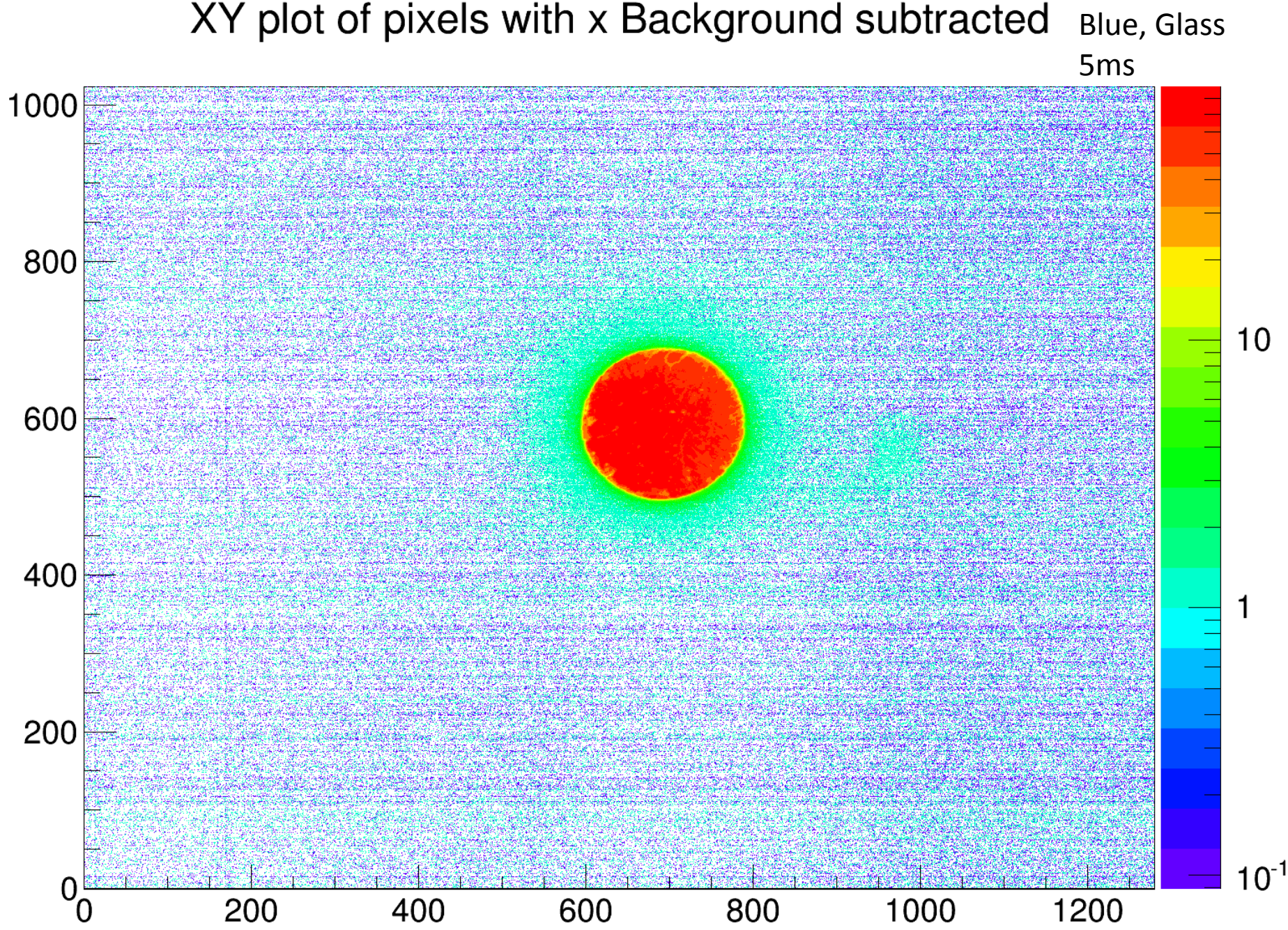
Mirror updates

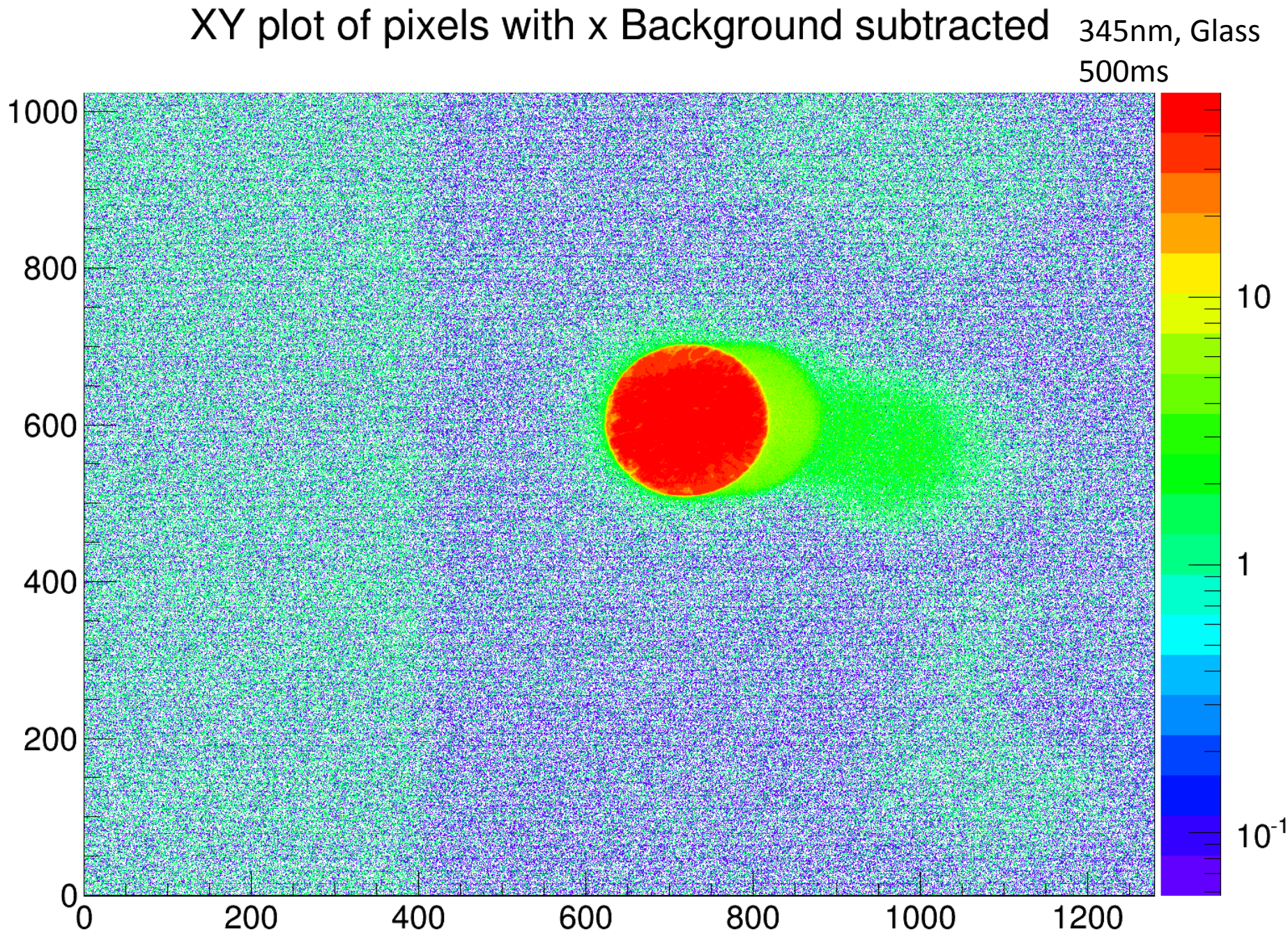
Overview

- Aluminum mirrors in 3 stages have returned from Chicago
- Glass mirrors are also under investigation
- Progressing on measuring mirror reflectivity

Mirror Reflectivity Measurement

- Must measure signal over background with and without 2 bounces
- Sqrt of the ratio is the reflectivity
- Sample images below (control is on left, reflected is on right)

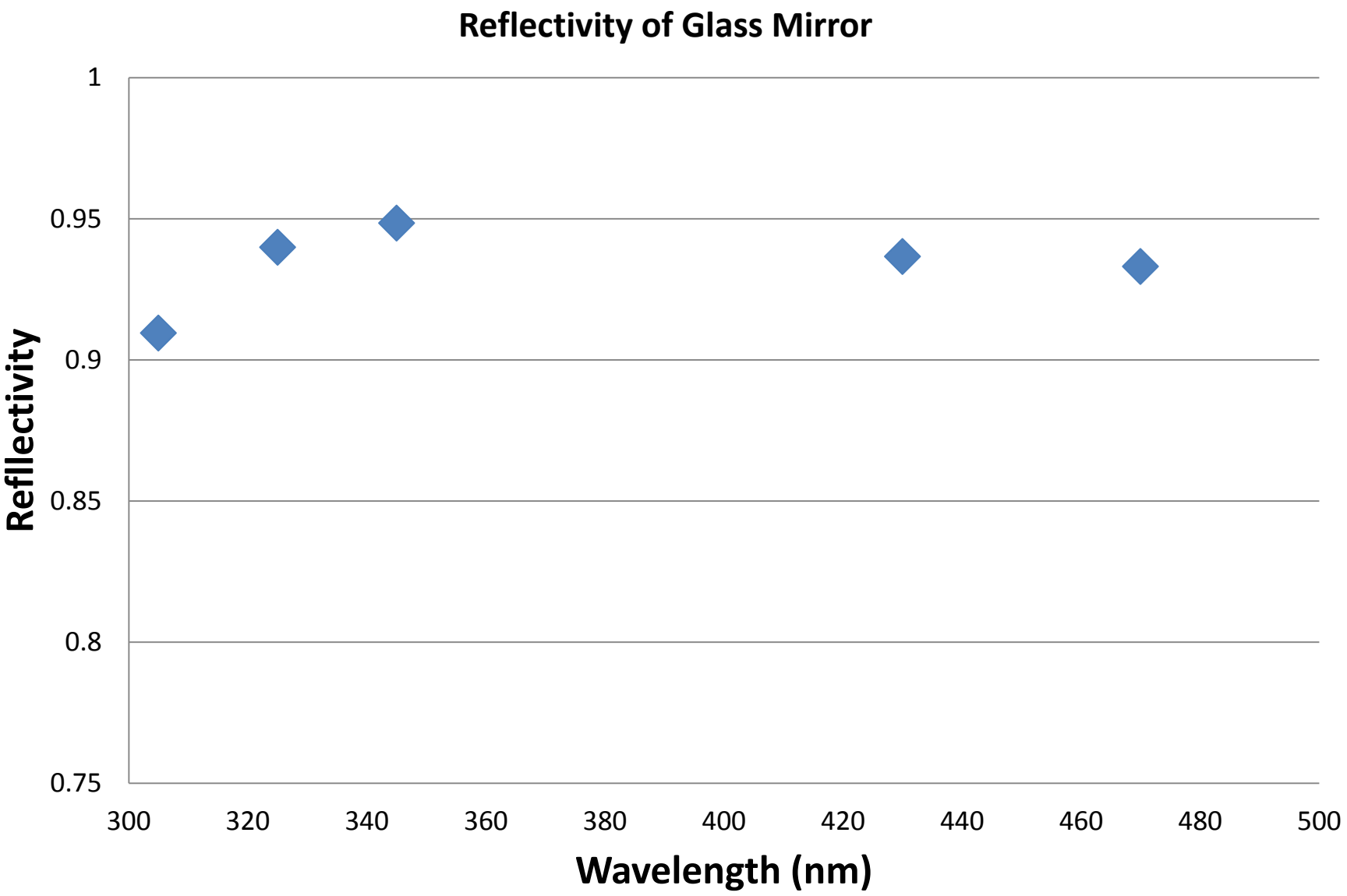

XY plot of pixels with x Background subtracted
Blue, Glass
5ms
1000
800
600
400
200
0
0
200
400
600
800
1000
1200
10
1
10^{-1}


XY plot of pixels with x Background subtracted
345nm, Glass
500ms
1000
800
600
400
200
0
0
200
400
600
800
1000
1200
10
1
10^{-1}

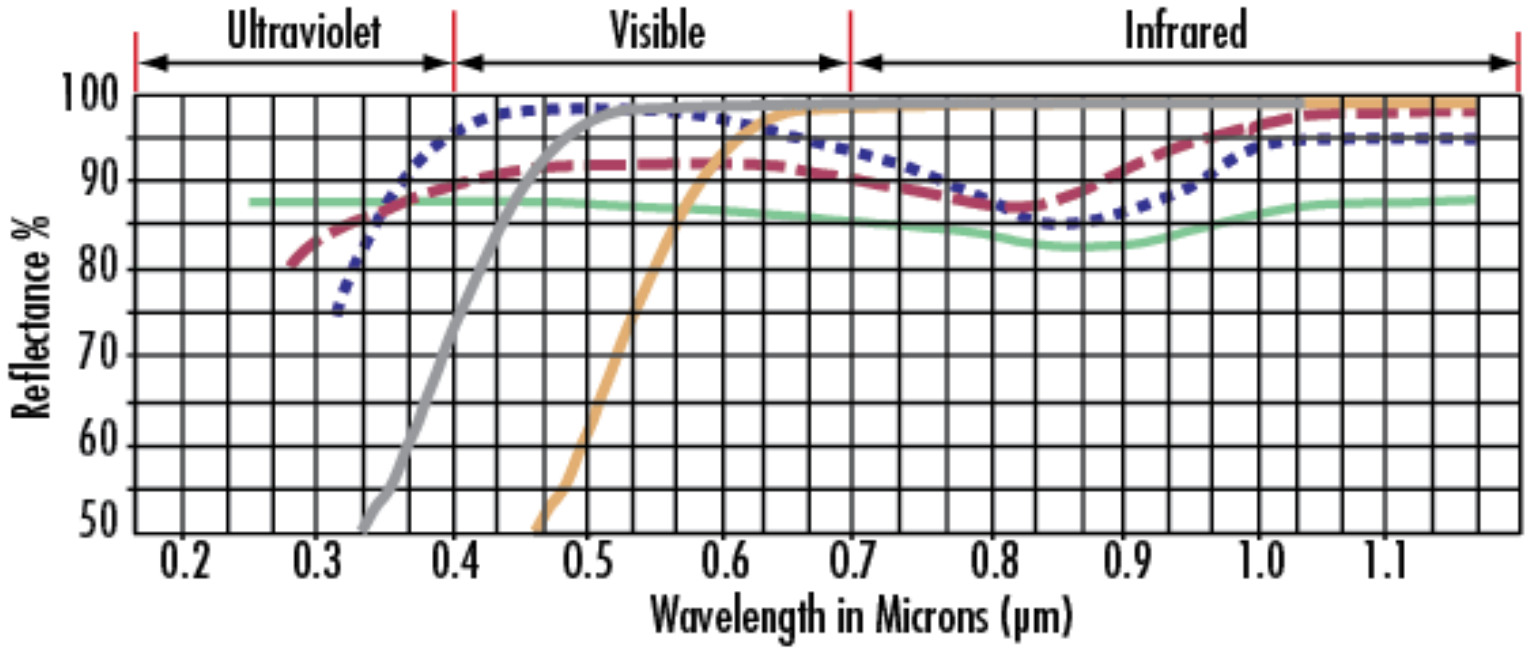
Modified Methods

- Over long exposure times, the x column had strange behavior, so I only used the y columns to integrate
  - Could be improved by extracting the background line per histogram
- Thor mirror is very small and therefore extremely difficult to align, data was inconsistent with previous run and is not shown
  - On the list for next week

Results and Comparisons

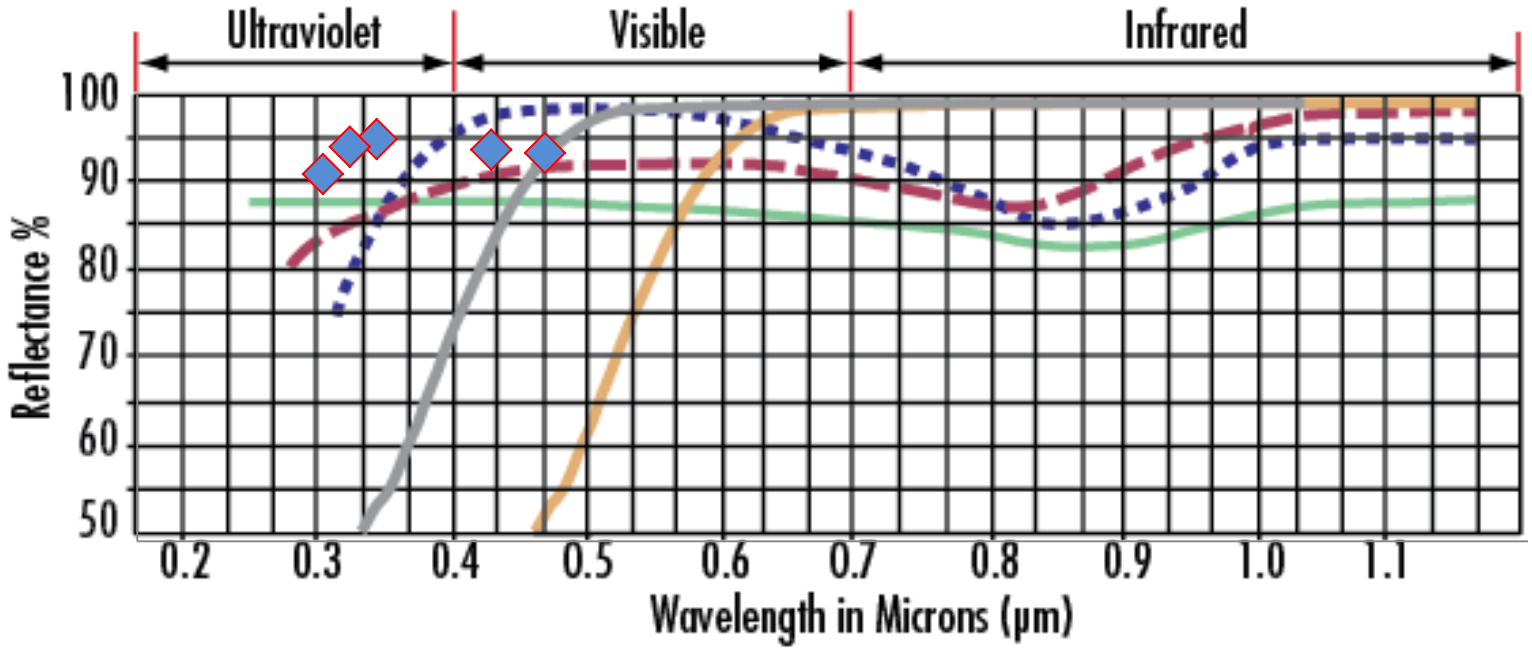


Reflectance Curves for Metallic (Mirror) Coatings



- UV Enhanced Aluminum (R_{avg} >85% 0.25 - 0.7 Microns)
- Enhanced Aluminum (R_{avg} >95% 0.45 - 0.65 Microns)
- Protected Silver (R_{avg} >98% 0.5 - 0.8 microns, R_{avg} >98% 2 - 10 microns)
- Protected Aluminum (R_{avg} >85% 0.4 - 0.7 Microns)
- Protected Gold (R_{avg} >97% 0.8 - 2 Microns, R_{avg} >94% 0.7 - 0.8 Microns)

Reflectance Curves for Metallic (Mirror) Coatings



UV Enhanced Aluminum (R_{avg} >85% 0.25 - 0.7 Microns)

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Enhanced Aluminum (R_{avg} >95% 0.45 - 0.65 Microns)

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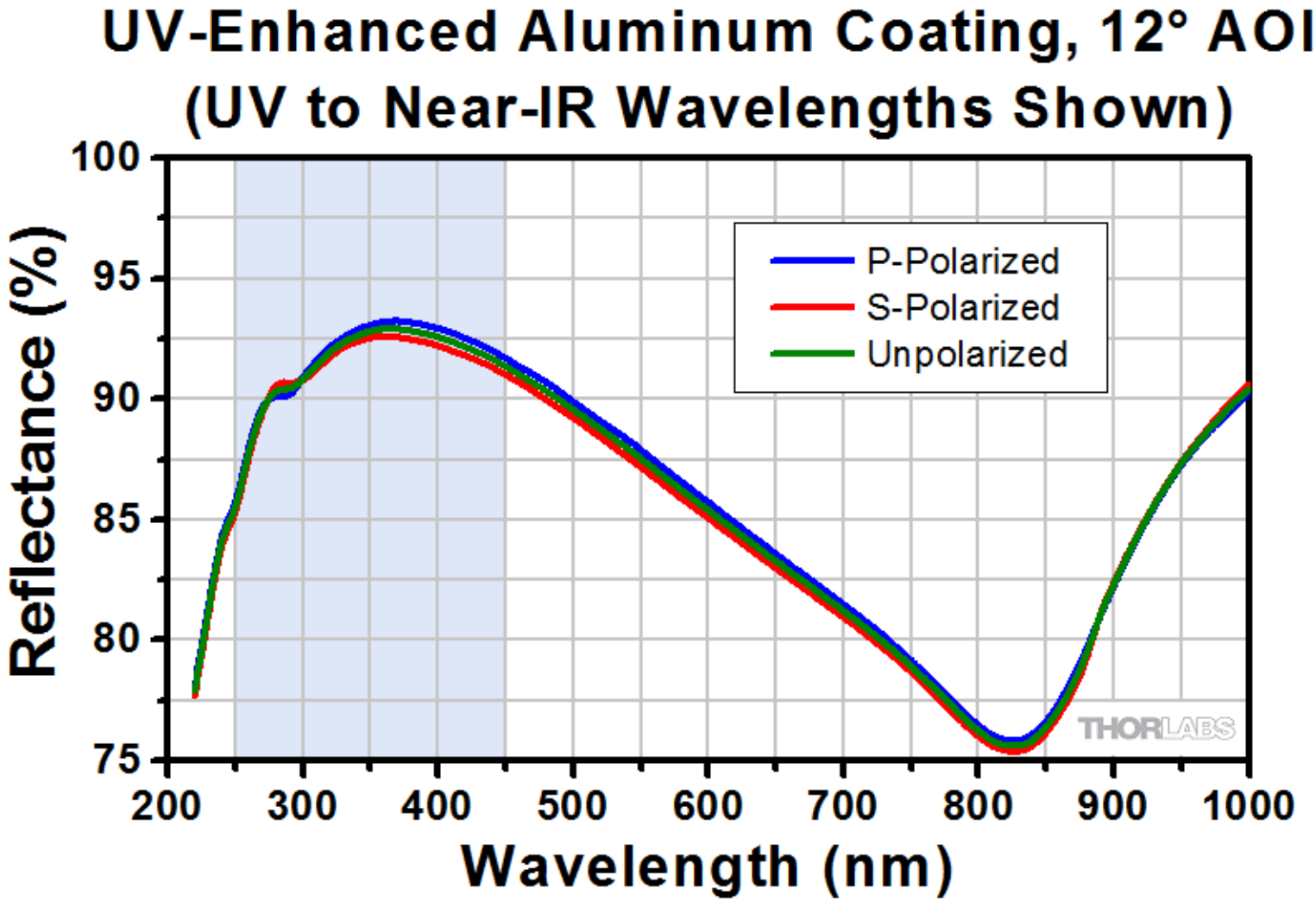
Protected Silver (R_{avg} >98% 0.5 - 0.8 microns, R_{avg} >98% 2 - 10 microns)

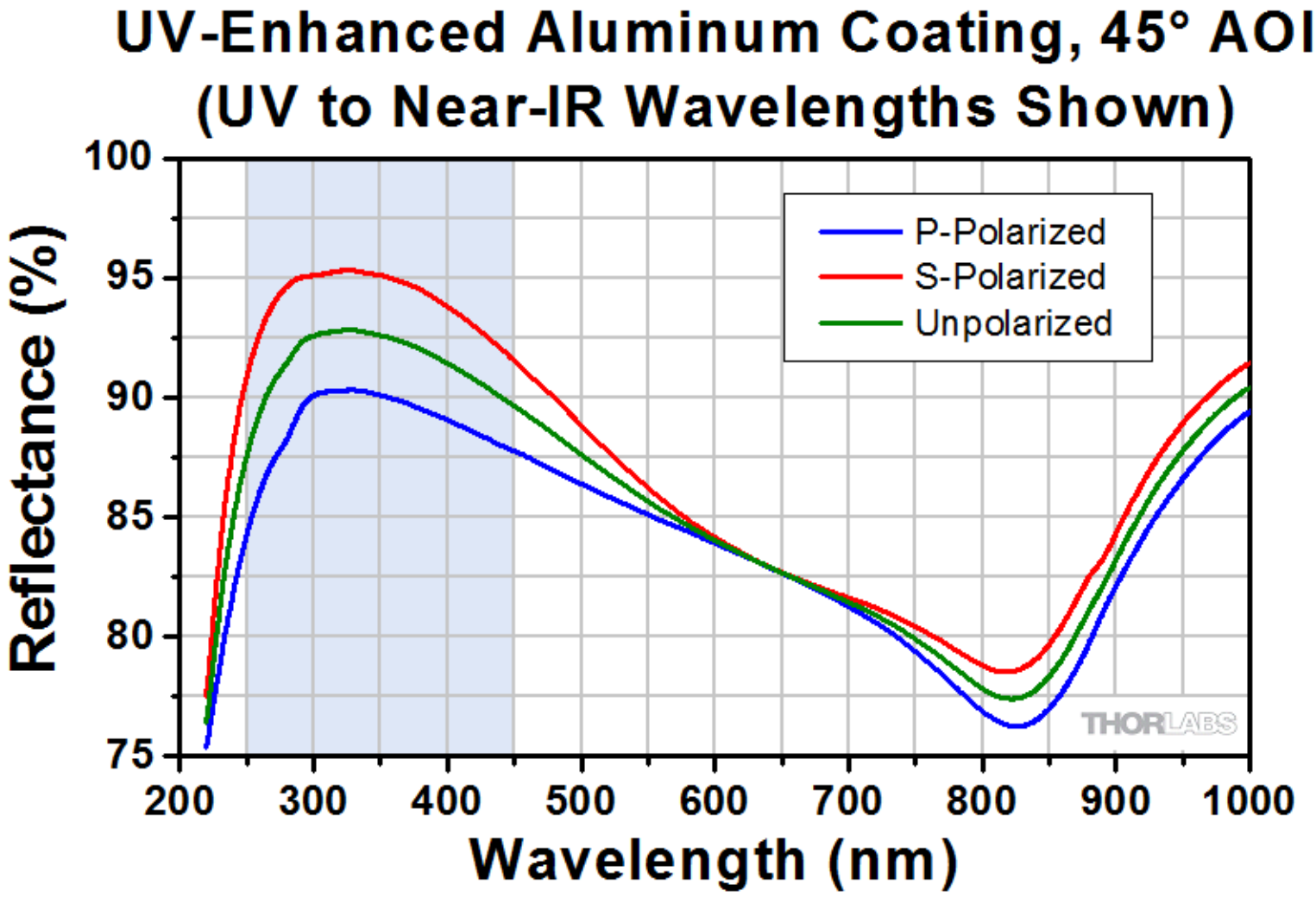
Conclusions

- Analysis indicates mirror outperforms expected values in the UV range and underperforms in visible
- Possibly due to reflection angle – data received does not specify an angle, and reflectivity is known to be angle dependent
  - 45 deg is often not the quoted value
- Also, y projection does not have perfectly lined up background either – may be affecting things.

Angle comparisons (Thor published data)



Angle comparisons (Thor published data)



Other Progress

- Al mirrors are in, mounting and measuring them next week
- Tape to fix glass to Al is in
  - Commencing water test next week