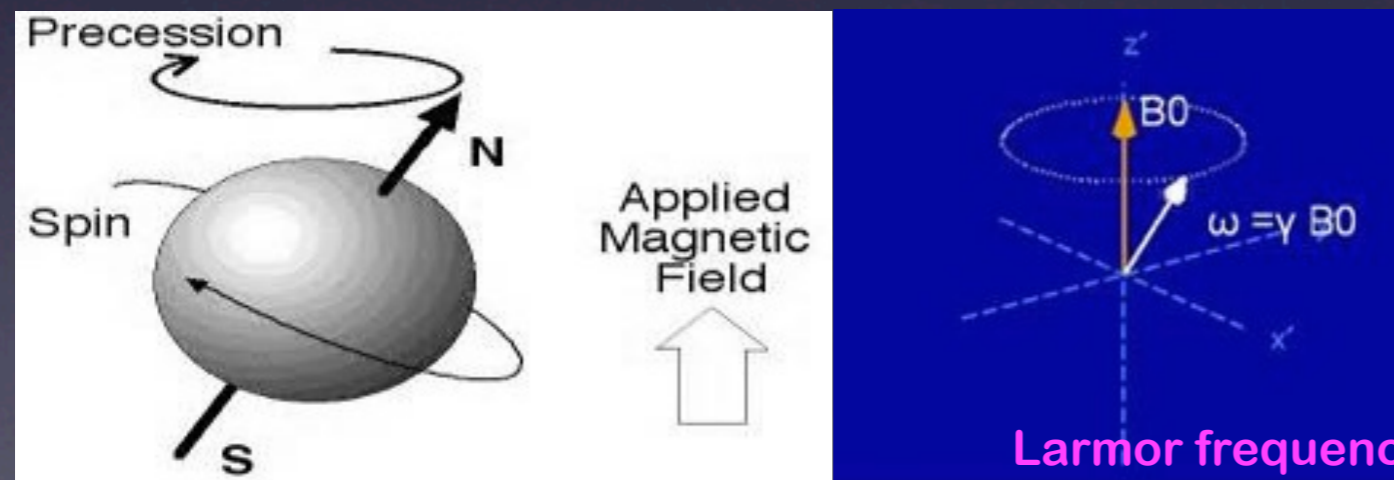
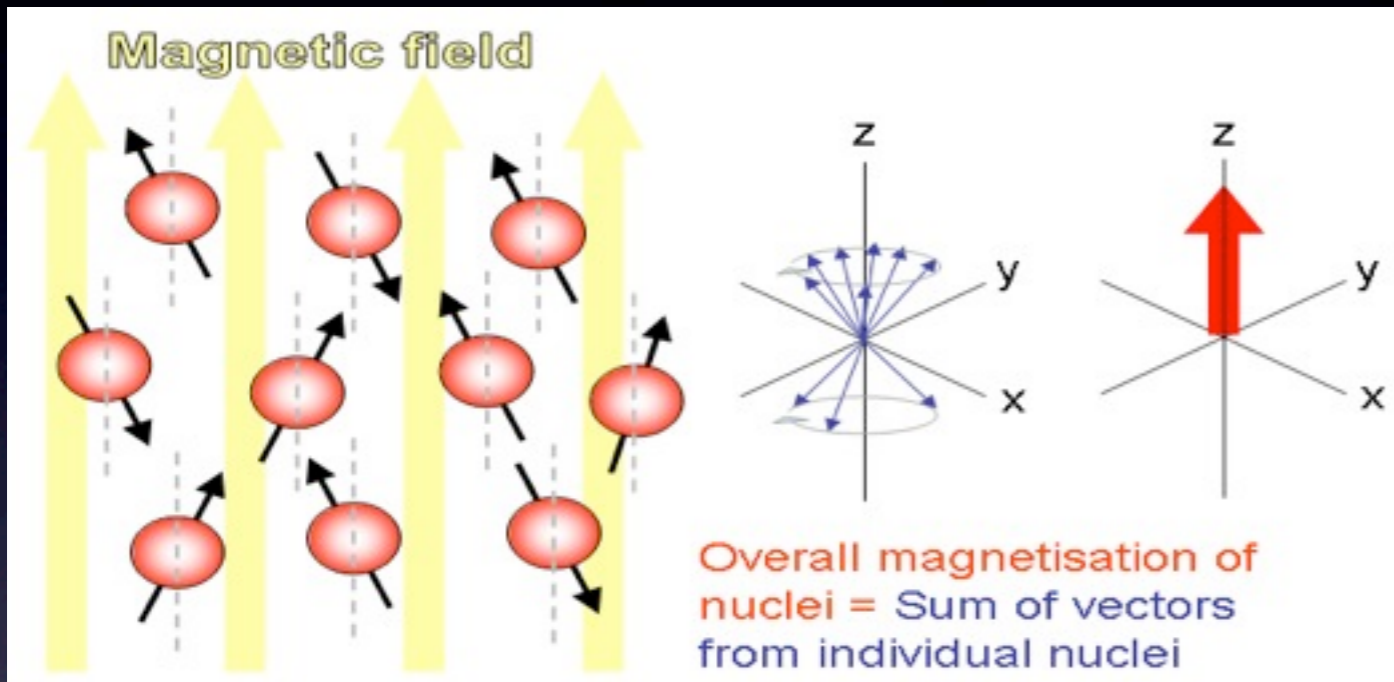


Longitudinal magnetization, Precession and Larmor frequency

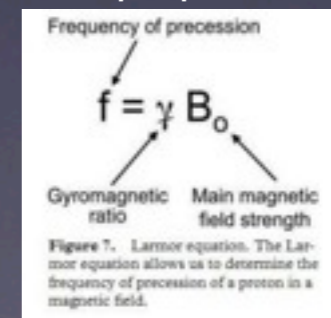


Ask Mish



H atoms have in nucleus just **one proton w/ an unmatched spin** that normally creates a **small MF**. Placed in a weak MF (like the Earth's MF) the small bar magnets (protons) are oriented in all directions. But when they are placed in a strong MF (MRI scanner) they can follow one of two ways:

- **most of them line up w/ the strong MF**, in the direction of the MF and these are the low energy p+
- **few** line up in a direction **opposite** to the main MF= these are the high E p+ (they can have extra E from some heat in the surrounding tissues).
- The **net vector** obtained from adding all vectors (protons) together is called **LONGITUDINAL MAGNETIZATION** and it cannot be measured directly since it is in line w/ the strong external MF but it can be inferred.
- Also, when placed in a strong MF, p+ are not just pointing in the direction of MF. They have a movement called **PRECESSION**. The rate of rotation (precession) is given by **LARMOR frequency** and is proportional to the strength of the MF applied (B_0)



Larmor frequency