5.1: Background Material

Text References

- single slit diffraction
- Babinet's principle
- interference of many sources in phase

Interference After Reflection

In the previous lab, we explored interference of light waves coming through two slits. The two waves emerged from the slits in phase, so difference in distances they traveled accounted for the interference pattern observed. In the reading above, we see that if we use many more slits (a diffraction grating), then we get a much more sharply-defined pattern, with very intense bright fringes separated with the same $d \sin\theta = m\lambda$ relationship as for the double-slit, but separated by broad regions of darkness.

We are going to explore this phenomenon in this lab, but rather than pass the laser light through the many slits of a diffraction grating, we are going to *reflect it* off a surface with many grooves – a compact disk. The light that strikes the raised ridges of the disk are reflected diffusely (i.e. not in phase), which effectively means that these ridges act like the spaces between slits in a diffraction grating. Meanwhile, the interior of the grooves are highly reflective, so the light reflected from them remains in phase, and the grooves behave like the slits of a diffraction grating.