Aligning the MZI:

Our experiment calls for a White Light Interferometer (WLI), specifically using the Mach-Zehner Interferometer (MZI), which differs slightly from the normal Michelson interferometer in that there are two beam splitters rather than the one. To align the WLMZI (White Light Mach-Zehner Interferometer), we will first use the HeNe Laser to get us in the ballpark (mm). The WLI requires um precision, which we will get to by empirical means.

1. Use the HeNe laser, fiber, fiber connector, cards, and the MZI setup
   * Connect laser w/ fiber to connector and the connector shining the beam into the path of the WLMZI set up we want to use.
   * Measure the split beam paths with a ruler (+/- mm) and ensure they are as close to equal as possible. Record this.
   * Adjust mirror-beamsplitter pair until we begin to see the bright spot with few fringes at two points after the beam has been recombined. Look at the spot with the card. Take pictures of this.
2. Switching fiber back to WLS and now using an Ocean Optics spectrometer in place of the diode of the recombined end of the ZMI.
   * We will finely adjust the stage until the spectrometer spits out a graph that looks like our homework. (intensity as a function of phase) Record the distance, and the graph
   * Once we see the graph, we know the WLMZI is aligned both spatially and temporally

The Experiment:

Now that we have an aligned WLMZI, we can take some measurements. We’re going to look at different surface roughness and try to reconstruct the surface. By placing transparent and rough materials into the beam path of one of the arms of the WLMZI, we are changing the length of the arm of the WLMZI, which then throws off our alignment. We will need to adjust the stage and record and repeat.

Goals:

* Measure the roughness of different materials using a MZWLI
* Digitally reconstruct the surface from our measurements