

國立中央大學九十一年度碩士班研究生入學試題卷

所別: 天文研究所 不分組 科目: 近代物理 共 1 頁 第 1 頁

Planck constant: $h=6.625 \times 10^{-27}$ erg sec

Boltzmann constant: $k_B=1.38 \times 10^{-16}$ erg K⁻¹

1. Using uncertainty principle show that the expectation value of the energy of a harmonic oscillator can never be less than zero-point energy. (20 point)
2. Explain the Zeeman effect and the Stark effect. (20 point)
3. The sodium D line has a wavelength of 590 nm corresponding to a transition from the first excited state (3p) to the ground state (3s). What is the ratio of the stimulated emission to spontaneous emission at a temperature of 500 K for the sodium D line? (20 point)
4. Calculate the number of photons of all frequencies in a cavity of volume V at a temperature T . (20 point)
5. Determine all of the states of a pf configuration of two electrons in LS coupling. (20 point)