

Physics 267: Problem #12

Consider the HeNe laser. Assume that the amplified transition gives  $\lambda=632.8$  nm. The cavity length is  $L= 30$  cm.

1. How many wavelengths fit inside the cavity?
2. Estimate how much broadening of the line occurs due to the thermal motion of the Ne. Hint: Use relativistic doppler shift.
3. Given the width of the transition estimated above, calculate how much longer the cavity could be and still have the radiation be in the same "mode". A particular mode is defined by the (integer) number of wavelengths in the cavity.