Quantum Mechanics

Bohr Magneton

The Bohr magneton is the magnetic moment that a hydrogen atom would have in the hypothetical ground state of the Bohr model due to the orbital angular momentum of the electron.

Recall that the magnetic moment for a current *I* in a circular path of radius *r* is:

$$\mu = I\pi r^2$$

If the electron were moving in a circle of radius *r* with a speed *v*, the moment would be:

$$\mu = \frac{e}{2\pi r / v}\pi r^2 = \frac{erv}{2}$$

The radius in the ground state of the Bohr model is $r = \frac{4\pi\varepsilon_0\hbar^2}{me^2}$ and the speed is $v = \frac{e^2}{4\pi\varepsilon_0\hbar}$, so the moment is:

$$\mu = \frac{e\hbar}{2m} = 9.27\times10^{-24}\ \text{J/T}$$

Which is called the Bohr magneton.