

- 1) *Temperature of a blackbody with same spectral energy density as a HeNe laser:*
  - a. The linewidth of a HeNe laser ( $\lambda = 632.8\text{nm}$ ) is one-fifth of the Doppler linewidth. The temperature of the discharge is 400K, and the atomic mass of neon (the lasing atom) is 20.18. Calculate the laser linewidth in Hz.
  - b. Assuming the power inside the cavity is 200mW and that the cavity mode has a constant diameter of 1 mm, and a uniform intensity. Calculate the temperature of a blackbody, whose energy density at 632.8nm is equal to the energy density of the em wave inside the laser cavity.
- 2) Find the relation between spontaneous emission lifetime and cross section for a simple atomic transition that is independent of the dipole moment.
- 3) Svelto problem 2.5.
- 4) Griffiths problem 9.7.
- 5) Griffiths problem 9.8.
- 6) Griffiths problem 9.14.