Large mirror test stand

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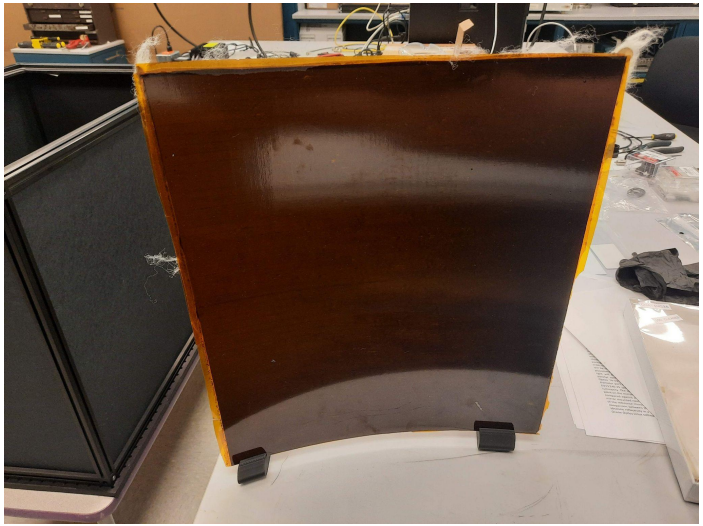
Overview

- Tests with full scale mirror
  - First tests with uncoated mirror

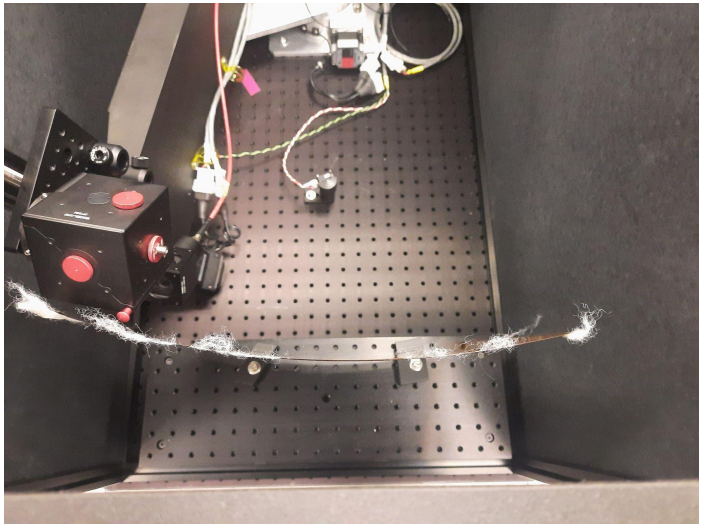
Full scale mirror

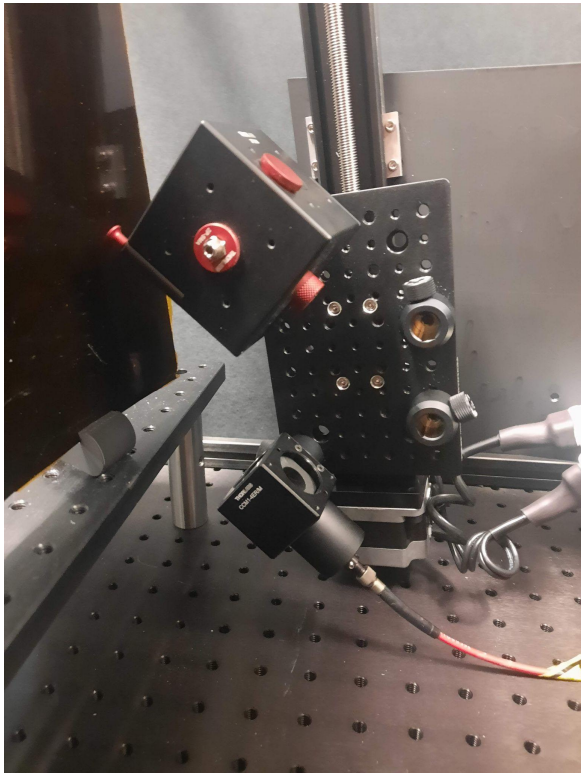
- Uncoated full scale mirror for testing of large test stand
- Custom holders with slot (thanks Preet!)
    - This mirror does not have any support structure



Mounting – first test

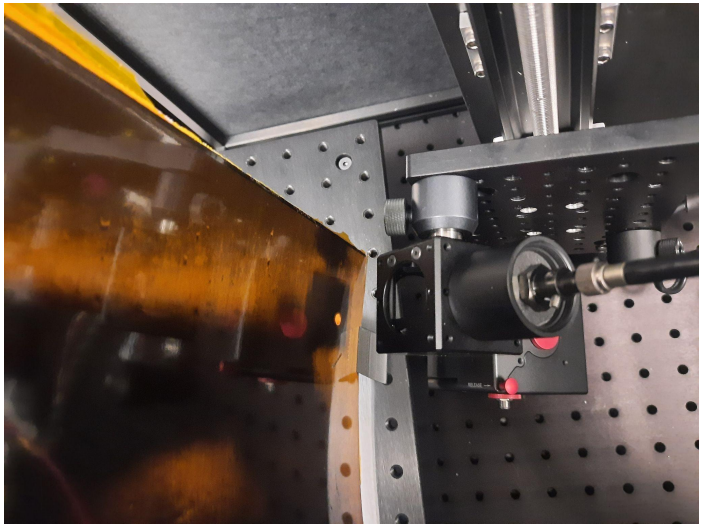
- Test fitment of full scale mirror and breadboard
- Issues discovered
  - Small breadboard hits motor on bottom of linear stage
  - Difficult to align beam with integrating sphere on top
  - Solutions on following slide

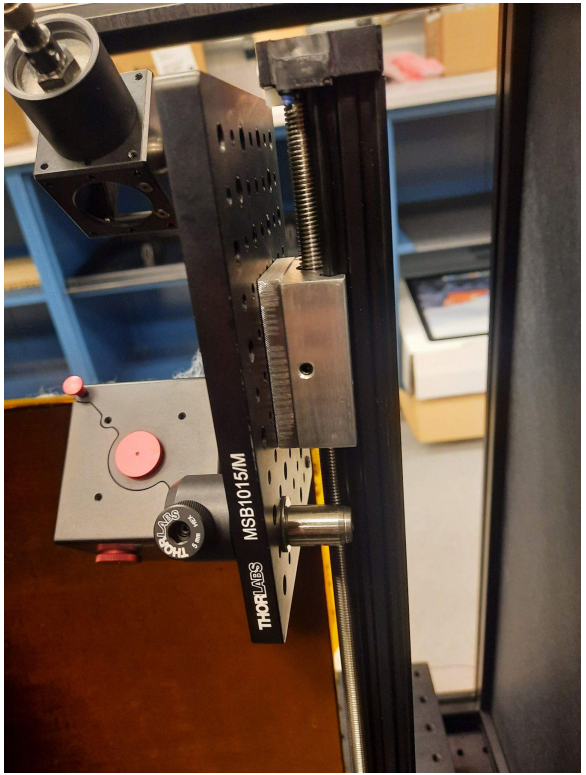




Mounting – update

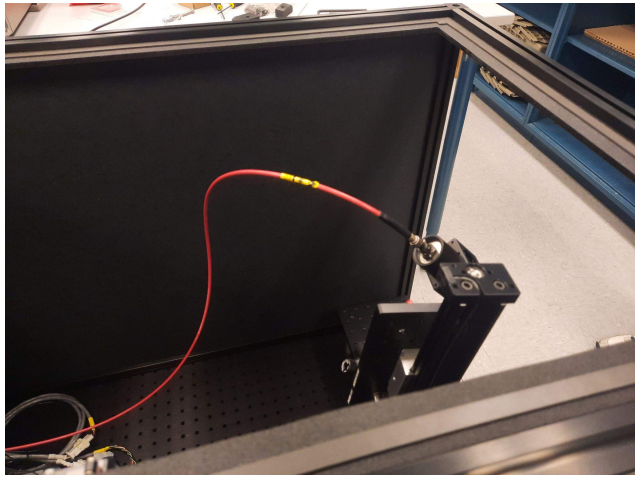
- Solutions to issues:
  - Added new stop on small breadboard
    - Small metal post
  - Swapped integrating sphere and beam splitter cube
    - Now can see spot on mirror and integrating sphere input port (more follows)





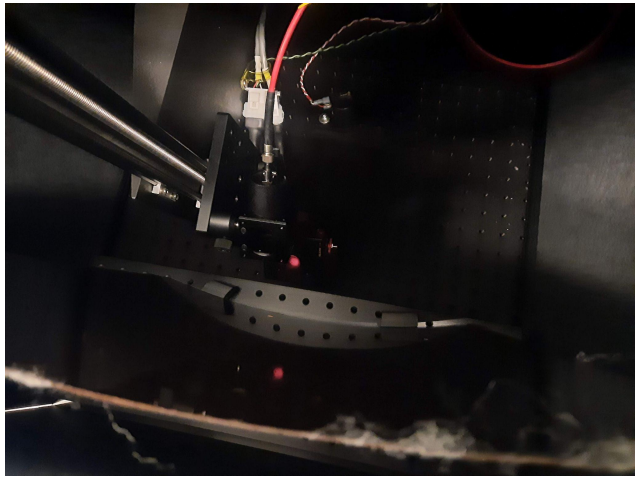
Mounting – update

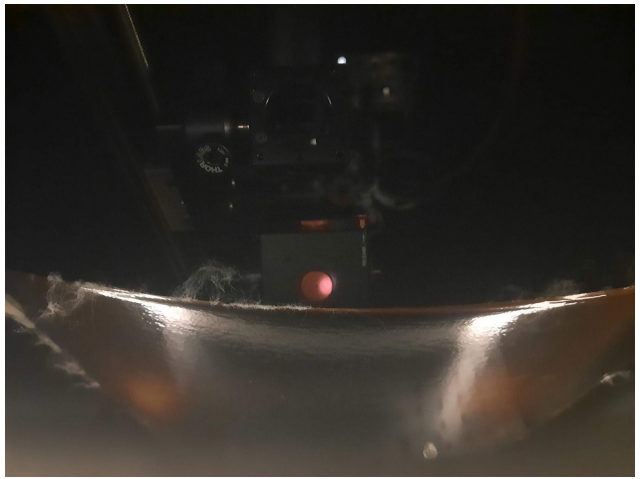
- Solutions to issues:
  - Added new stop on small breadboard
    - Small metal post
  - Swapped integrating sphere and beam splitter cube
    - Now can see spot on mirror and integrating sphere input port (more follows)
- New issue – need a new stop on **top** of linear stage
  - Breadboard needs to stop about 4 cm before the top of the linear stage to prevent fiber hitting the box lid
  - Top is outside normal operation range
    - Only for safety to prevent optical fiber damage
  - **Solution** – 3D printed stop that will hit the endpoint switch
    - Will be designed and 3D printed in-house at BNL



Beam alignment

- New setup allows easy beam alignment
  - Now using limited reflectivity of uncoated mirror
- Possible challenges for full scale mirrors:
  - Mirror shape
    - Beam alignment good at bottom of mirror, but bad at the top – mirror is “propeller” shaped
      - (top) Beam spot aligned with input port
      - (bottom) Beam spot shifted
    - Hopefully will be solved with back supports
  - Precise position with respect to the rotating stage
    - Bolt holes on breadboard don’t provide fine enough spacing for precise placement
    - Suggested solution is a custom holder mounted to breadboard
    - Current holders should be good enough for first tests, before we get fully assembled mirrors





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 (finish by end of June)
      i. Installation of the optical table to the dark box – need full scale or small curved mirror
      ii. Optimization of output data format
      iii. Missing: Curved mirror holders (full scale and small sample)
      iv. Goal: First test scans
3. July
   a. Deploy full reflectivity scanning framework, including documentation (finish by ca. July 11)
      i. Present progress at Collaboration meeting
   b. Start full mirror scans (have ready by end of July)
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
      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 – ongoing, will be finished with coated mirror
      iii. Curved mirror holders
3. July
   a. First test scans – with coated mirror (first full scale mirror coating this week)
   b. Deploy full reflectivity scanning framework, including documentation (finish by ca. July 11)
      i. Present progress at Collaboration meeting
   c. Start full mirror scans (have ready by end of July)
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)