TO RUN 2D SCAN OF A SAMPLE:

1. Initialize stage (in x,y directions only). Run “Alex_initialize.vi”.
    a. VISA Resource Name should be Com 9 (for all vi’s)
2. Mount sample on mirror
3. Focus laser on sample by moving stage in z-direction using the buttons for “axis 3” on the Newport motion controller
4. Get the background reading for the photodetectors
    a. Turn on photodetectors. Block the laser so that it does NOT reach the photodetectors
    b. Open “test_voltage.vi”
    c. Set desired sampling rate and number of samples to collect. Run the vi (don’t worry about the other inputs). This will return the average voltage reading for each detector for the set parameters in the boxes “Incident Voltage” and “Detected Voltage”
        i. I used 100Hz and 5000 samples here, but that was an arbitrary choice
    d. Set returned voltages as “Incident Offset” and “Detected Offset”
5. Ensure that the photodetectors are reading the proper voltages
    a. Still in “test_voltage.vi”
    b. Have laser hit mirror only (the laser does not go through the sample)
        i. Use the buttons on the motion controller for “axis 1” and “axis 2” to move the spot of the laser
    c. Set number of samples to something small (100 to 500), run continuously
    d. Adjust the beam / irises / detectors as necessary until “Det P / Inc P” is close to 1
        i. “Det P / Inc P” is the scaled power readings from the detectors
        ii. The voltage indicators are the measured voltages, with “corrected” indicating that the offsets from step 4 are subtracted out
    e. Increase the number of samples and tune again
    f. Repeat until satisfied that “Det P / Inc P” = 1
6. Open “master_filenames.vi”
    a. This is the vi that actually runs the scan
    b. Inputs:
        i. Use offsets from “test_voltage.vi”
        ii. Set number of rows and columns of scan
        iii. Set pixel size for each pixel in scan
            1. Note that the algorithm scans a pixel and then moves, so the physical size of the area scanned is (# columns - 1) * (pixel size) in the x dimension and (# rows - 1) * (pixel size) in the y dimension
        iv. Set sampling rate and number of samples to average for each pixel
        v. Set file path to store the data. End in “.csv”
            1. The data is printed to the file row by row. So, if the file here is non-empty, the scan data will append to that file (not overwrite)
    c. Set laser to desired location of first pixel (upper left corner of scan area)

i. The scan will occur row by row, moving down the rows, from left to right for all rows. The ordering is shown below:

ii.

1	2	3	4
5	6	7	8
9	10	11	12

d. Run the scan

e. The output to the .csv file will be as follows:

i.

X position	Y Position	Det P / Inc P
(pixel 1)		
(pixel 2)		
(pixel 3)		
...		

ii. The position columns read the position from the motion controller. The third column gives the power fraction between the two detectors, with 1 - (Det P / Inc P) the fraction of incident power absorbed / scattered

OTHER FILES (you may need to use):

1. “Alex_write_command_and_read.vi”
    a. Allows user to send commands directly to the motion controller.
    b. Commands I used:
        i. Move to absolute position: (Axis)PA(position)
            1. So the command 1PA+3 will move the x-position of the stage to +1 mm
        ii. Move to relative position: (Axis)PR(position)
            1. 2PR-0.5 will move the stage 0.5 mm in the -y direction
        iii. Read current position: (Axis)TP
        iv. Homing Command: (Axis)OR
2. “Scan_to_position.vi”
    a. Given a direction and a distance, the stage will move
    b. There is a safeguard to prevent the stage from moving too far at once (it will abort the scan if commanded to move more than a given distance - I had it set to 15mm). This may need to be changed in the block diagram if scanning a large area

c. Probably the only time you would need to use this file would be to change the safeguard