

# Supplement: Chemistry Notation

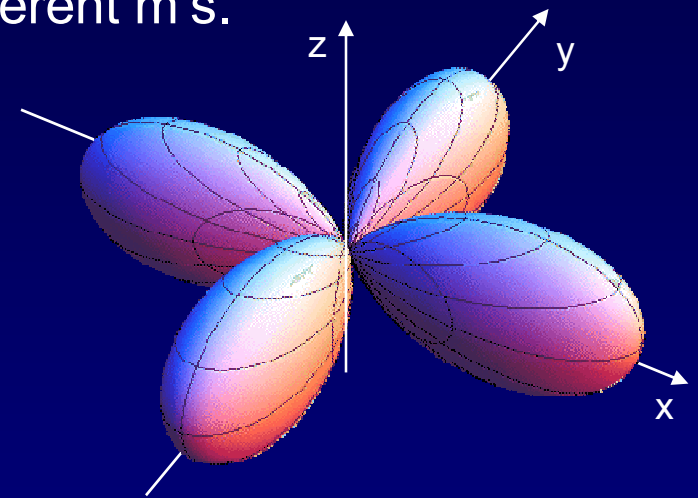
From chemistry you may be familiar with states like  $d_{xy}$ , etc.

How do these relate to our  $Y_{lm}$ ?

- “d” means  $l=2$ .
- “xy” stands for a particular *superposition* of different  $m$ 's.

$$d_{xy} = (Y_{22} + Y_{2-2}) / \sqrt{2}.$$

The probability distribution is shown here:



Which set of states is ‘right’?

It depends on the problem you want to solve.

- In a strong magnetic field the “ $m$ ” states are (approximately) the energy eigenstates, because the magnetic moment determines the energy.
- In a crystalline environment, states like “xy” may be better, because the interaction with nearby atoms dominates the energy.