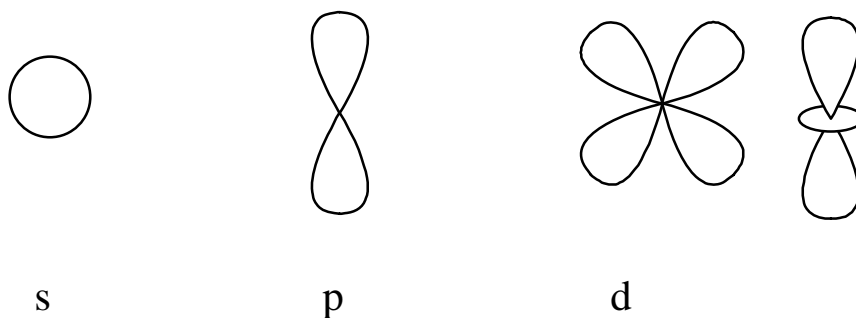


### 3.7 Wave Mechanics and Orbitals

- Where does the electron spend its time inside the atom?
- Bohr was wrong with the idea of orbits. Louis de Broglie came up with a set of equations to calculate the probable location of an electron in an atom.
- de Broglie's insight was: if a wave can behave like a particle, then a particle should also be able to behave like a wave. In his equations he treated electrons as waves (the reinforcement of the duality of states for electrons).
- Schrodinger used de Broglie's electron wave to solve the problem of electron motion inside an atom. Schrodinger's solution is called wave mechanics, which is usually referred to as quantum mechanics.

#### Electron Orbitals

- Heisenberg's Uncertainty Principle: it is impossible to simultaneously know exact position and speed of a particle.
- Electron Probability Density: a mathematical or graphical representation of the chance of finding an electron in a given space.
- Orbital shapes:



#### Problems with Quantum Mechanics

- Quantum mechanics is still not well understood and as it becomes more complex, Heisenberg's uncertainty principle limits how precise we can measure things.
- Superconductivity is a fact but we still cannot explain it fully...even with the use of quantum mechanics.

#### Homework

- Questions 1,2,3,4,5,7