

Physics 712 Homework Problems

Homework: Sakurai problems 5.35, 5.38.

Hints:

5.35

- This case is similar to the photoelectric effect which was worked out in detail in class, and for which the main steps are either outlined or worked out in the book.
- What is the equivalent of $2eA_0/mc$ here?
- What is the equivalent of the photon vector \vec{k} here?
- You have to work out a rate, i.e., $w = |c_f(t)|^2/t$.
- Is there a gradient operator here?
- If not, is there still a Fourier transform?
- How do the angular and momentum distributions of the final state (ejected electron) differ from the photoelectric effect case?
- Does the angular dependence you obtain make sense?

5.38

- This case is much closer to the photoelectric effect, it's just that the initial "atomic" state is the ground state of a 3-dimensional harmonic oscillator.
- Is it easier to do the Fourier transform in Cartesian rather than spherical polar coordinates?
- Does the angular dependence you obtain make sense?