

Physics 285a Problem Set 5
posted October 10, 2023, due October 18, 2023

Problem 1. Hydrogen expectation values

Find the expectation values for the various orders of the radius $\langle r^\xi \rangle$ for the hydrogen atom in the ground state and in a non- S excited state (i.e., $n > 1, \ell > 0$). It is probably easiest to do this calculation separately for $\xi > 0, \xi = -1, \xi < -1$ (where ξ is always a non-zero integer). What is the dependence on n and ℓ for the various quantities?

Feel free to do the integrals with Mathematica or any other way. ChatGPT is fine, but I did not get much help out of it...