Math 280: Quantum Probability

Instructor: Greg Kuperberg

Where: Mathematical Sciences Building 3106

When: Monday, Wednesday, Friday 3:10-4:00 pm

This course will be a mathematician's introduction to quantum information, quantum mechanics, and quantum computation. The foundation of these topics is also known as quantum probability or non-commutative probability.

The framework is entirely rigorous — we will not do quantum field theory. Nonetheless, it implies many things that are difficult to understand because they are difficult to believe, including: the two-slit experiment, the EPR paradox and Bell's inequalities, true random number generators and quantum communications security, and quantum algorithms that are exponentially faster than classical algorithms.
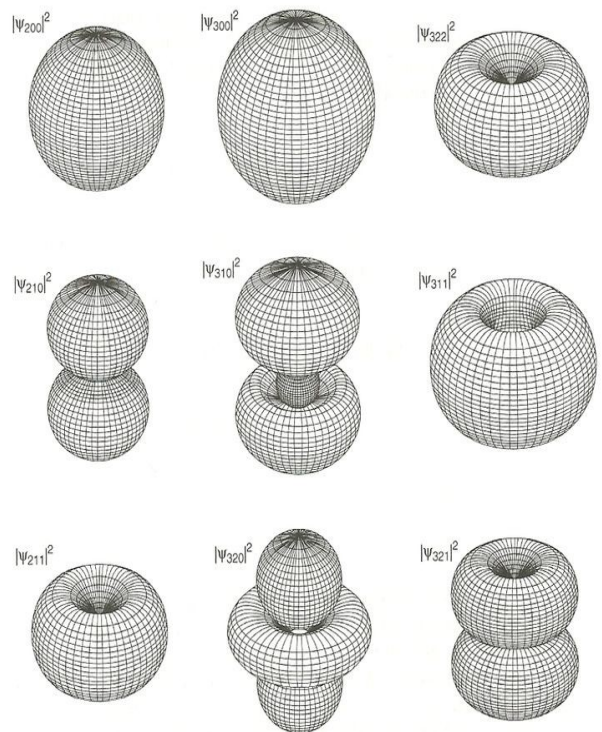

FIGURE 4.6: Surfaces of constant $|\psi|^2$ for the first few hydrogen wave functions. Reprinted by permission from Siegmund Brandt and Hans Dieter Dahmen, *The Picture Book of Quantum Mechanics*, 3rd ed., Springer, New York (2001).