Outline Session 2

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The focus of this session will be to establish the validity of previous sessions setup procedures, and to conduct the mesh filtering experiment, along with the character recognition, dark field image recognition, phase contrast using a phase plate. If we have time we'll attempt to complete the diffraction component as well.

Setup: (quick)

- Align the spatial filter using methods outlined in the session 1 lab book
- Setup the beam collimation correctly
- Identify the image plane and object plane, using the configuration from section 4.3
- Identify the Fourier plane, using the second lens in conjunction with the line image

Mesh Filtering: (slow)

- **Imaging setup.** Look at the image somewhere along the output and measure spacing to get m
- Use the formula for magnification $m = \frac{s_i}{s_o}$ and determine whether the magnification agrees
- Add the Fourier lens to generate magnified image of FT, **TAKE PICTURE**
- Make observations for what happens as mesh is moved
- Make calculations on the spatial frequencies, compare with the mesh spacing

Character Recognition: (quick)

- Using same Fourier setup as before, place NOZON aperture, observe Fourier Transform
- Based on Fourier transform, we'll add another filter this time with two slits

Dark Field Image: (quick)

- Using the black dot as the aperture, and testing out a bunch of filters as the object, observe the resulting images

Phase Contrast: (quick)

- Place phase plate into the Fourier Transform plane
- Place grating aperture into the object plane
- Insert vertical razor blade with wedge of clear plastic taped to it into FT plane **TAKE PICTURE**
- Make observations, and estimate mesh magnification

Diffraction: (slow)

- Insert slit aperture with variable width into system, and remove the Fourier Transform lens
- Observe for small and large slit width, **TAKE PICTURE**
- **Record 5 different slit widths**
- Plot diffraction pattern intensity along the axis perpendicular to the slit axis
- Compare the experimental data with the Fraunhofer and Fresnel models, see which is better.