Homework #8

(due Wednesday, May 28, 2025)

- 1. (10 pts) Consider a three-level laser system.
 - (a) Write down rate equations for the population of each level
 - (b) Introduce the fluorescent quantum efficiency η for this case following the same logic as we did in class for a four-level system
 - (c) Write down the steady-state population difference N₂-N₁ in terms of total number of atoms N, pumping rate W_p, radiative lifetime τ_{rad} , fluorescence quantum efficiency, and a parameter $\beta = \tau_{32}/\tau_{21}$.
 - (d)Under what condition does the population inversion occur? Compare with the case of a four-level system.
- 2. Reading assignment: Chapter 15 of B&J.