Lecture 2: Physics 212

Monday, January 25, 1999
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1 Reading

1. Chapter 10 of French and Taylor.
2. Sections 4.3 and 4.4 of Griffiths (angular momentum and spin).

2 Concepts to Understand

Please make sure you understand the following concepts:

1. You should understand in complete detail how to think about Figure 7-5 (page 284 of French and Taylor), both classically and quantum mechanically. In particular, make sure you understand why this figure implies the need for introducing the idea of a quantum amplitude.
2. You should understand the three basic rules for combining quantum amplitudes: they add for independent events, they multiply for dependent events, and one takes the magnitude squared of the final amplitude to get the overall projection probability.
3. You should understand why the wave function $\psi(x)$ from the time-independent Schrodinger equation can be written as the amplitude $\psi(x) = \langle x|\psi\rangle$, i.e., as a projection of the state $|\psi\rangle$ onto the position state $|x\rangle$.

3 Questions

1. A properly cut calcite crystal will split an incoming beam of light into two parallel beams of orthogonal polarization. If these two beams are then fed into a two-slit diffraction experiment (one beam going into one slit, the other beam going into the second slit), it turns out that an interference pattern is *not* observed. Explain this interesting result. Note: historically, this experiment by Thomas Young provided the first demonstration that light was a wave involving transverse oscillations. Prior to this experiment, people thought that light was just like sound and involved longitudinal motion.