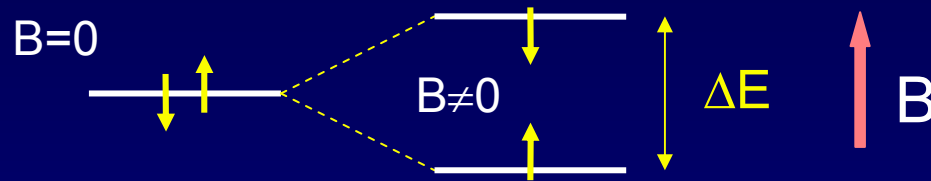


Example: Nuclear Spin and MRI

Magnetic resonance imaging (MRI) depends on the absorption of electromagnetic radiation by the nuclear spin of the hydrogen atoms in our bodies. The nucleus is a **proton with spin $\frac{1}{2}$** , so in a magnetic field **B** there are two energy states. The proton's magnetic moment is $\mu_p = 1.41 \times 10^{-26} \text{ J/Tesla}$.



1) The person to be scanned by an MRI machine is placed in a strong (1 Tesla) magnetic field. What is the energy difference between spin-up and spin-down proton states in this field?

2) What photon frequency, f , will be absorbed?

