasing, laser ambient ~65F

8:45am turned on Arduino, Win 11 laptop had gone to “sleep” which means we lost power again after I had shut all else down & then gone to bed last night.

- It retained settings from GINESTA run sequence but MOVE TAB wouldn’t move slit.

9:21am POWER OFF AGAIN

Genesis™ MX Series OEM Laser Operator's Manual

Utility Requirements Before installing the system, confirm the availability of the following utility requirements.

Table 2-2. Utility Requirements, Dimensions and Weights

PARAMETER	VALUE	
	High Current (MTM)	Low Current (STM)
ELECTRICAL		
Operating Voltage	100–240V _{AC}	24V±10%V _{DC}
Frequency (Hz)	50 to 60	
Power Consumption (W)	300–600	250–300
Maximum Current	8A @ 120V 4A @ 220V	10A
CE Mark ^a		
High Current OEM Power Supply	EN 55011 EN 61326 EN 60825 ^c EN 61010	
Benchtop Power Supply		
Low Current STM Power Supply	EN 55011 EN 61326 EN 60825 ^c EN 61010	
DIMENSIONS		
Laser Head ^d (L x W x H)	121 x 44 x 65 mm (4.76 x 1.73 x 2.54 in.)	
Power Supply (L x W x H)		
High Current OEM Power Supply	290 x 210 x 90 mm (11.42 x 8.27 x 3.54 in.)	
Benchtop Power Supply	361 x 229 x 160 mm (14.22 x 9.01 x 6.29 in.)	
Low Current Controller	270 x 127 x 78 mm (10.63 x 5 x 3.07 in.) ^e	
Cables (laser head to controller) ^f	3.05 m (10.0 ft) (10 ft) (6 ft)	1.83 m (6 ft)

^a Requires user supplied 24V_{DC} external power supply. COSEL PBA300F-24 recommended. See http://www.cosel.co.jp/en/products/pdf/SPE_PBA300-1500.pdf for requirements.
^b The laser head is not CE certified.
^c Not all OEM systems are fully EN 60825 compliant.
^d Back connector not included in laser head length dimension.
^e Dimension given for controller only. For dimensions for the external power supply see http://www.cosel.co.jp/en/products/pdf/SPE_PBA300-1500.pdf under the 300F Series.
^f Standard lengths. Cable lengths depend on maximum current.

SECTION 2

SPECIFICATIONS

Coolant Operating Temperature Range:	10 to +45 °C
Set Point Range:	10 to +45 °C
Control Accuracy:	± 0.2 °C
Coolant Type:	25% Propylene Glycol and Water recommended to prevent bacterial growth and minimizing pump noise. (Note: propylene glycol is non-toxic). SCS Recommends Koolance LQ-202CLB coolant. Ethylene Glycol and Water mixtures are also acceptable. Note: Methanol, Ethanol, and Isopropyl Alcohol may not be used as coolants either by themselves or in water mixtures; use of these coolants voids the Oasis warranty.
Nominal Cooling Capacity:	150 Watts @ 20 °C in a 20 °C ambient (See Figure 1 for chart).
Operating Voltage:	12VDC, 8 amps max
Optional AC/DC Power Supply:	100 watt, 12 VDC; 85-265 VAC input
Safety Certifications:	CE/NRTL (ETL)
Safety Certifications:	EN 61010-1: 2 nd Edition UL 61010-1: 2008 CAN/CSA 61010-1: 2008
Coolant Pump:	500ml/min brushless DC magnetically driven gear (See Figure 2 for chart)
Maximum Coolant Outlet Pressure:	25 psig (1.72 bar)
System Proof Pressure:	50 psig (3.36 bar)
Coolant Fluid Connections:	1/8" Coldler quick disconnect with shut-off valves
Tank Volume:	75 ml
Noise:	~56dB with 25% propylene glycol/water
Dimensions:	7.5" x 5" x 7" (L x W x H, plus fittings)
Weight:	6.5 lbs. (3 kg.)

This Unit Serial Number:

Genesis laser power requirements.

Oasis 150 chiller power requirements.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

See Red Lab Notebook, start date Apr. 6, 2024, May 22-25, for new holo studio backup UPS power setup (pgs. 14-21).

1:22pm POWER BACK ON AGAIN
4:30pm Oasis on, laser on, all systems GO!
5:07pm laser ambient 64F/42%H
5:13pm laser up to 800mw
9:40pm all thermostats turned down to 45F & heat “off”
9:45pm laser ambient 61.2F/46%H, Oasis good, laser good, oasis lid closed.

Pg. 63: Apr. 4, 2024, Wang Project:

GENISTA (again)

OB: 670-780nw

RB: 3.6-4.73uw

4270-5510

5.37:1- 6.06:1 25” exposure time

10:23pm tape liner removed from H1PH

10:40pm plate in 95-02-2024, 200x300mm cut 8E56HD, GENISTA, (should be 95-01 – check actual plate!), 25” exposure times, 91” cycle time, 2 hrs. 47.5 minutes.

11:05pm 150 exposure slit sequence started. Finished ~ 2:52am.

Pg. 63: Apr. 5, 2024 Wang Project:

12:25am outside garage light went on (due timer needs to be reset after power outages).
~2:20-2:30am fire sirens going off in town for ~ ten minutes.

Question for Chris P: is there a time stamp for events?

2:03pm 95-02 removed from H1PH, laser ambient 63.2F/39%H

5:01pm darkroom ambient 68F/38%H, chem temp 66-67F

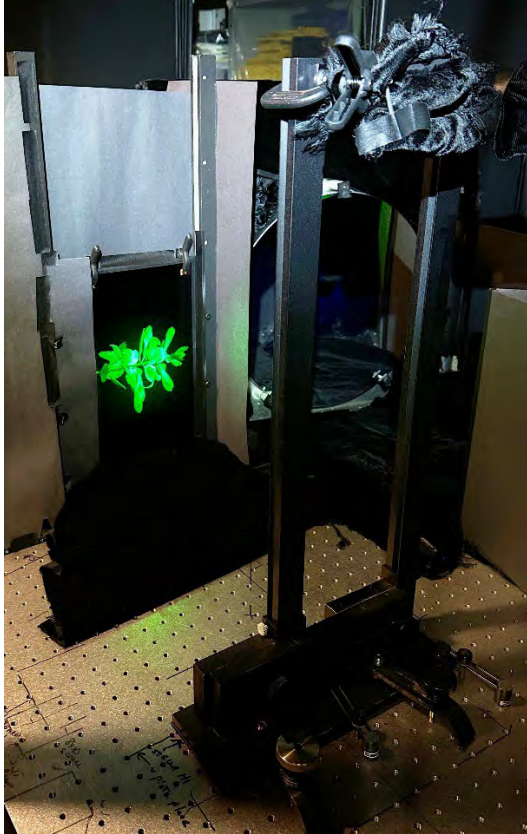
Dev: 1’, Stop: 30”, stop rinse, Fix: 2’20”, running H2O wash: 16’, dist spray, E#1: 5.5’, E#2: 5’, E#3: 5.5’, ES

- Looks good in “flashlight” test.

After this plate mix fresh GP-61 developer.

Pg. 64: random notes, FOR CHRIS:

- Larger type in SLM+ GUI, especially entries
- Ability to move “X” slit in MOVE TAB 100s rather than 10s
- Time stamp for events
- Randon closure of shutter when it shows as on in MOVE TAB
- Profile new LCD



Genista LCD image in H1 setup.



Genista LCD image closeup.

Video of Genista H1 evaluation: <https://youtube.com/shorts/KIFU3LnQWkc>

Pg. 65: Apr. 5, 2024, Wang Project (LAST PAGE OF THIS NOTEBOOK):

5:57pm 95-02 GENISTA into drying cabinet.

6:35pm removed tape from H1PH legs & ethanoled them.

6:40pm laser ambient 60.7F/44%H

9:30pm dkrm trays & funnels cleaned

9:37pm laser ambient 60.1F/43%H

HOTTONIA

OB: 800-925nw

RB: 3.6-4.81uw

4400-5735

4.5:1 – 5.2:1

OB: 825-930nw

RB: 4.22-5.25uw

5045-6180

5.11:1 – 5.64:1 (21.4”-22.3”) 22” exposure time

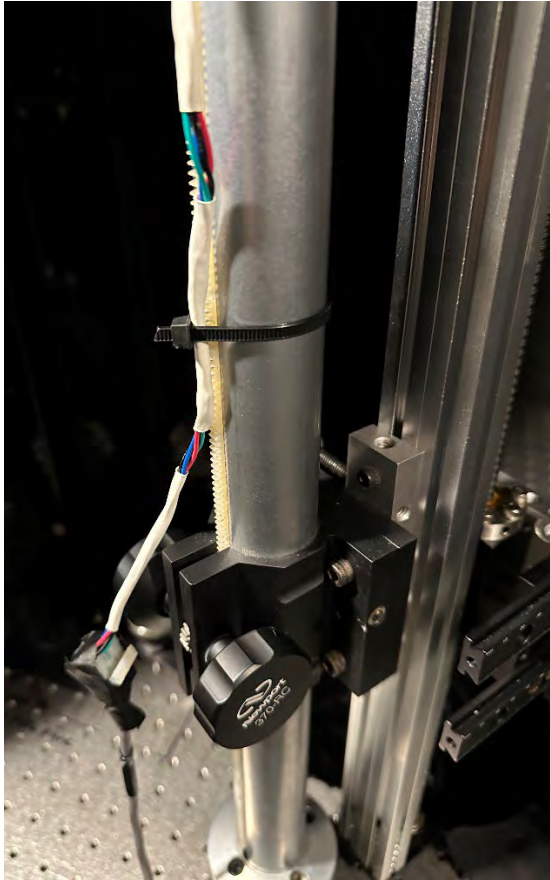
10:45pm Plate in 96-01-2024, 200x300mm cut 8E56HD, HOTTONIA, 22” exposure time.

- Turned off outside garage light switch so timer doesn't turn it on at 12:25am – fix tomorrow. 3 hours 40 minutes sequence run time.

11:10pm 150 exposure slit sequence started. Should be done ~ 2:50am – too late then to begin another one.

Apr. 6, 2024, Wang Project:

Just noticed that the outside garage light is on anyway so the switch I turned off must have been for something else.



Zip tie on FUYU Arduino cable.



Hottonia H1 LCD image.

Video of Hottonia H1 evaluation: <https://youtube.com/shorts/AmdpwbQhtEA>

10:20pm Fresh mixed GP-61 still stirring & cloudy – topped off to 1000ml H₂O.

APPENDIX 1: April 4th- 8th, 2024 text sequence with Chris P re: power outage:

(added note: A complete backup UPS system, able to provide six hours of uninterrupted power to the complete hologram recording studio for both tables including lasers, chillers, laptops and the Arduino driver system was added in May 22-25, 2024).

J: An interesting experiment. Lost power at exposure 58 (of 150). I think laser etc. safely shut down and I shut down everything else so it can't proceed. The laptop with software controller and the image files are still active but have a pause button which I pushed. If the power comes back on before the laptop runs out of juice, should be ok to continue with maybe one miss. More tomorrow 😬😂.

The power came back on briefly and I heard the slit move which implies that it tried to expose but no laser power and LCD was in red off mode. I then pushed pause in your software and made sure everything else was off.

The power just came back on

C: Oh no! I'm glad the power came back on but it sounds like it might be a miss for a couple of frames there with the LCD being in red off mode.

J: The LCD had turned back on to green but not a problem since software is still on "pause" (button says "resume"). Think I'll leave it until tomorrow morning and try to continue. Nothing to lose.

I think it was only one step since I was in the studio when the power came back on and then I heard the slit move once and hit the pause button. So use the Move tab to back up one slit and start from there. It'll take awhile for laser/chiller etc to stabilize and then simply continue. Nothing to lose since one third of plate is already exposed. It was a gamble that I took to run at all tonight. A calculated risk. I don't usually take the plate off the table for at least 5-12 hours after it's done exposing anyway. The key thing is not to inadvertently open the shutter. The spatial filters have been surprisingly stable which is one of the reasons I prefer these Newport 910 and especially 910A units over all others so no reason to open the hood. A new and different test of system stability...

Think about this - the system has been running nonstop for a week with no tweaks at all to anything except the first halfwave plate to change the beam ratio between images. I dutifully check both spatial filters each time to make sure that they're still tuned in and solid as the proverbial rock.

C: That's great to hear - so meticulous! The move tab to step back 1 frame sounds good. I don't have a 'step back' intentionally programmed for the image sequence but that might be something to add/check it sounds like for when there is a power failure/mishap.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

J: Suspect it'll have to be reshot from scratch but worth a try to continue since the whole run is the shortest so far (3 hrs 47 minutes) do about 2hrs 15min left.

That's assuming that there's no damage to anything especially the laser. Sam G says it's fine for the laser to be shut off at full power. Because the chiller was keeping it cool, it wasn't hot anyway. We'll see 😬 😊.

I guess this is an argument for knowing exactly which image is being exposed each time in the log and on the screen.

This project is a great "shakedown cruise" for the system. Another thing I was thinking is to increase the type size in the software. So it's easier to see.

C: Those sound like good adjustments to the software. I can prioritize those for an update by tomorrow (before the next run) if that works?

J: No rush!!! It's easy enough to see normally as is. However, when I go down to start sequence in the dark (even with safelight), I find myself squinting to doublecheck all the settings. While it would be desirable to run the laptop from the darkroom instead of the laser studio (and it's designed for that) I realize that, because the positioning of the slit is so manual for each new plate, that I don't feel confident leaving until the first cycle is complete and I've heard the slit move the first time. Of course, I could start the run sequence and then go into the studio. It would effectively be the same and it would be easier to see the laptop. I would hold off on making any cosmetic changes for now. The image sequence monitoring is definitely functional though but still no rush since this particular cycle is "water under the bridge" 😂. Going to bed. Suddenly very tired 😬 😊

C: Ok Jody sounds good and will do 😊 👍 I'm gonna get some shut eye myself. Talk soon!

J: One very good thing you built in was the sequence number so we know where it stopped! It was fortunate that I was down there to hear the slit move even though there had been no exposure so I know to be able to "rewind" it 2mm. If I use the move tab to make that happen, will it cause the sequence in the SLM tab to change or are they completely unrelated? Ok - really going to bed now 😊

C: The move tab is of course the manual control, so "stepping back" with that will leave the image sequence unchanged. I think i disabled the image sequencing slider during a run to prevent any unintended mishaps, but will confirm tomorrow 😬 👍

J: Hi Chris, let me know when you're compos mentis. No rush 😊. Just checked in with Michael after his query wondering how all is going. Here's what I said:

"Power came back on last night. Just fired up the chiller & laser and they're working.

Hoping to restart Ginesta at sequence 58 of 150 where it stopped but may not be possible.

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

I may have to restart the controller software and will lose the run sequence info. Checking with Chris Portales. If not, only one lost plate 😊. Will keep you posted. Won't be until this afternoon anyway once everyone in the house settles down 😊."

Last night when power went out, I turned off the Arduino master switch, LCD, laser power supply, & chiller in case of surges. The laptop had gone to sleep which it's only set to do when running on battery so power must have failed again after I went to sleep last night. Your SLM software was still up when I woke up the software and retained settings from when I pressed Pause. When I turned the Arduino back on, it dinged in the laptop but the Move tab won't move the slit. I infer from that that I may have to restart the SLM software. If so, I assume, there's no way to resume where it left off in terms of image in the sequence, correct? As I mentioned to Michael, it's only one plate lost which is not a big deal compared to what could have been lost 😬😭.

C: Morning Jody, compos mentis here I believe 😊 yes, if the move tab isnt operating the slit then the connection / communication was lost with the arduino and the software will have to be restarted. However, there should still be a way to continue where it left off i think. After restarting the software, and moving the slit, of we know the last frame number sequenced (which i think can be determined in the log) then we should be able to adjust the image folder some to allow it to 'pick up where it left off' even though it would be as if we're technically starting a new run sequence.

J: Ok - just lost power again at 9:21 and company sent automated notice that it should be back on by 3pm - ugh.

Right now no Internet access except through cellular so I can't put the laptop on the Internet for you 😬

C: Ooph - I hope they fix it so that the power is stable and constant again. I'll be available for the day and ready to hit the ground running once it's back on.

J: Turns out lightning hit a pole etc near us and they're currently replacing it. I saw the lightning last night at 11:12pm (note in my holo journal 😊). Amazing that the power came back on at all before now. This most recent is deliberate shutoff I think while they replace the pole & associated equipment.

Sent you an email re possible implementation of UPS(s) for system downstairs. Also asking Sam Goldwasser for his opinion.

Power back up - hopefully for good now.

Do you want me to turn Internet on for laptop so you can check the log file(s)?

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Laptop & WiFi on but nothing else. SLM software still open with settings. Doing some errands & back soon

C: Just replied to your email and saw these msgs. I will log in and check. the log files

From the log file it looks like the Run Sequence started at 11:03pm last night, and sequenced 44 images. Maybe 43 since the power was out by then? But the software thinks 44 ran.

J: Ok - that could be. I'm going to forget trying to salvage this master and start fresh tonight. Them's the breaks i guess. I'm going to take the plate out and put it with the other plate that had a misadventure 😓. Supposedly there's a way to rejuvenate exposed but unprocessed plates 😬.

C: Ok Jody sounds good. I was looking at the B&H UPS you sent but saw that Sam says it would give you ~30mins. Is a UPS like that an option, but perhaps with a backup gas powered generator for more time if need be? The generator would vibrate though and could not be in the lab of course.

J: Exactly my problem with an exterior generator

<https://assets.tripplite.com/ups-runtime-chart/smart3000rm2un-runtime-chart-en.pdf>

C: Nice find! I didnt realize you could array / use multiples of those together.

J: Might be absurdly expensive though

C: Yeah the only other thing on my mind was a setup similar to solar power diy's for home use using car batteries or something similar.

But i think it would be the same issue

J: Hi Chris, just a heads up that there was a random shutter close earlier when I was in the Move tab. The green patch still showed as open. I put it on the list of things for you to look at.

I'm setting up right now to shoot another master. If I can finish the run before 2am, I'll run another tonight.

Last night's run (Ginesta) came out great - 5 in a row excluding the master lost to the power outage.

I'd like to get the UPS thing decided before you come if possible. Partly depends on the noise issues. If it creates noise under normal operation, I won't do it.

It's likely that Hannah goes to Egypt April 15 or 16 but uncertain right now.
More later.

C: Ok Jody, will talk soon about the random shutter close.

J: Move x worked a couple of hours ago. I'll check now

No not working now but image sequence tab is working so close software turn off Arduino, unplug usb at laptop, plug in usb, turn on Arduino & reopen software?

C: It sounds like it lost communication somehow with the Arduino. I would close the software, power cycle the Arudino, then open the software again.

J: Ok shutter working again on move tab

Unnerving - we lost power suddenly about an hour and a half ago for ten minutes. Guess I really am going to have to do something. It's not good for these electronics 🙄

C: Oh no - all i have over here is a basic tripp lite surge protector at the moment, but yes, with power going out frequently a bit more is needed of course.

J: Just discovered that if I'm in the move tab and moving X, the shutter won't open & close although the indicators are working. As soon as X stops moving, the shutter control works 😊

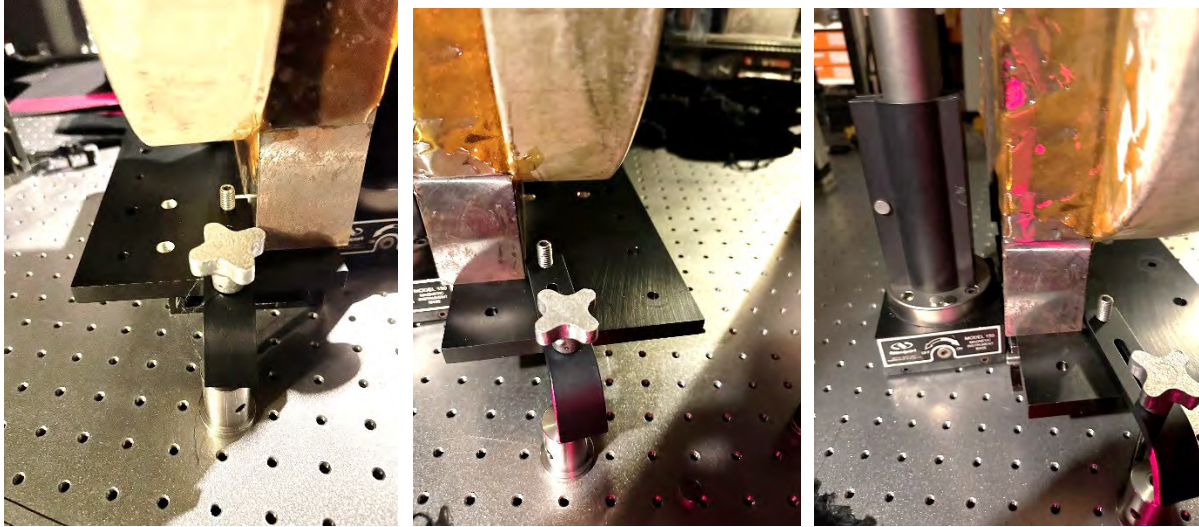
C: I might be using 'blocking' in the UI, for the controls to the Arduino, so each action has to complete (UI feedback is updating first), or i'm waiting for the Arduino to respond that the action completed. When using run sequence i always do the shutter action first (fastest) then the motor next (slowest). The LCD operates independently so the inage can change whenever it needs to (manually or automatically). I can adjust that so that the shutter works when triggered.

J: Not important to change. Just an idiosyncrasy that I noticed 😊. Now that I know I won't freak out 😊

APPENDIX 2: H2 12 inch Meade collimating mirror (used for H2RB for Steve Sechrist II pulsed portrait achromat 8x10" transfers), mounting photos taken Mar. 22, 2024. No notes in Blue Lab notebook covering this photo documentation. Purpose of photo documentation is so it can be setup easily again if ever needed again.



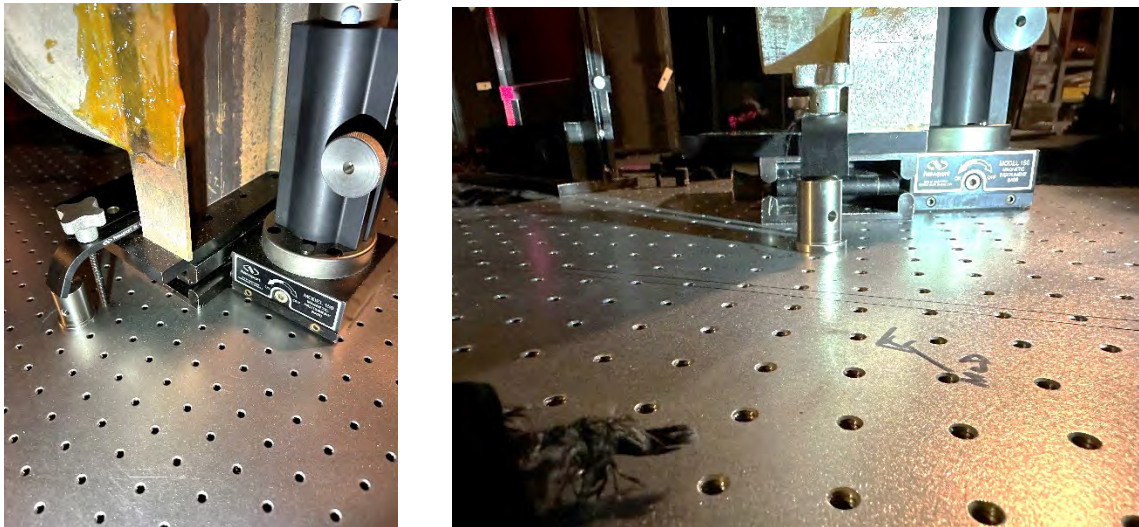
S2 1, H2RB H2PH.



S2 2, 3, & 4, H2RB collimating mirror mount.



S2 5, 6, & 7, H2RB collimating mirror mount.



S2 8 & 9, H2RB collimating mirror mount.

APPENDIX 3: May 5, 2024 Facebook Holography Forum Group, post with comments and included photos & video link:

Joseph Burns



Top contributor

· May 5, 2024 ·

Just finished a big (for me) hologram project doing 12 holograms for artist Michael Wang. Started Feb 17 and finally delivered this last Tuesday night to Michael before his 8am Wednesday morning flight to UK for permanent installation of his art piece for the lobby of a new finance building in Birmingham UK.

Here's info about him:

[https://en.m.wikipedia.org/wiki/Michael_Wang_\(artist\)](https://en.m.wikipedia.org/wiki/Michael_Wang_(artist))

<https://michaelwang.info/About>

This amazing interview with him is what persuaded me to take on the project:

<https://youtu.be/2jmnaoGIB6g?feature=shared>

Below is a video of the 1st laser viewable master hologram I made Mar 22nd. It was 150 separate exposures of separate 2D images of a 3D model he had created in the software program, Blender.

Below is a photo by Michael of the 1st white light transmission viewable proof hologram made Mar 24th from that master.

Also below is a photo made by Michael this last Tuesday evening, April 30th, of that exact same piece, laminated by my longtime friend and collaborator, Ira Tiffen, to a 1st surface mirror with Hxtal and then cut to the finished size of 6" x 6".

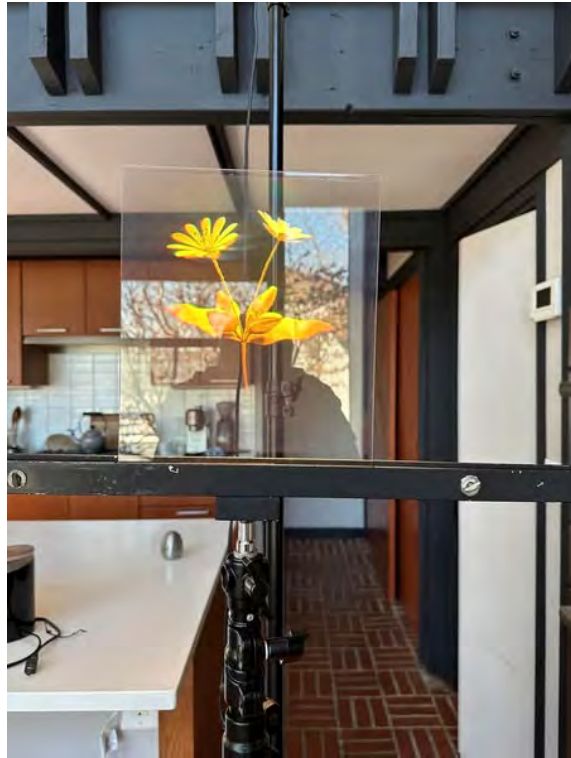
The 12 different holograms are each of a different flower that used to be indigenous to Birmingham UK but that no longer grow there.

It was a real gut buster of a project but a great "shakedown cruise" of the custom hologram system I built to record these kinds of holograms.

Many things went wrong throughout the project but in the end it all turned out right. Of course, if I could do it over again, I do a number of things differently. It was on a tight deadline though from the beginning 😬😬.

We're all thrilled with the finished pieces 😊. It was a real team effort with master artist/creator Michael Wang, Chris Portales (software programmer par excellence), master hologram laminator and finisher, Ira Tiffen, and me holographer. Special thanks to Chrissy Stuart for introducing me to Michael.

Video of H1: https://youtube.com/shorts/Yp133_eQRNk



Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

As of May 15, 2025: 84 likes, etc.; 40 comments; 14 shares

Comments:

Martin Richardson

Beautiful work, well done Joseph!

Marcie Merryman

Wonderful! Just splendid

Mark Diamond

Fantastic

Sam Moree

How is he using this brilliant hologram?

Joseph Burns replied

Joseph Burns

[Author](#)



Top contributor

Sam Moree MW promised to make photos & videos of the final installation which should be completed by May 10th.

Jacques Desbiens

beautiful! Very sharp...

2

Josh Dellay

Top contributor

Stunning work. Absolutely great job!

Marvin Uram

Congratulations

Phil Bergeron

Top contributor

Using lasers from Sam and I? 😊

Joseph Burns replied

5 Replies

Joseph Burns

[Author](#)



Top contributor

Phil Bergeron used your Genesis to create all 12 H1 masters. It performed flawlessly and ran at 800mw for over a week continuously twice. It even survived a power outage! The H2s would have been created using your Lightwave 440mw but the chiller (shouldn't have left it unused for so long) for it wouldn't operate so had to make a quick triage decision to use my 500mw Cobolt Flamenco instead. Fortunately the H1 masters recorded at 532nm didn't seem to mind being reconstructed at 660nm 😊!

Jeffrey Weil


Joseph Burns Maybe you should get rid of that chiller and get the heat exchanger I told you about. I've run 600mw of laser power from 3 heads for many hours and it didn't blink. I don't think it would notice the extra 200mw. the only moving part is a cheap water pump that can be replaced in no time.

Maybe I'll present it at Lake Forest.

Joseph Burns

[Author](#)

Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

 Top contributor

Jeffrey Weil hi Jeff, it's been on my to do list for a long time 😄😄 - ever since you first posted about it a few years ago!!! I was very fortunate to have the Cobolt red laser already set up on my transfer table using Cobolt's wonderful solid state TEC plate (no liquids and no moving parts). Highly recommended. Regardless, no question in my mind that your heat exchanger is the best way to go. You should really write a book about all your excellent holography hacks and insights. I've learned a lot from you. I'm pretty sure most in community could benefit.


3

Jeffrey Weil

Joseph Burns Thanks, that a very nice thing to say.


Joseph Burns

[Author](#)

 Top contributor

Jeffrey Weil just the truth Jeff 😊.


Phil Bergeron

 Top contributor

Nice work

2

Nandigana Krishna Mohan

 Rising contributor

Keepkeep it up

Chris Levine


Looks great.. I would like to go and see them is this possible?

Joseph Burns replied

1 Reply

Joseph Burns

[Author](#)

 Top contributor

Chris Levine as soon as I find out the installation address in Birmingham UK, I'll post it. It's a new building that isn't open to the public yet. Sometime around the end of May I think.

Ikuo Nakamura

Wow 🤩! Beauty

Jonathan Casto



Sterling Barclay Ely

Lovely! I'd love to make holograms with you again some day, especially with the new methods available!

Mary Melissa Crenshaw

Way to go Jody! Looking good there. Congrats!!

2

Rob Munday

Great work Jody. Michael Wang is a very cool artist with some great ideas.

2

Stefano Sica

Great work Jody, it will be nice to see the photos of the installation. What emulsion did you use? Film or glass plates? What glue did you use to seal? Excuse these questions from a newbie. Congratulations again

2


Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Stefano Sica replied

7 Replies

Joseph Burns

Author

 Top contributor

Stefano Sica thank you for your kind words. Would hardly call you a newbie 😊. All good questions!

I would have liked to have used BB plates from TruLife Optics in UK but couldn't get them in time.

The H1 masters were 25+ year old Agfa 8E56HD (with built in anti-halation) 300x400x3mm glass plates cut in half to make 200x300mm H1s. I suspect these are the only plates of this type left in the world 😱😱. They were given to me in 2009 by Debbie Duston Roberge in Ottawa Canada (a couple of years before she died). In addition to making holograms in Ottawa at the Canadian Research Council, she published papers about making black and white (achromat) stereograms (like these) with Steve Benton at the MIT Media Lab, using imagery from the LandSat satellites. I like to think that she would have approved of this use of her plates 😊🍷. The H2s were all on 25+ year old Agfa 8x10"x3.3mm 8E75HD NAH (no anti-halation) glass plates. One box of ten plates was bought from Lon Moore a few years ago and the other was given to me recently by Jeannie Benton in partial payment for a project I did for her. The processing was very old school, created by Nick Philips for Agfa transmission holograms, GP-61 dev, F-24 non-hardening fix, Agfa GP-431 bleach with graded ethanol drying. It has the benefits of leaving relatively clear plates with a clean somewhat hardened emulsion for subsequent lamination. The phenosafranin in the GP-431 bleach acts as a desensitizer preventing undesirable printout when the plates will be constantly illuminated as these will be.

The optical cement was Hxtal. It's a very high quality, hopefully archival, optical cement. It was first recommended to me by August Muth a few years ago as what he uses for his unique dichromate hologram art works. It turned out that it is also what Ira Tiffen, (who did the excellent lamination and hologram cutting and finishing for this project) has used for laminating some of his glass art.


3

Rob Munday

Joseph Burns that's great news as i have about 150 43x32cm 8E75HD glass plates that i bought from Frank Milman when the C Project closed in the late 90s, and also from Margaret Benyon when she moved to Australia. I was hoping they were still good. In fact i used some 15 years ago, already 10 years old then, and they seemed better than when they were new.

Joseph Burns

Author

 Top contributor

Rob Munday sorry to say that, while the 8E56HD 300x400mm plates were excellent for H1 slit masters, they would most likely have been rejects had they been used for H2 white light transfers - reason being that there were multiple voids of 1/8" or so here and there on every plate. Not noticeable as a small part of a single slit destined as part of an H2 achromat multislit integral transfer but would have definitely been noticeable as a black hole had they been used as H2s in an otherwise nice H2 white light transfer.

Regarding the 8E75HD NAH 8x10" plates, I bought two boxes from Lon. They were both from the same lot# and the boxes looked as new as the date they were first shipped in the 1990s. One box was great with ten excellent exposures and no obvious defects but the other box was completely fogged. They turned black almost immediately in the developer. It turned out that there were good holograms in them but they were very dim. I guessed that maybe the two boxes had each been stored differently but Lon assured me that they had spent their life stored together in a cool dry dark place.


When they're good, they're great, especially if processed appropriately, but upshot is that you never know from box to box.

Rob Munday

Joseph Burns ill have to hope for the best. They are in sealed boxes as new., but frankly have been kept in all sorts of places, not necessarily dry or cold! Im in the middle of building my fifteenth hologram studio at the moment in my barn in France in the hope of making copies of some of my 1980's and 1990's holograms. and some new images of course.

Joseph Burns

Author

 Top contributor

Rob Munday out of 150 12x16" plates, I know you'll get some great work - looking forward to seeing what you do in that French barn! My experience is that if there's one iffy plate in a box, most likely the others from that box are as well. Still useful for good H2 tests or H1 masters though unless they're fogged. Bon chance 🇫🇷 😊


Lab Notebook blue metal spiral bound, Dec. 3, 2023 to Apr. 6, 2024, Wang

Stefano Sica

Thank you Jody for your patient and generous response, full of inspiration and information. It's very nice to hear you tell me how this project started from afar, with acts of generosity and collaboration from protagonists and artists of the global holographic community such as Debbie Duston Roberge, Lon Moore, Jeannie Benton, Nick Philips, August Muth and Ira Tiffen . Did I get it right ? Will your final holograms for this project be achromat? I find them the most fascinating and by analogy they are similar to black and white art photography. Thank you and I look forward, like everyone else in this forum, to seeing the updates of this fantastic project

Joseph Burns

Author

 Top contributor


Stefano Sica yes you have it right re the people (and many more!) and yes they are “achromats”, although, depending on a viewer’s height, the pieces may appear tinted toward the red or blue end of the visible spectrum.

Sally Weber

Great Jody ! Congratulations. Looks terrific!

2

Loic Cherel

 Rising contributor

Congrats, very nice result 😊


Can you detail a bit more the setup ? Are you using a digital screen to display the 150 2D images or are they printed on film?

1 Reply

Joseph Burns replied

Joseph Burns

Author

 Top contributor

Loic Cherel thank you Loic 😊. Yes, digital. I still can use 35mm & 16mm film if someone prefers though 😊.

Something is going on with these images that is unique in my experience of stereo holograms (integrals as I prefer or synthetic holograms as the maestro Jacques Desbiens prefers 😊). I haven't yet figured out exactly why but I have some ideas. The finished H2 holograms look as though the H1 masters were shot using actual objects, not composited from a sequence of 2D images.


Roberta Booth

Congratulations 👍

Randi Ehrhart

WOW !!! SPECTACULAR !!!

Tove Noorjahaan Dalenius

 Rising contributor

Wow, I can not wait to see this in real life. I'm not to far from Birmingham. 🎉

Vivian Amos

Awesome work **Joseph Burns**

2

Bill Molteni

Nice

R Scott Lloyd

Looks really good! (When are these commissions never on a tight deadline.) Hope the new setup gets to do some more images on your preferred time schedule now.