

Worksheet # 18

(Friday, February 27, 2026)

Name

Questions (5 pts):

(a) Calculate the total fine-structure energy corrections (in terms of $\alpha^4 mc^2$) to the $n = 1$ and $n = 2$ energy levels of the hydrogen atom.

(b) Sketch the energy level diagram and indicate the energy corrections and corresponding states in spectroscopic notations (which include information on n , l , and j quantum numbers)

(c) What are the relative contributions of H'_{rel} , H'_{SO} , and H'_D to the overall correction for the $n = 1$ level?