Large mirror test stand

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Overview

- New optical setup
  - Focusing lens in front of the integrating sphere

- First test measurements
  - Small mirror
  - Large mirror

New setup

- Solution to large beam spot at integrating sphere is additional 1" diameter lens
  - Focusing of beam spot (size reduction by about factor of 2)
  - Easier focusing into integrating sphere even when reflected beam is moving a bit
- Made sure that added components do not hit anything
  - Moved sphere back, new bottom stop for linear stage
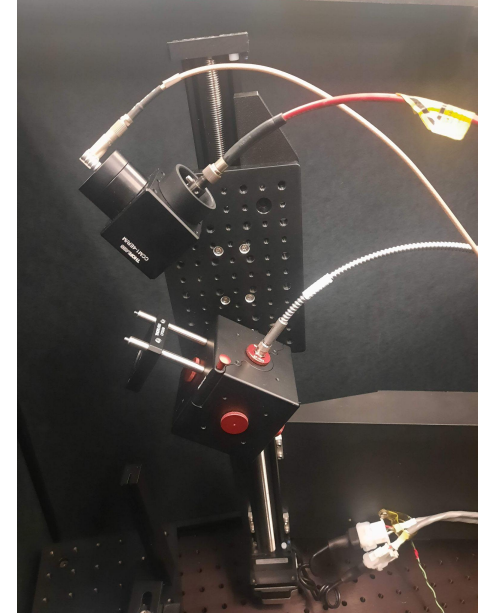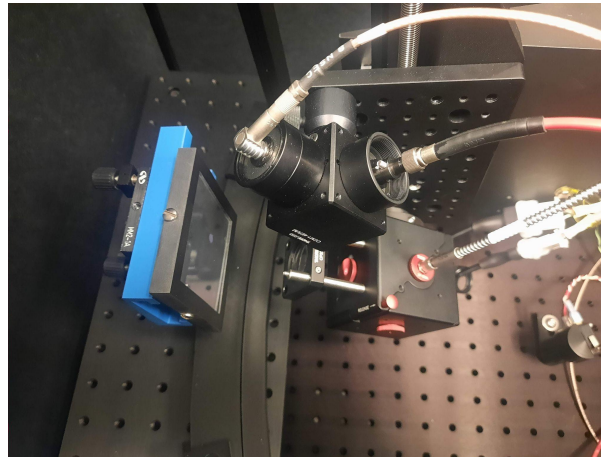
Small mirror test measurement

- First test measurement with new setup
- Reflectivity measurement at large test stand:
  - Measure spectrum reflected from reference mirror (S_{ref})
  - Measure spectrum reflected from sample mirror (S_s)
  - Using known reflectivity of reference mirror (R_{ref}) reflectivity of sample mirrors (R_s) is:
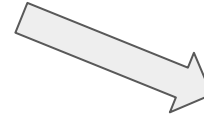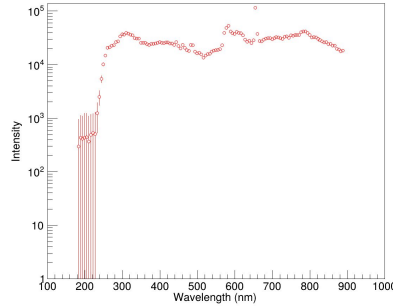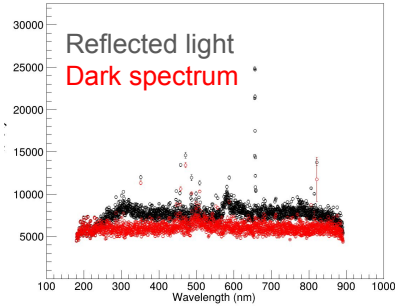
$$R_s = \frac{S_s}{S_{ref}} R_{ref}$$

- Now showing only S_s / S_{ref}
  - Need to get reference reflectivity (R_{ref})
    - Documentation not found yet
    - Can be measured?
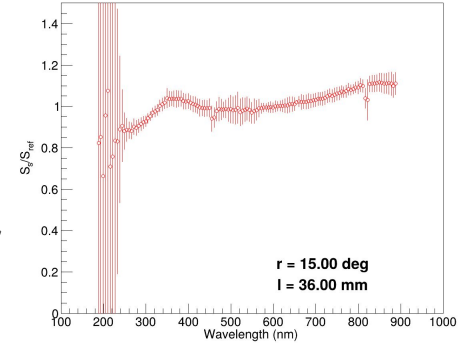
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Measurement procedure
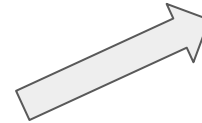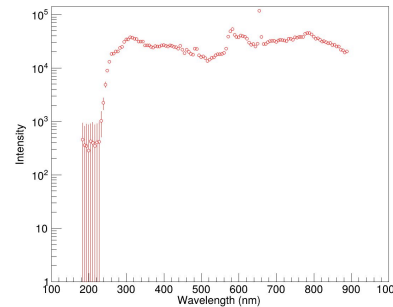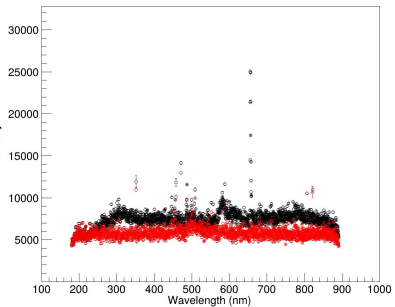
Raw measured spectra
(2048 bins)

Dark current
subtracted spectra
(128 bins)
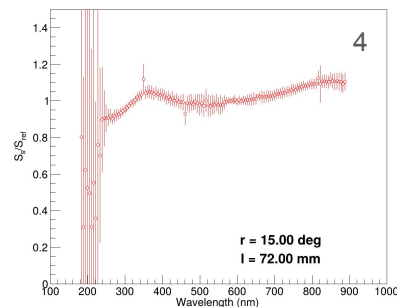
Reference mirror

Spectra ratio

Sample mirror

Small mirror test measurement

- Reflectivity scan of small mirror for one position
  - Vertical scan in the middle of mirror
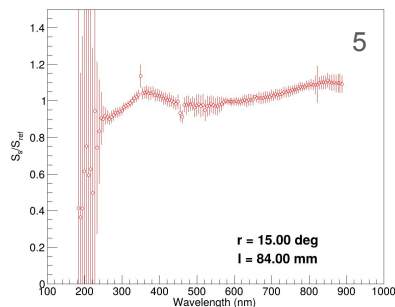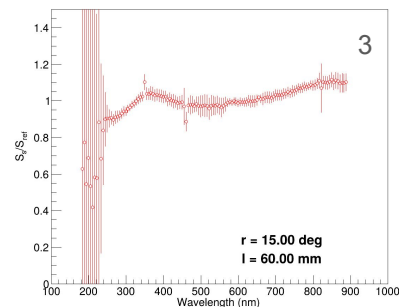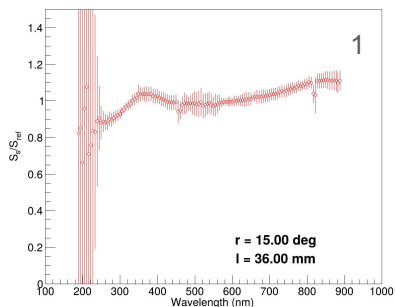
Large mirror test measurement
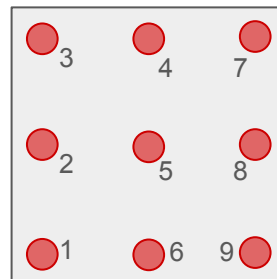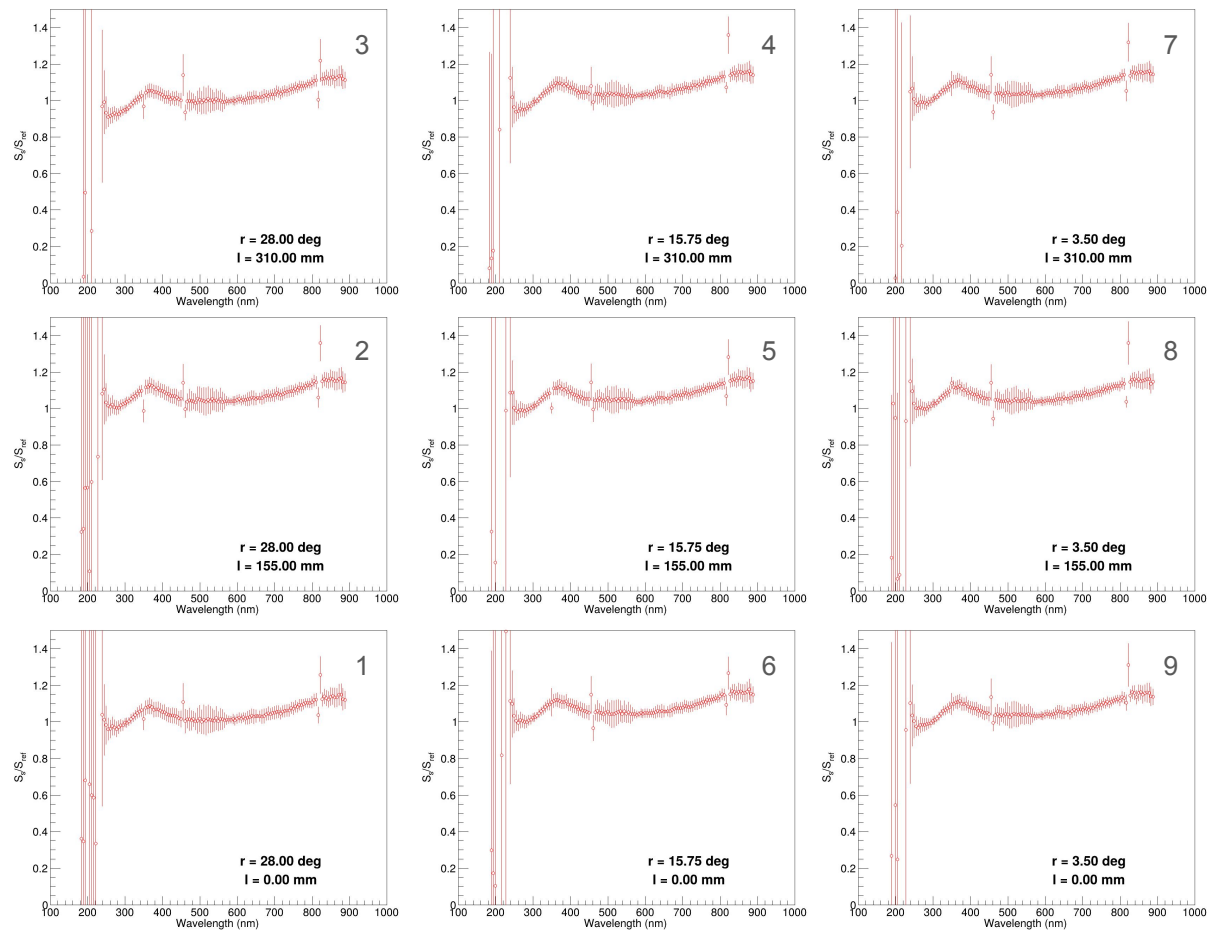
Summary

- Large mirror test stand almost fully deployed
  - Software tested and working
  - Hardware ready for scans of both small and large mirrors
    - Large mirrors without their own support/mounting system
    - Small flat 7x7 cm mirrors

- Missing/to-do
  - Reflectivity curve for reference mirror
    - Needed for proper reflectivity calculation
  - Mounting system for fully assembled full scale mirrors
    - Can be developed only after we have the full mirrors
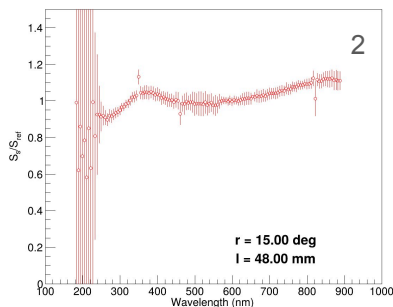 - Implement reference current correction to reflectivity measurement
    - So far, light source seems to be stable, so not critical, but better to have

Estimated work timeline – **previous** status

1. May
   a. Readout – finished
      i. Result: Readout software successfully installed and successfully tested
   b. Steering of stages
      i. Both rotational and linear stage operational
      ii. Cross-check homing precision for rotating stage – should be good enough for now
2. June
   a. Development and optimization of steering and readout software
   b. Prepare for scans of small and large mirrors
      i. Installation of the optical table to the dark box
      ii. Optimization of output data format
      iii. Holders: Curved full scale mirror, reference mirror, small flat sample mirrors
3. July
   a. First test scans – with coated mirror
   b. Ready for first full scans – minor updates may be needed
   c. Deploy full reflectivity scanning framework, including documentation
4. August
   a. Make sure everything is working and properly documented for anyone to take over (by August 15)
   b. Help with any leftover items (by end of my contract at BNL, August 21)

Estimated work timeline – **current** status

1. May
   a. Readout – finished
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