Mirror test stand at BNL and tuning/first test

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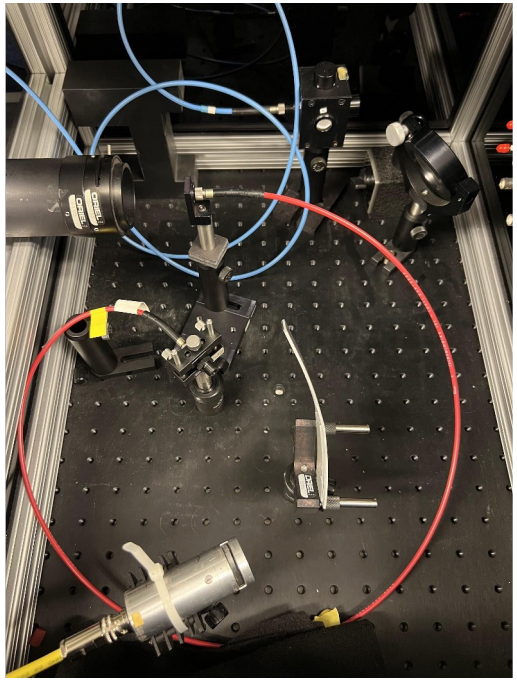
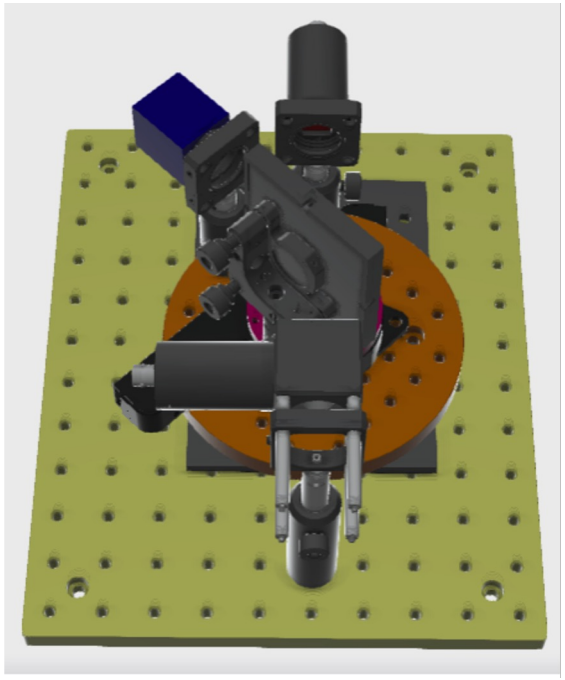
May 9, 2024

OLD vs NEW setup

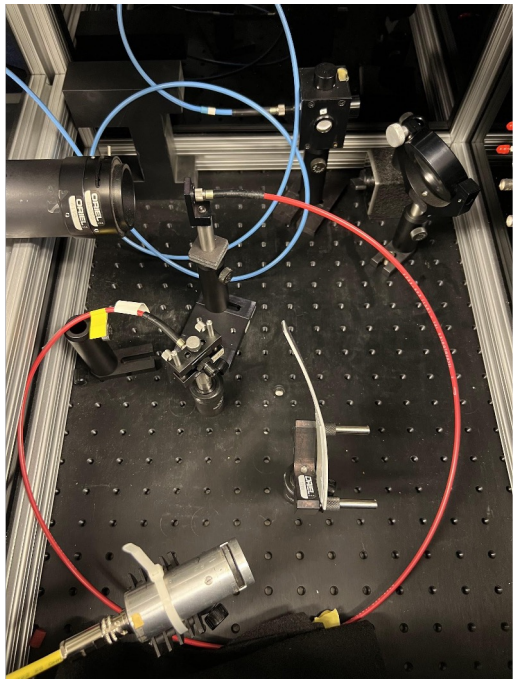


Improvements:

- No manual operation
- Reference sensor for monitoring purposes.
- Mirror holders.
- **Camera** for checking beam spot.
- Angle precision (**rotary stages x2**)
- **Automatic controls**: monochromator, rotary stages.



OLD vs NEW setup



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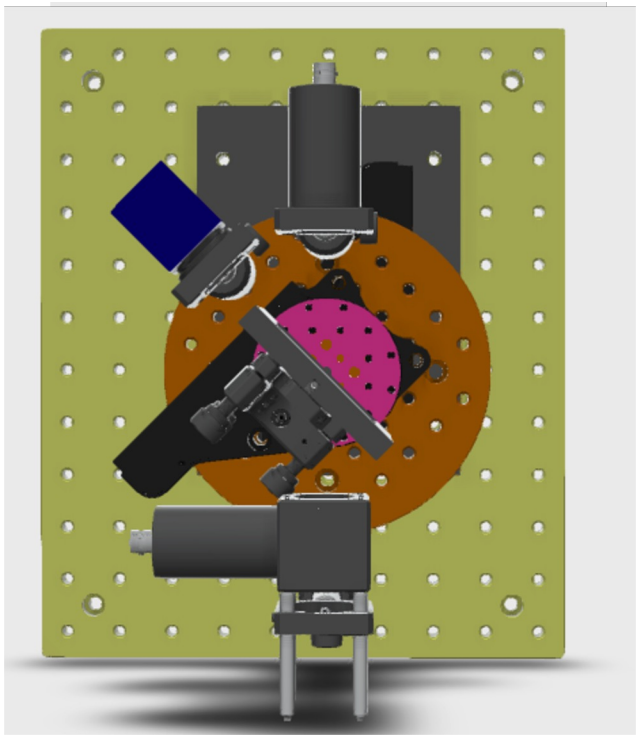
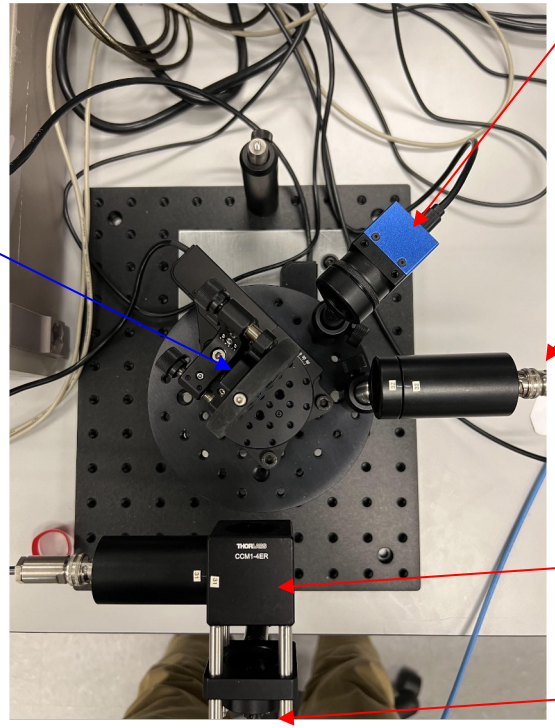
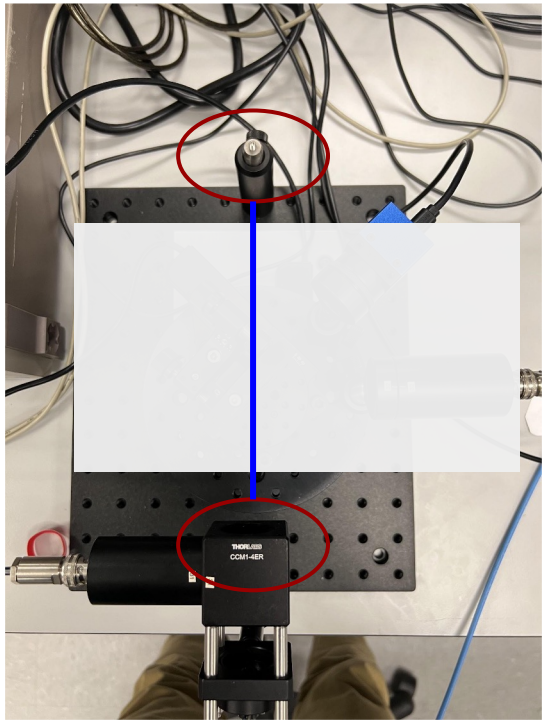


Mirror test stand major components



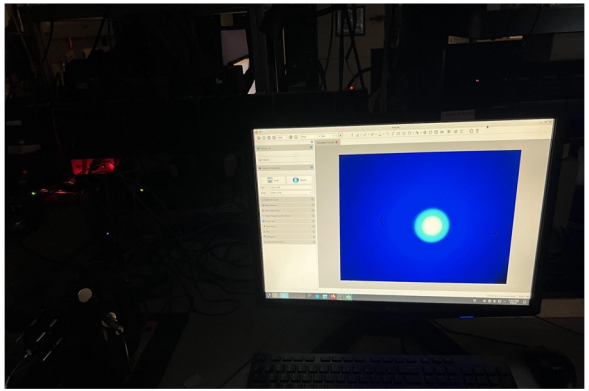
Align the source.



i) Camera set directly (0 degree) to the light source.

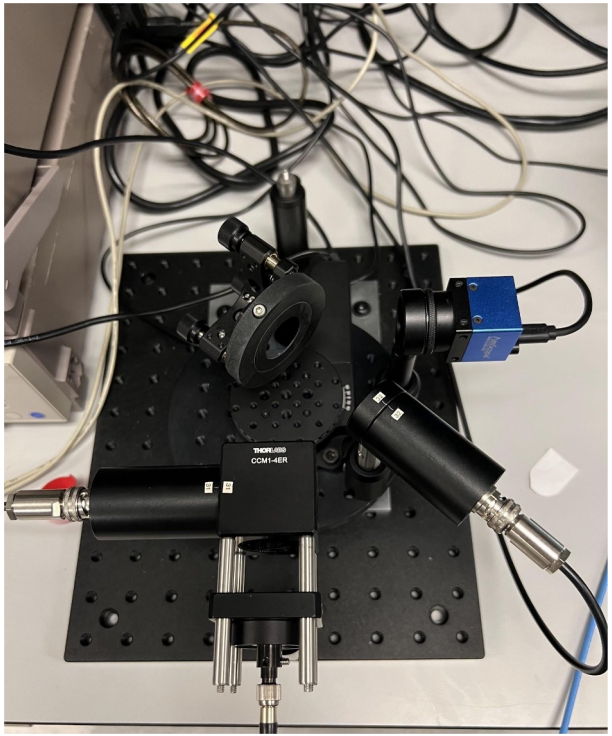
ii) check the beam spot nice and centered.

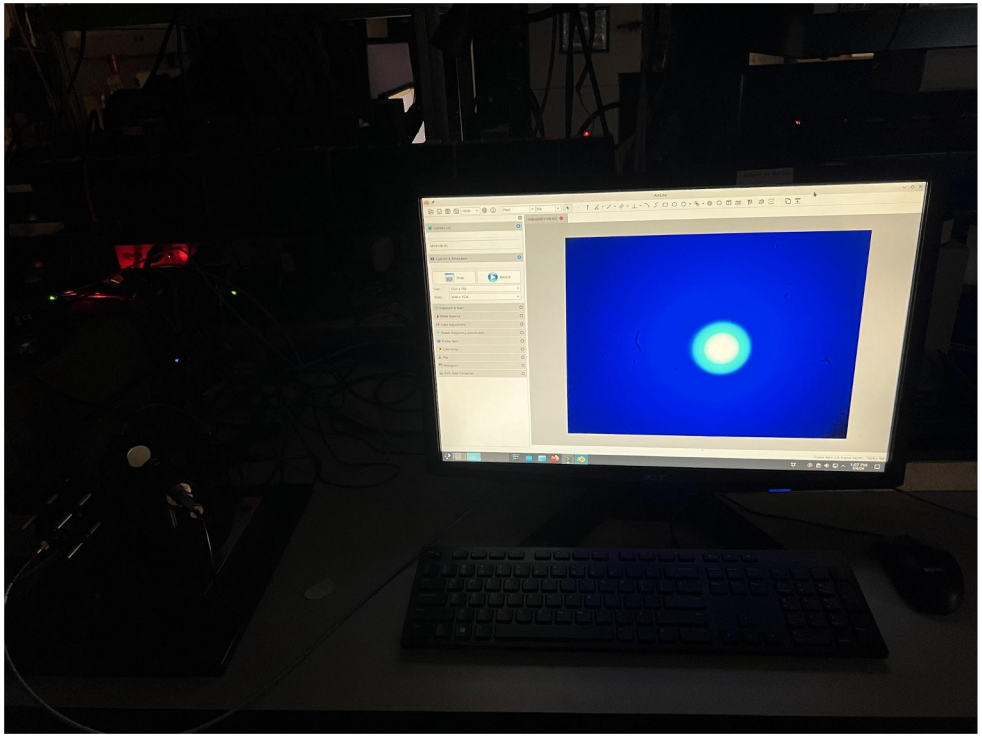
iii) fixed all screws on the post for the incoming beam.



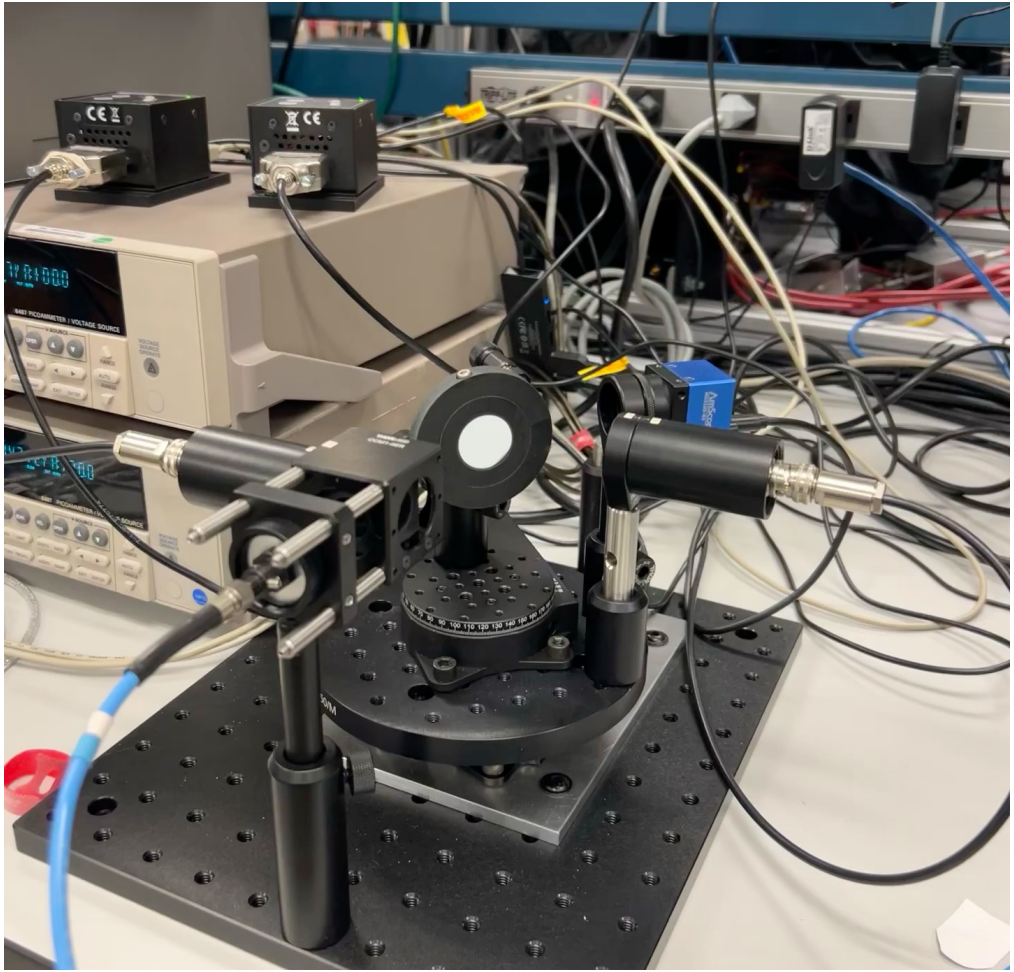
Camera sensor is ~2x3 mm

Check the beam spot for a range of angles





Demo



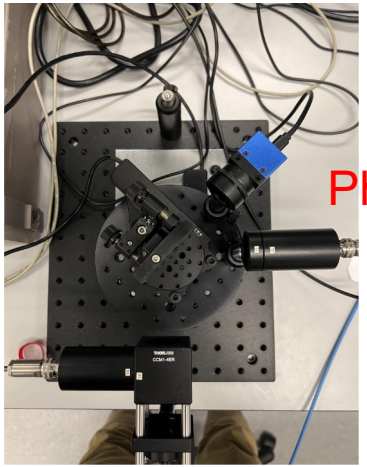
Calculation/Algorithm:

Direct measurement:

- Base photodiode 1 (base 1)
- Base photodiode 2 (base 2)

45 degree measurement:

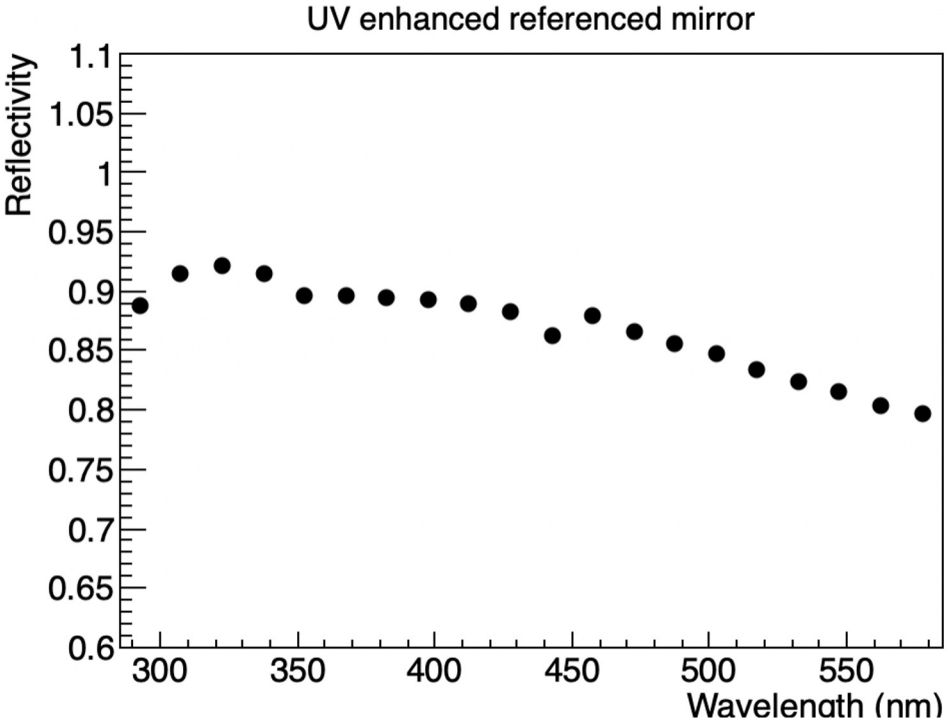
- Test photodiode 1 (test 1)
- Test photodiode 2 (test 2)

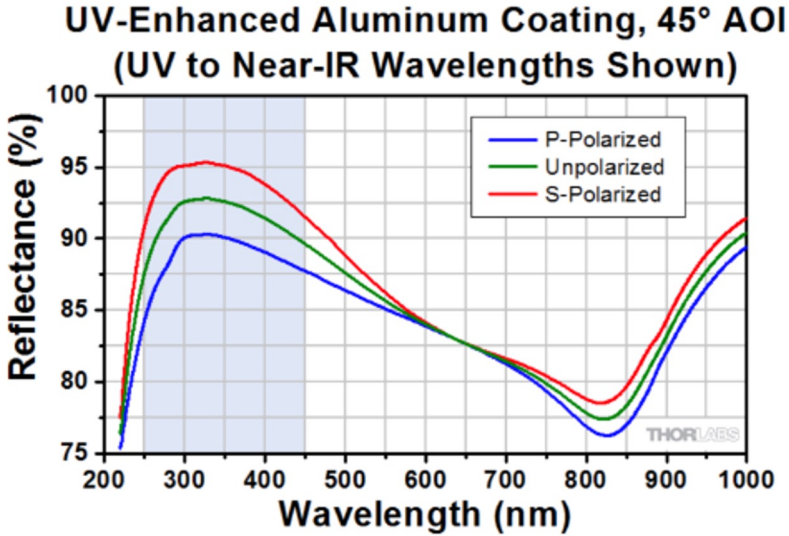


Photodiode 1 is the monitor sensor, and Photodiode 2 is the measurement sensor.

Reflectivity = [(base 1/ test 1)*test 2] / base 2

Test results on UV enhanced mirror





Results look very reasonable now.

Summary and outlook

- Results look good and reasonable. The setup is successful.
- Will move it inside of the dark box with some minimum tuning.
- Will start to measure our coated mirrors after that.

- (Near) future upgrade -
  - Translational stage to check different position of the mirror
  - Larger mirror sample testing.
  - …