Measurements from 8/16 were with the room lights on, when there was a light leak

8/17/18

Found that the max power with no aperture was lower than with the aperture, despite the fact that the beam seems to be ~1 degree wide and ~2-3 degrees tall (vertical), and the aperture is ~4 degrees. The last image from today shows many tests, with the highest points from the runs with no aperture and the lights off being about 20% higher than with the aperture. We believe this is because the PMT has small metal lines at its front surface ~0.03” wide which block part of the beam (could be 20% depending on alignment). This makes sense, as the scans without the aperture show dips in the measurement of a similar amount. So measuring the power with the aperture is likely to underestimate the true total power by ~20% (while the reflectance measurements will probably be negligibly affected). Using this correction may still underestimate the incident power somewhat, as the beam is still partly blocked even with the aperture removed, but probably by no more than ~5%.

Do we understand why the beam is affected by the aperture at all when well-aligned? Dips with the aperture seem to line up with dips without it, but the drop isn’t quite the same. But if the aperture is only slightly larger than the beam, the peak power may align with a PMT line, so the apparent peak power is actually lower (and in a different spot) than the true beam max.