

# **Biomolecular Nuclear Magnetic Resonance Spectroscopy**

## **BASIC CONCEPTS OF NMR**

- **How does NMR work?**
- **Resonance assignment**
- **Structural parameters**

**Reading: Chapter 22 in *Protein and Peptide Drug Analysis*  
“Solution Structure Determination of Proteins by NMR”**

# Nuclear Spin

- Nuclear spin angular momentum is a quantized property of the nucleus in each atom, which arises from the sub-atomic properties of neutrons and protons
- The nuclear spin angular momentum of each atom is represented by a nuclear spin quantum number ( $I$ )
- All nuclei with even mass numbers have  $I=0,1,2\dots$
- All nuclei with odd mass numbers have  $I=1/2,3/2\dots$
- NMR is possible with all nuclei except  $I=0$ , but  $I=1/2$  has simplest physics

*Biomolecular NMR → primarily  $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^{15}\text{N}$  ( $^{31}\text{P}$ )*

# Spin 1/2 Nuclei in a Magnetic Field

