

Physics 520 – Graduate Quantum Mechanics

Homework I, due August 29, 2007

1. Read G&Y Chapter 1 and 2.1
2. Elucidate each of the key concepts in chapter 1 in a paragraph or two:
 - Complementarity and uncertainty
 - The superposition principle
 - Two-particle interferometry and “spooky action at a distance,” or EPR correlations.

If you don't understand this chapter well, don't worry. We'll be covering these subjects thoroughly this semester and next. My main goal here is to see what you *do* understand so far. This part of your write-up must be typed, not hand-written, in 12 point single-spaced format.

3. Sketch (a) the geometries associated with the three orthogonal bases for polarization and (b) the three orthogonal bases for a spin-1/2 particle, or qubit. Compare these two geometries.
4. Clearly explain the distinction between dimension in Hilbert space and dimension in configuration/momentum space.
5. Prove the Schwarz inequality.