

Physics 492: Recitation #2
January 29, 2016

1. Calculate r_0 for carbon monoxide. Use the value $\lambda_1 = 2.61\text{nm}$ (microwave). The atomic mass unit is $U = 931.5\text{Mev}/c^2$
2. Define an angle $\cos\theta = J_z/|\vec{J}|$. What is the smallest value of θ (in degrees) for a spin-1/2 particle? An $\ell = 1$ atomic state? A macroscopic spinning top? Yes, $\theta = 0$, but make an estimate for ℓ . ($\hbar = 10^{-34}\text{kg} \cdot \text{m}^2/\text{s}$)
3. Show that if two operators \hat{A}, \hat{B} have a complete set of eigenstates in common then they commute. Make sure you use completeness.
4. For a spin-1 particle in the basis $|1, m\rangle$ find the matrix representations of the $\hat{L}_x, \hat{L}_y, \hat{L}_z$ angular momentum operators. Work it out in detail from the properties of the operators even if you remember!