

ME 498 Homework 1 Due 9/6/23

- 1) Calculate the energy levels for a particle confined to a disk of radius r_0 . That is, it can have any value of r and θ , but z is fixed. You can probably find this solution on-line, but write it out in full detail, and then plot the radial part of wave function for the lowest two energy levels, and list the values for these energy levels.
- 2) For ${}^6\text{Li}^1\text{H}$, and the $A-X$ transition. Calculate the wavelength associated with the transition from A state with $v' = 2$ and $J' = 5$, to the X state with $v''=1$ and $J''=6$. Use the most accurate data you can find.
- 3) The hydrogen alpha line near 656 nm is a commonly seen spectral feature. Compare the wavelengths of this transition in atomic hydrogen, deuterium, and tritium. For heavier atomic species, will this isotope shift be larger or smaller? Why? Find a paper measuring isotope shifts for as heavy an atom as you can (highest Z). Compare the magnitude of that shift to that of hydrogen isotopes.