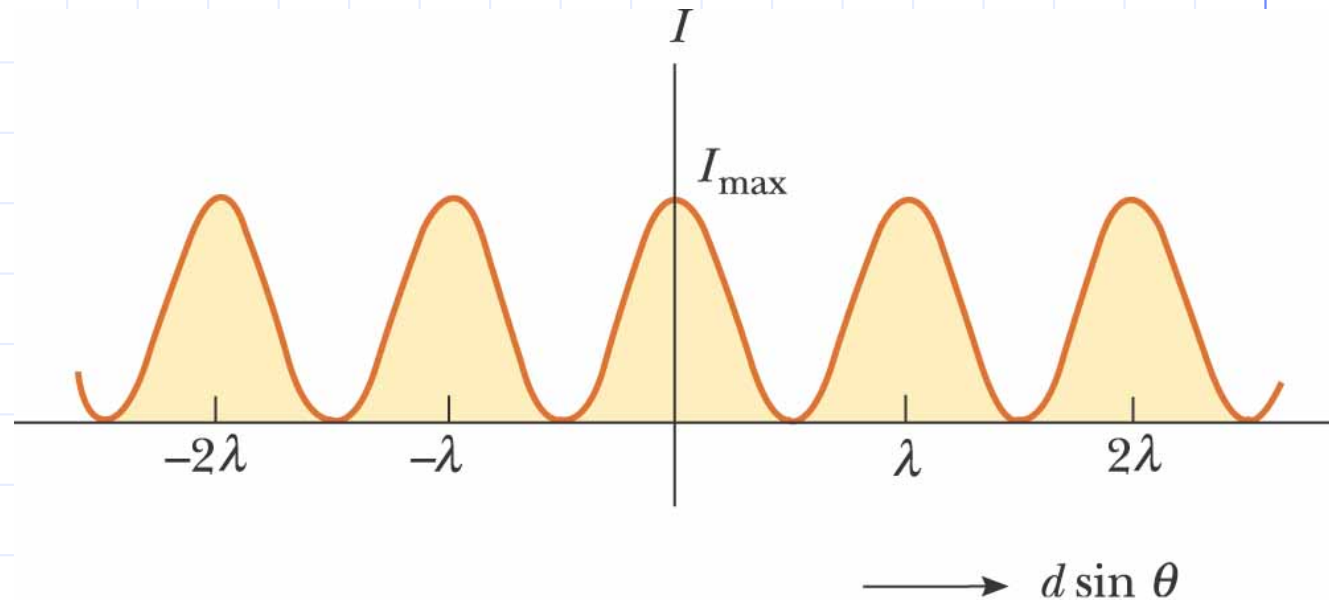
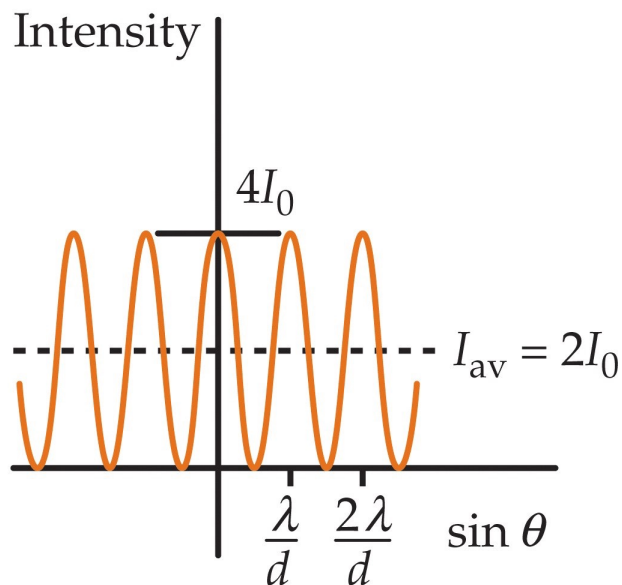


Interference Pattern Intensity Distribution

◆ Light intensity I for two narrow slits



©2004 Thomson - Brooks/Cole

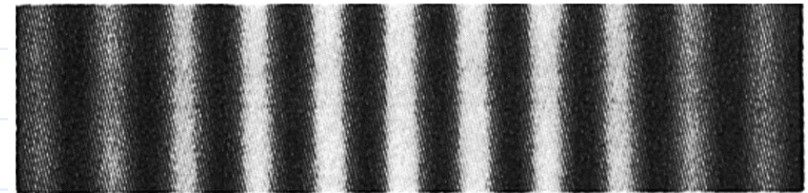
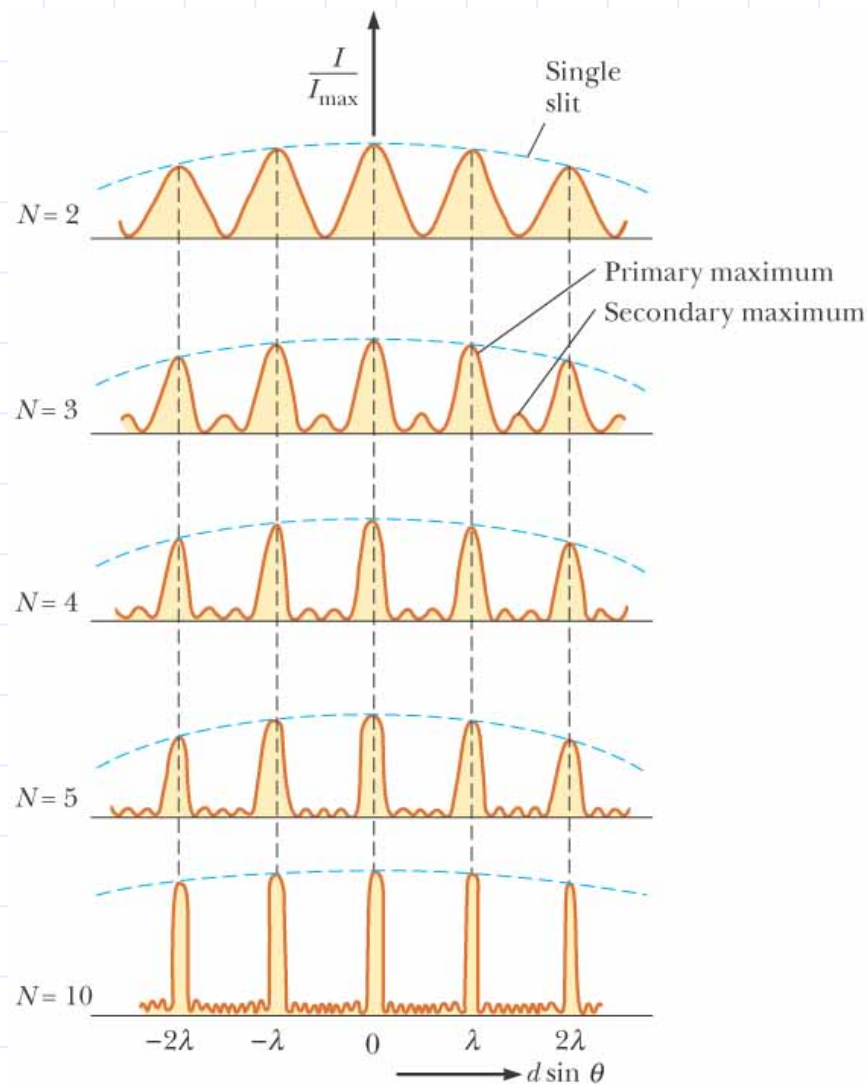


◆ Average amplitude for a squared-sine function

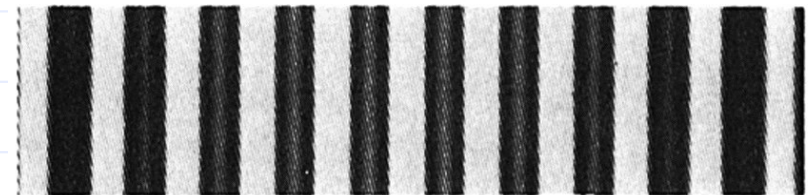
Example Problem

◆ A He-Ne laser with $\lambda = 633 \text{ nm}$ shines on a double slit separated by 0.35 mm . At what minimum angle is the intensity 50% of the maximum? If the screen is located 1.8 m away, what is the distance between the two angles on either side of the maximum for which this intensity occurs?

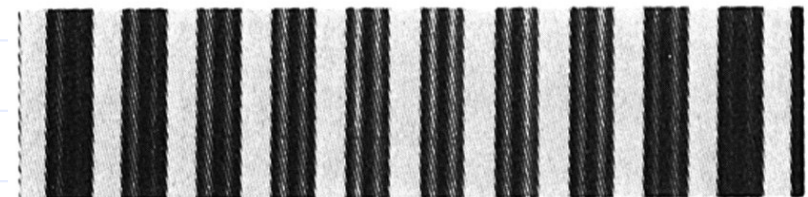
Intensity for multiple slits



Two sources

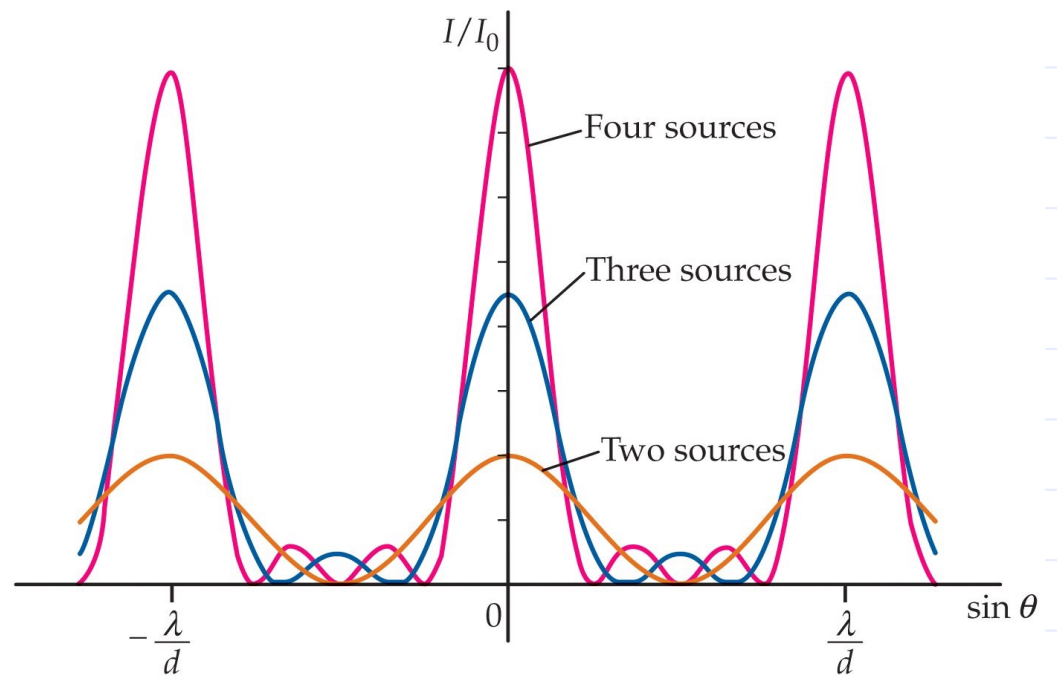
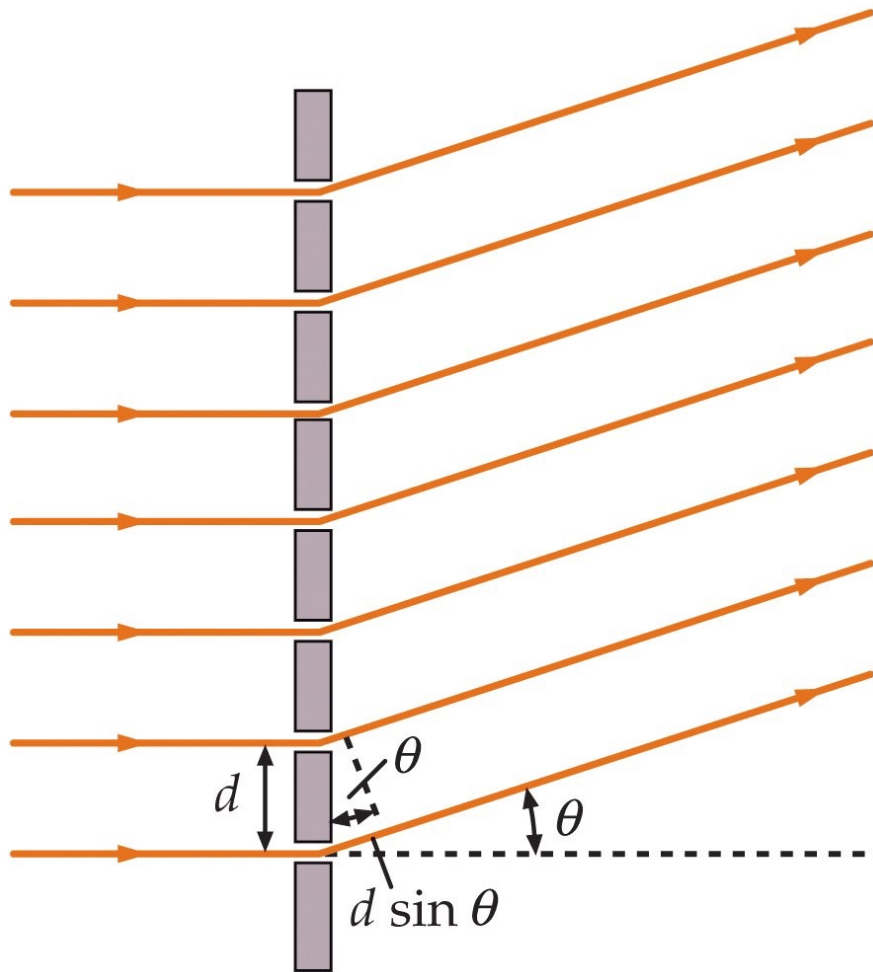


Three sources



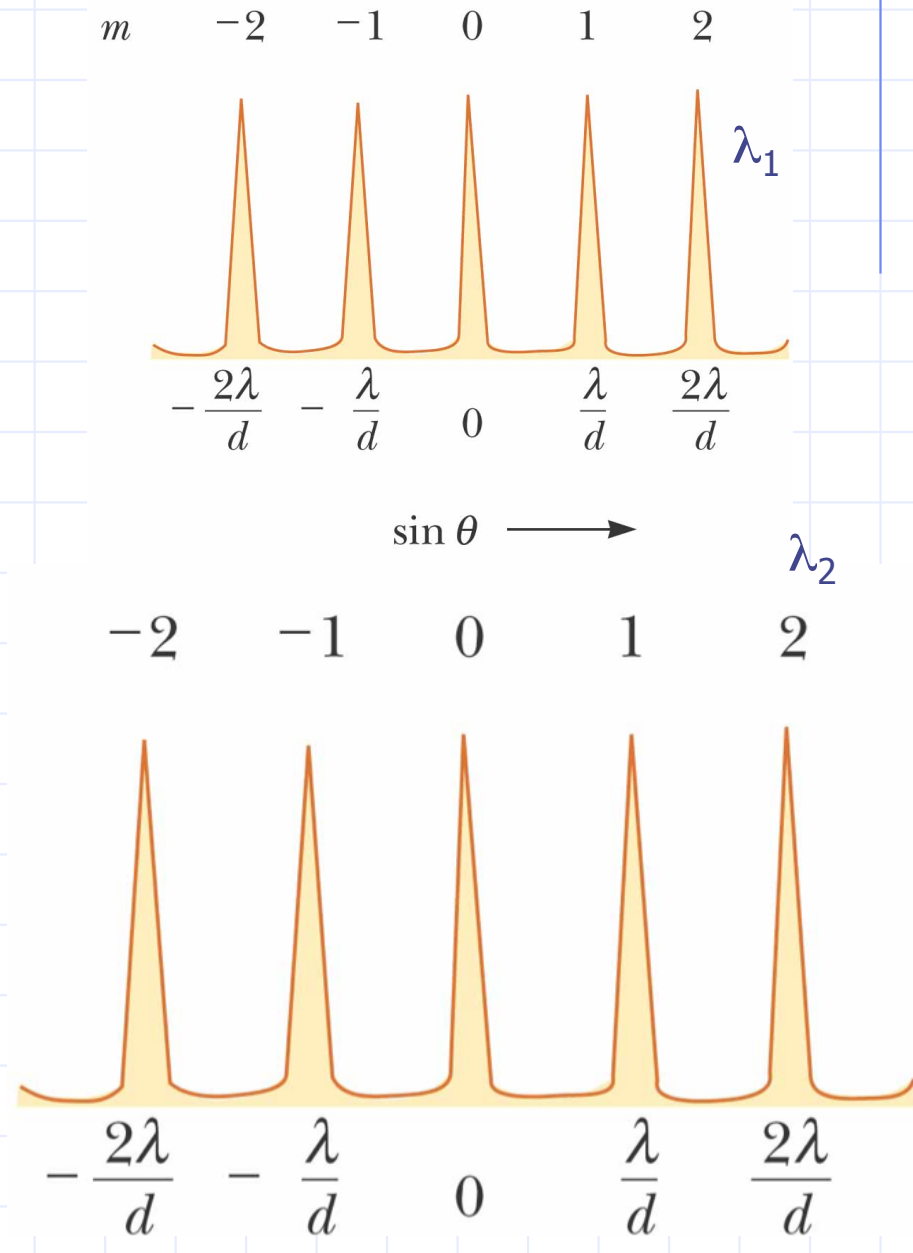
Four sources

Diffraction Gratings



Chromatic Resolving Power

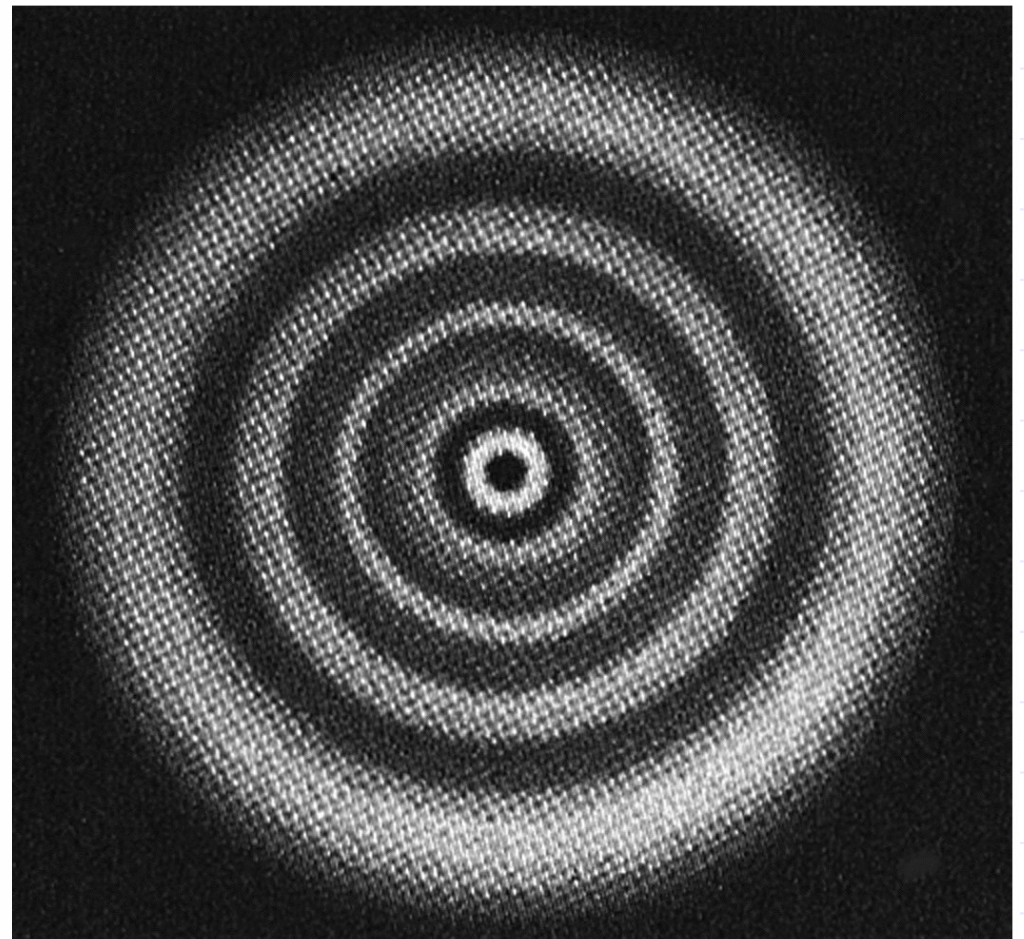
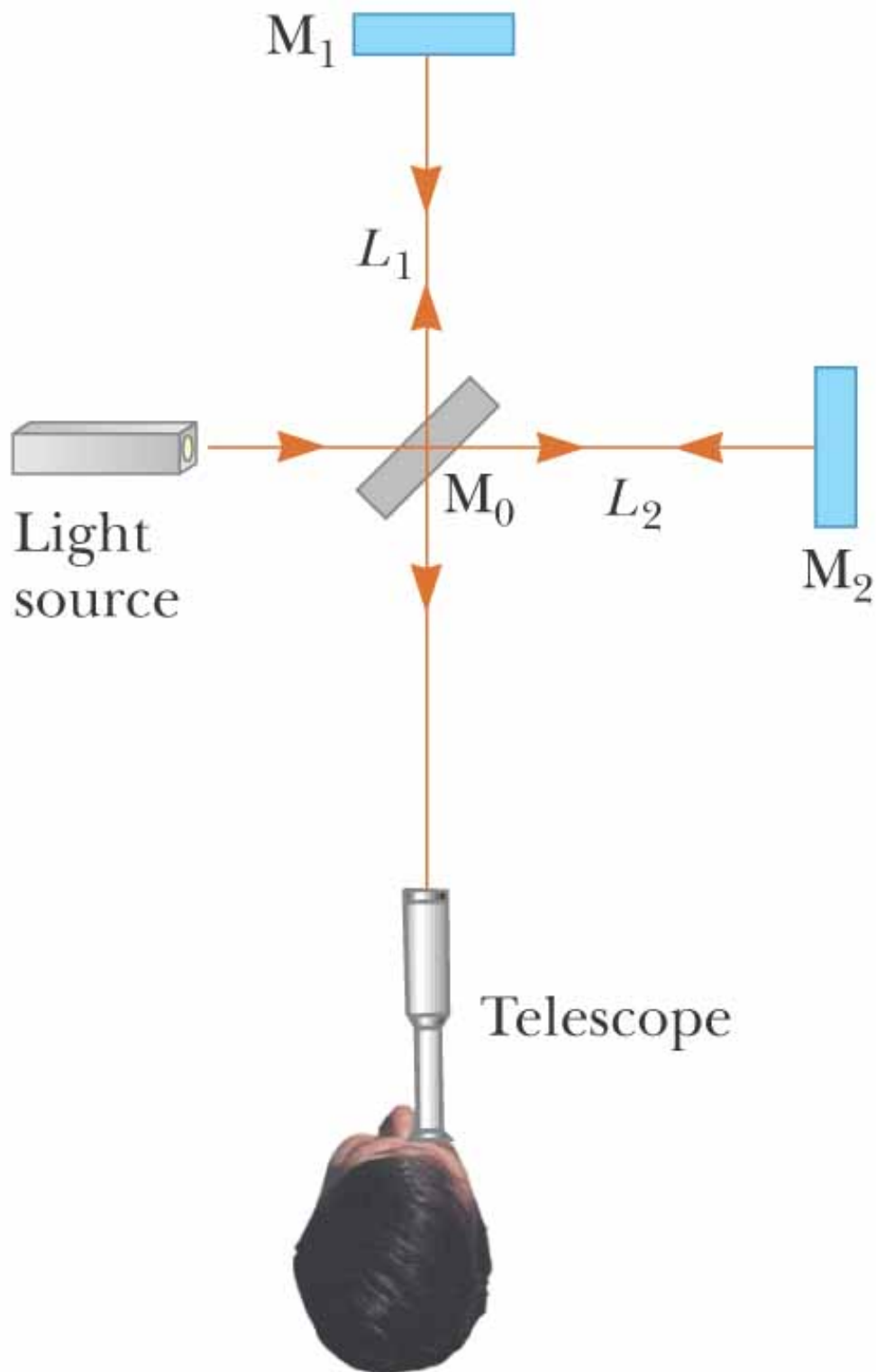
- ◆ If the source (i.e., a star) is not monochromatic, a diffraction grating can perform the same function as a prism – separate the different λ components
- ◆ For $m=0$, all components are merged
- ◆ As $|m|$ increases, the order of components separate more and more
- ◆ What if λ_2 and λ_1 are close?



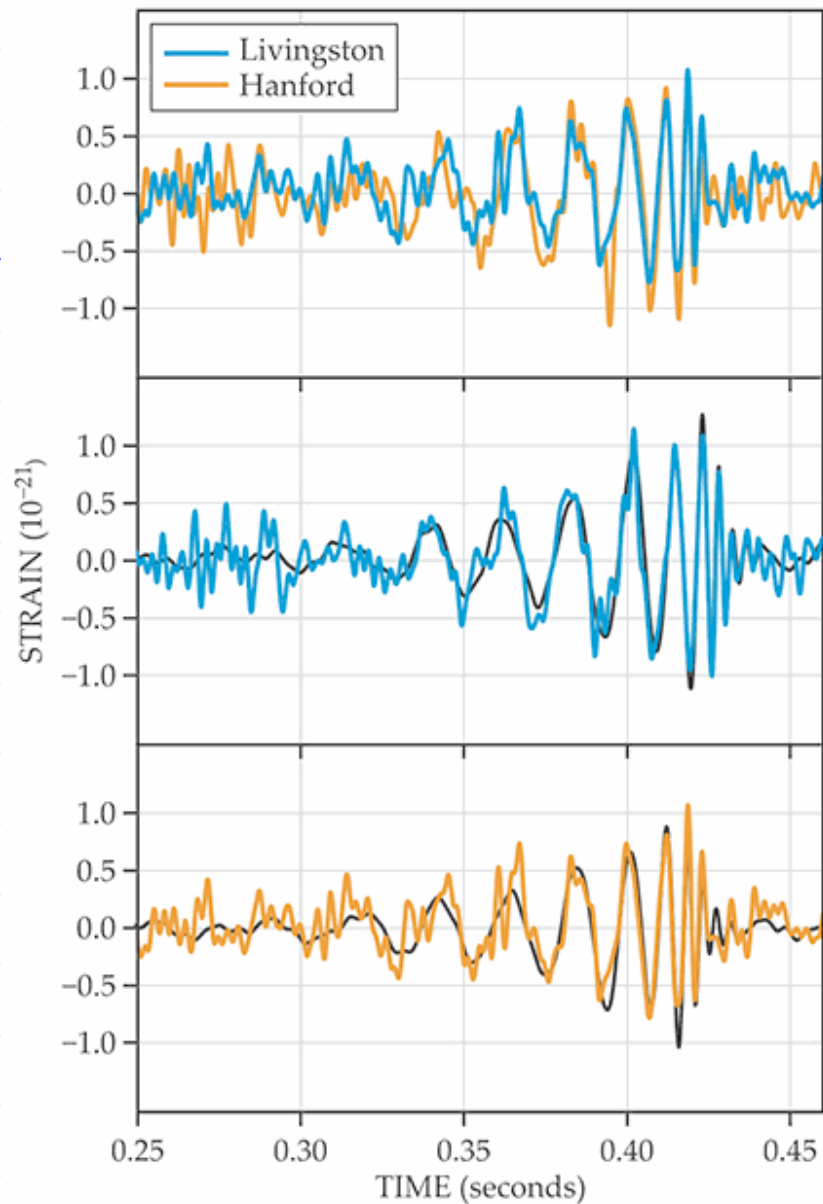
Example Problem

- ◆ Three discrete spectral lines occur at angles of 10.09, 13.71, and 14.77 in the first-order spectrum of a grating spectrometer. (a) If the grating has 3660 slits/cm, what are the wavelengths of the light? (b) At what angles are these lines found in the second-order spectrum?

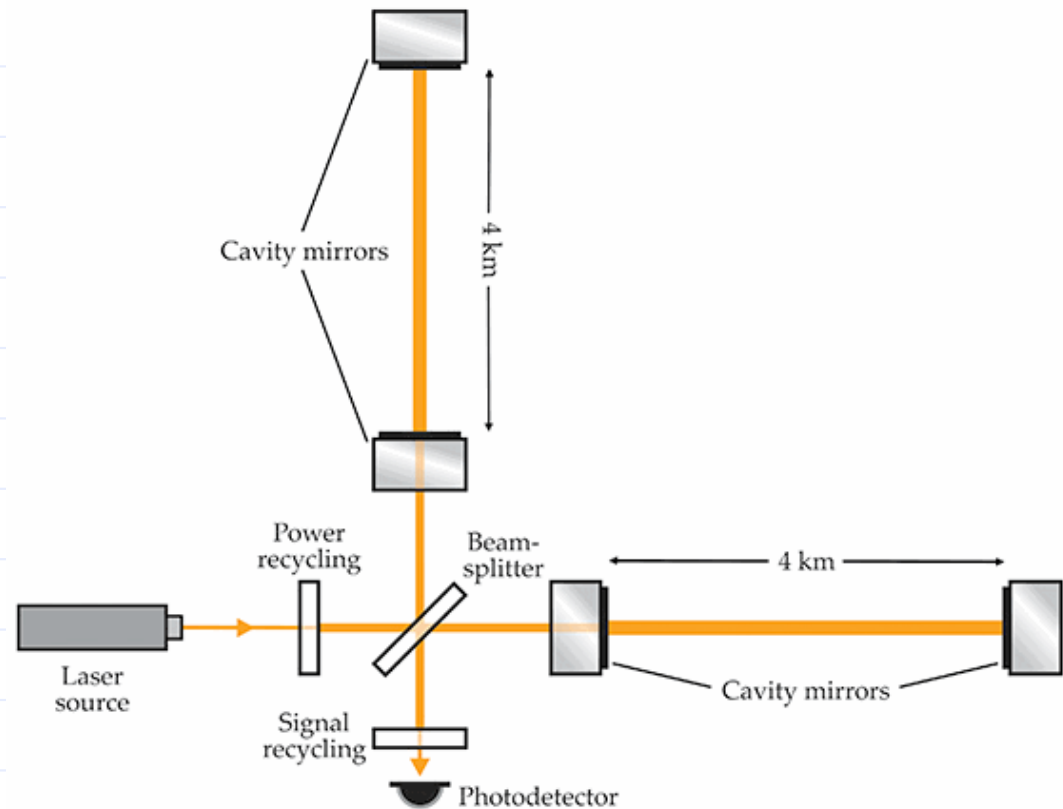
Michelson Interferometer



LIGO (Laser Interferometer Gravitational-Wave Observatory)

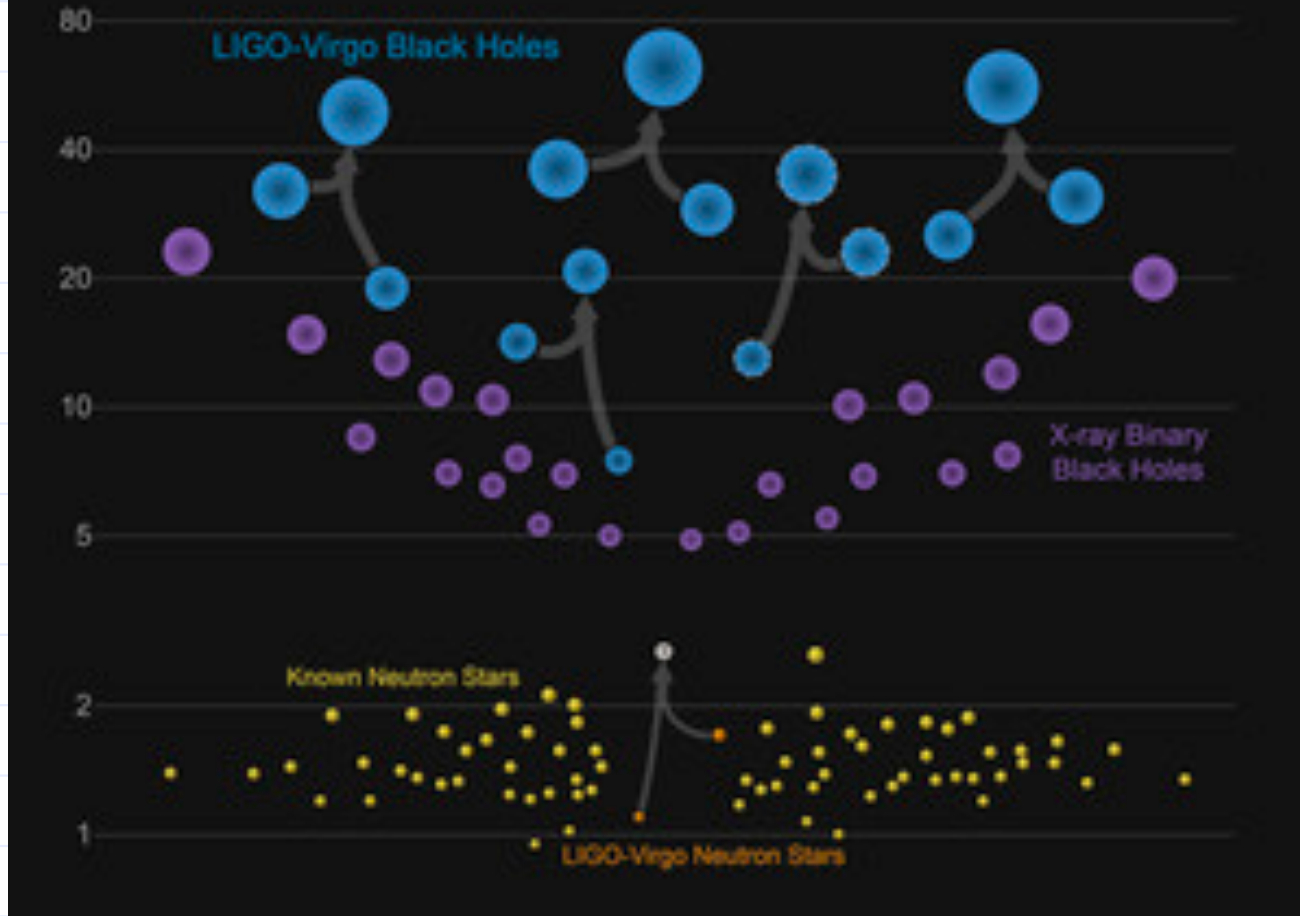


1st gravitational wave detection on Sept. 14, 2015

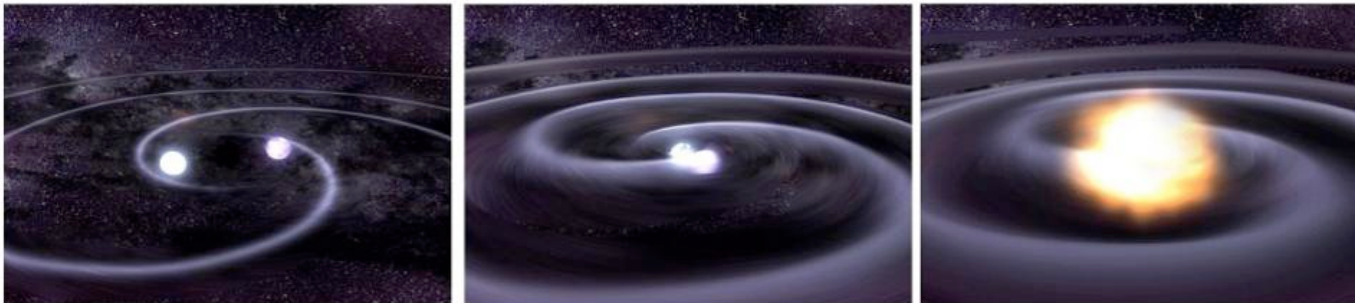


Masses in the Stellar Graveyard

in Solar Masses

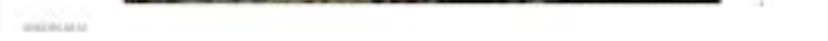


Many black hole mergers have been detected so far, as well as black hole-neutron star mergers



First binary neutron star merger
Aug. 17, 2017

LIGO ...LIGO in Louisiana



Origins of the elements

Example Problem

◆ A mirror in a Michelson Interferometer is moved a distance of $L=0.382$ mm. During this movement, 1700 fringe shifts (light to dark to light) are observed in the interferometer pattern. What is the wavelength of the incident light?