

# Mirror testing

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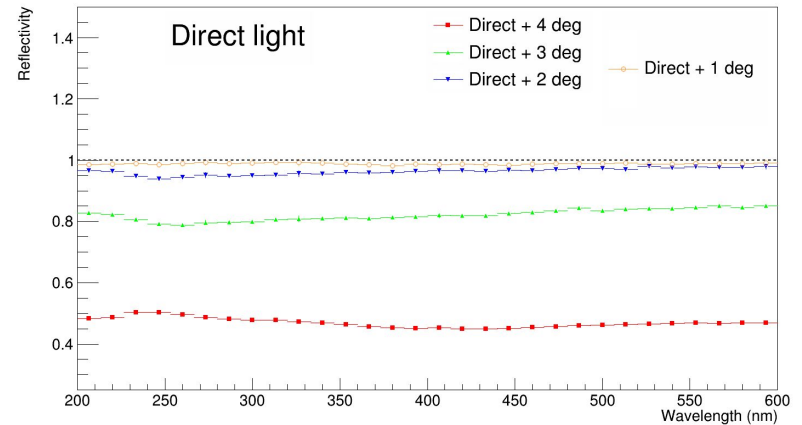
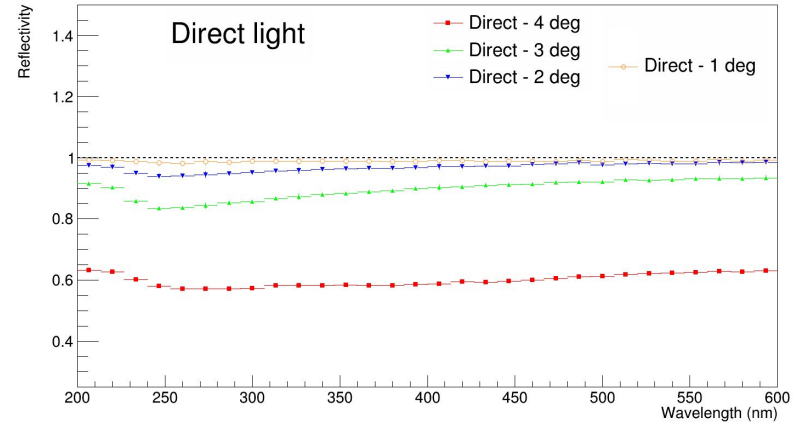
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# Overview

- Tests of the small mirror test stand
  - Photodiode scan
  - Darkness in the box test
  - Beam spot test

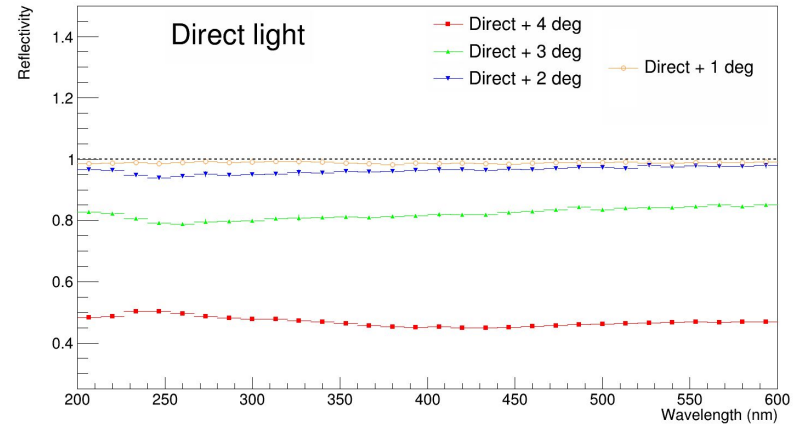
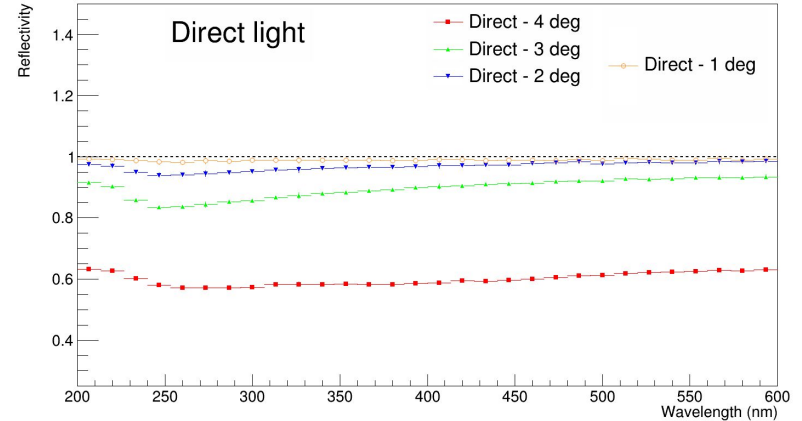
# Photodiode scan - method

- Move beam spot across the photodiode to evaluate its sensitivity
- Beam spot centered in the vertical direction, spot moved from side to side
  - Vertical scan will follow
- Baseline is measurement at direct light with beam in center of photodiode
- Beam spot moved in steps of **1 degree**
  - **1 degree** = 1.47 mm shift on camera
    - Sensor width is 1024 px. (6.55 mm)
    - Beam spot shift is 230 pixels/1 deg
- Shift for photodiode is smaller as it is closer to the axis of rotation
  - **1 deg** = 1.24 mm shift



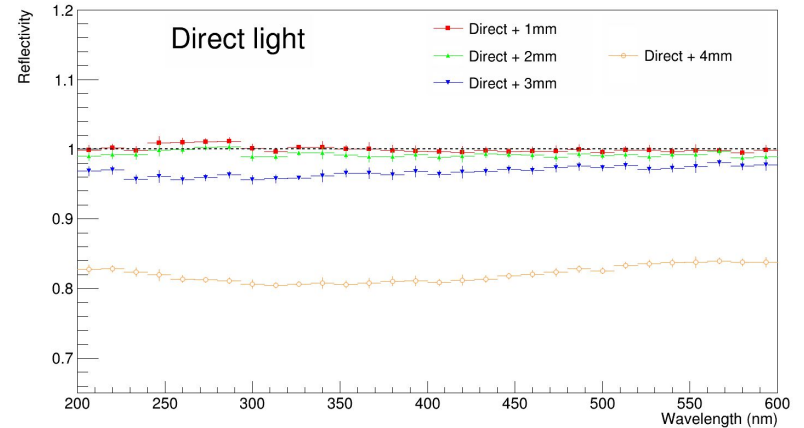
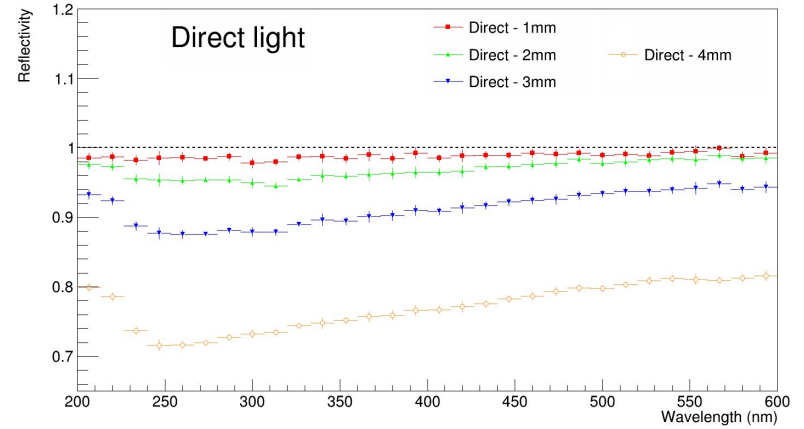
# Photodiode scan - results

- Small (1 deg) shift does not seem to have large effect on the collected light
  - Full beam spot should be still on the photodiode
  - Small difference from accepting different part of the “halo” around the main beam?
- Quick drop-off at larger angles
  - Beam spot already shifts close to edge around 2 deg rotation
- Halo around main beam is probably substantial
  - Quite a lot of light collected at large shift (4 deg) even when the beam should not hit the photodiode directly



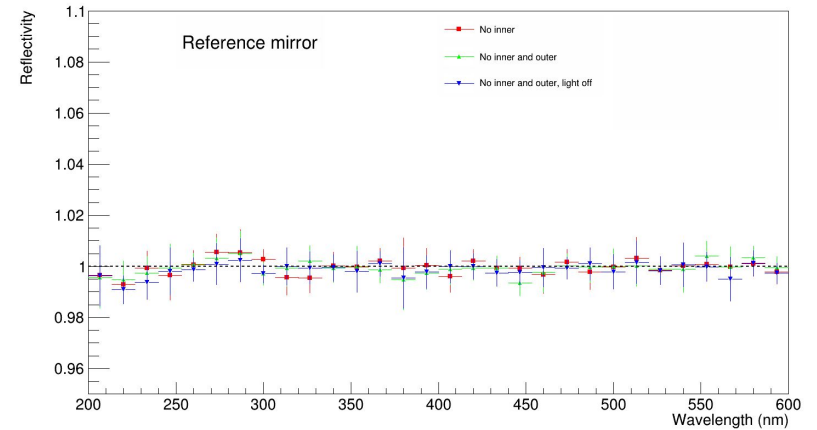
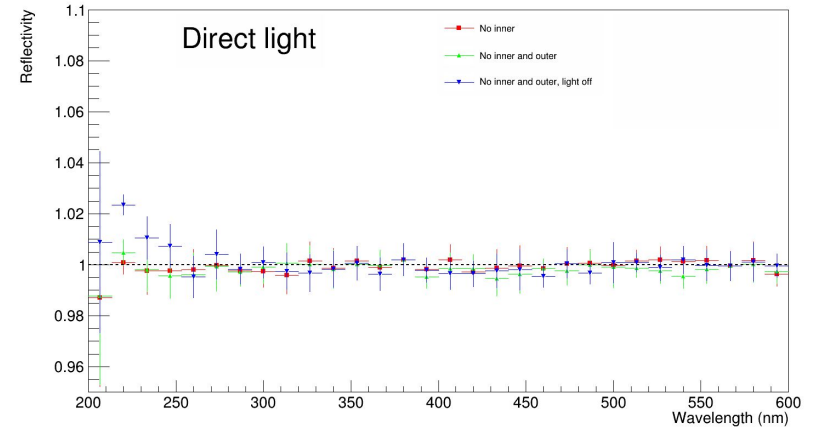
# Photodiode scan - new results

- New measurement with beam spot **shift by 1 mm** from center of the photodiode



# Darkness test

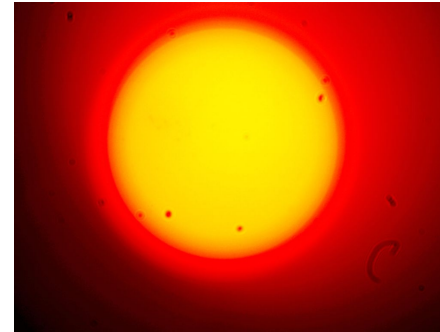
- Test if we have any light leaks in the box
- **Default method:** Cloth inside of box, lid on box, another cloth over the box, lights in lab on
- **Test 1:** Remove inner cloth, lights on
- **Test 2:** Remove inner and outer cloth, lights on
- **Test 3:** Remove inner and outer cloth, lights off
- Done for both direct light (top) and with Thorlabs mirror at 45° (bottom)
- **No significant differences between setups**



# Beam spot test

- Visual test of what the photodiode “sees” for different setups:
  - View using reference camera
  - Direct light vs. 45° with Thorlabs mirror
  - 600 nm light
  - Two different optical fibers
    - (top) default fiber (200  $\mu\text{m}$ )
    - (bottom) thin fiber (50  $\mu\text{m}$ )
- Large fiber seems to have substantial halo around the main beam
  - Also seen in the photodiode scan test
- Will investigate difference in alignment for the two fibers

Direct light



45° Thorlabs

