Experiment 7 Fourier Optics 傅立葉光學

Translation: J D White (Bench 1)

1. Theory (See Online Links)

2. 實驗儀器 (Laboratory instruments)

Chinese	English Name	Label
氦氖雷射(含雷射架)	He-Ne laser (with laser frame)	

3. 實驗目的 (Purpose)

1. Practice your skills in laser alignment
2. Understand the principles of high-frequency filtering and train in the expanding of the light for parallel processing.
3. Become adept at using the spatial filter
4. Observe the optical Fourier transform results and understand the application of these results in signal processing.

4. 實驗步驟 (Procedure)

1. Turn on laser and align laser parallel to the optical rail, adjusting laser direction and 45 degree mirror. This is done using two aperatures at the same height to ensure the laser beam goes is perfectly horizontal along the center of the rail.
2.
3.
4. Set up a screen at the end of the laser rail and mark the spot the laser beam hits the screen (could just leave an aperature there)
5. Place the Spatial filter assembly in the laser beam along with the 10X objective lens. Ensure the center of the emitted beam is at the same location.
6. Place 25 micrometer pinhole in the spatial filter assembly. Adjust the objective lens away from the spatial filter to maximize transmission.
7. Alternating with step 6, ajust pinhole position to maximize the brightness of the laser beam through the pinhole. You should see a circular diffraction spot.
8. Adjust the the spatial filter and slowly move forward in the objective lens to observe diffraction patterns and changes in brightness, Adjust the position of the pinhole until the diffraction fringes disappear and become a uniform round intensity distribution round. This is now approximately a point source.
9. Add a lens after the pinhole and position it so that the light is collimated.
10. Set up the rest of the system according to Figure 9.

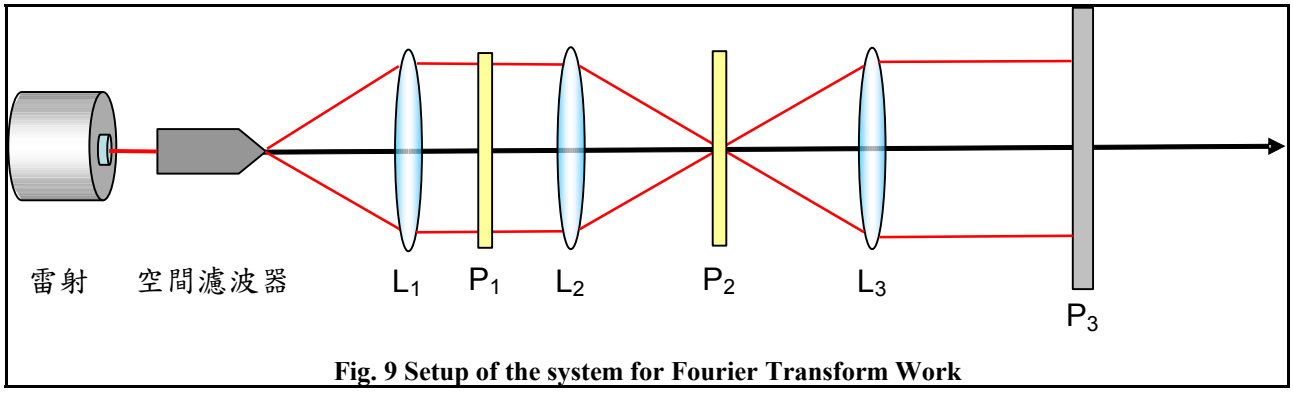

Fig. 9 Setup of the system for Fourier Transform Work