Unanswered Theory Questions:

1. How can we use non-optimal entanglement witnesses that require even fewer basis measurements in order to improve the adaptability of our procedure?
    1. [The witness that was suggested by Prof. Lynn](), $V = \langle a\mathbb{I} - \sigma_z \otimes \sigma_z - \sigma_x \otimes \sigma_x \rangle$, as something that is potentially evidence of an entanglement witness that uses fewer measurements is in fact a true entanglement witness. It is, however, not "optimal".
    2. I have not thought much about how to find other examples of these witnesses though. It is ironically somewhat more straightforward to find optimal witnesses.
2. Is the random state generation that we use a productive analogue of real world use cases?
    1. If in the real world we have have existing knowledge of what the state should be then it may instead be much simpler to choose a single entanglement witness tailored to that.
    2. It could be better to test our procedure on a finite set of carefully chosen and justified states instead of a random sample chosen from an arbitrary distribution.
3. Why does the min-max method described in our write up work analytically? Are there probability distributions for which it does not work?
    1. Thinking of the space of separable states as a convex hull in some higher dimension we can think of entanglement witnesses as hyper-planes that touch up tangent against this hull. This creates a geometric intuition for how different states can be roughly localized using witnesses that don't quite detect them.

Unanswered Technical Questions:

1. Why did it seem as if the rotation mount jumped slightly after crossing 0 degrees on 1 or 2 occasions and then never give evidence of doing so again?
    1. Could potentially have been an artefact of averaged data collection that started too soon before the mount had finished moving.
    2. Could also have been related to different speed settings for the motor.
2. Will the Elliptec Motors remember their addresses and positions/home if they get turned off?

1. Having talked to Gallichio's group we do expect that they should remember their addresses and home positions but this has not been tested ourselves.

3. What is causing the slowly decaying purity that we have been seeing the week of July 11th?

    1. At the start of the week the purity was calibrated to ~95% but by the end of the week it was approaching ~93%.
    2. We do not expect that it is an issue with the homing of the components as we have checked the calibrated positions for various states and verified that they are either maximized or minimized properly at these locations.
    3. Temperature has also been fairly regular at this time: 64-65 degrees.

4. Potentially related to the previous question: What is the cause of the unexpectedly low VV counts when making purely HH? And why are we detecting more HV than VV?

    1. A potential explanation might involve background single counts and accidental coincidences on the order of ~20 counts per second for the HV and VH channels. Although this may not check out with actual statistics.

5. How can we ensure that we never have to rotate the Quartz Plate far enough that we are near the Brewster angle? Or what to do if we have to?

6. How to utelize the measurement plates in a clever way to construct states that we would not otherwise be able to construct and measure.

    1. In particular Bob's creation HWP and Bob's detection HWP come in series and therefore the only important parameter is the relative rotation between the two. This indicates that we could produce states as if we had another HWP on Alice's path.
    2. However it is unclear whether or not repurposing the measurement plates could in some cases limit the space of states that we are able to detect.