

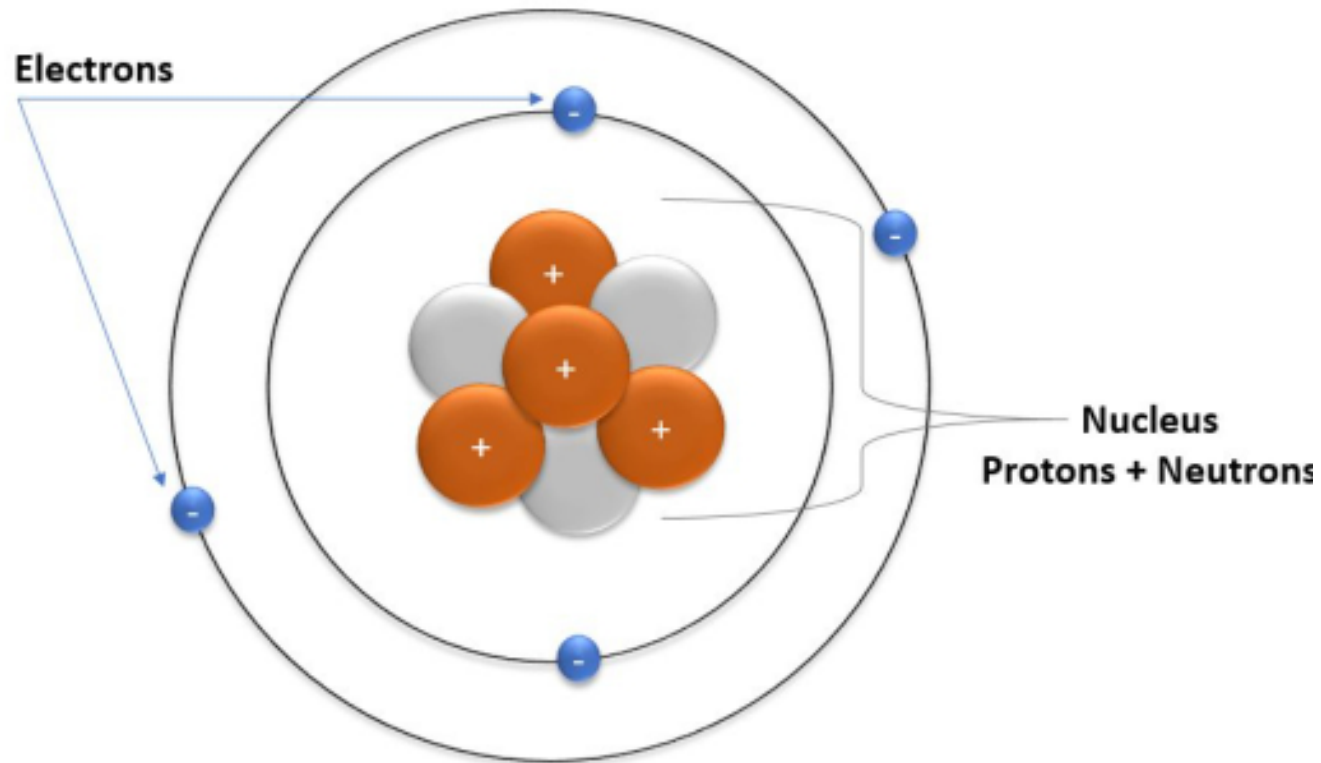
NMR

Nuclear Magnetic Resonance

By,
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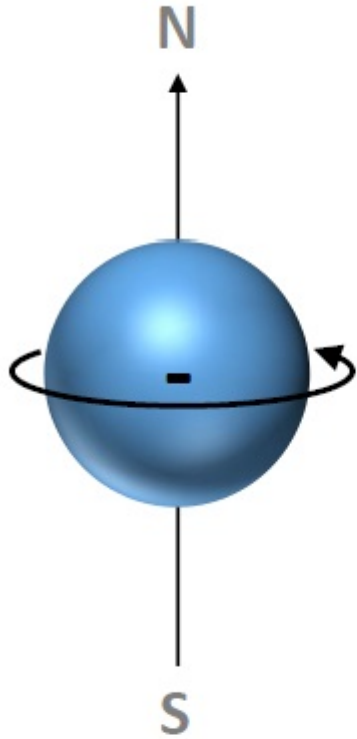
NMR basics



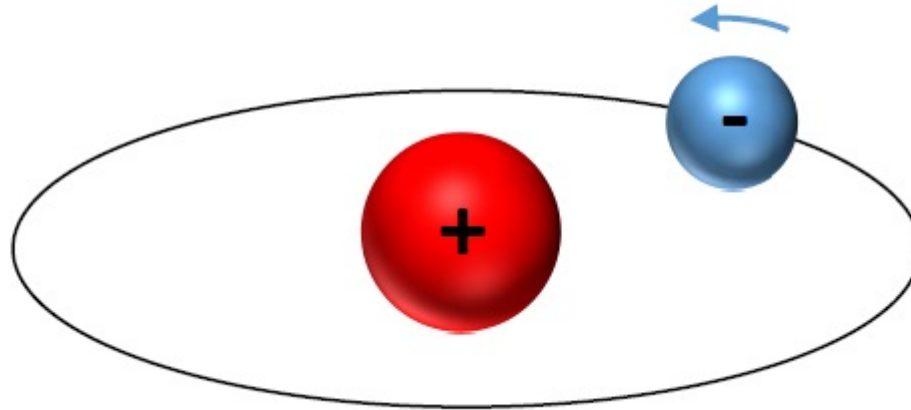
Structure of an atom



Feature of electron as a magnet:



Spinning electron



Orbiting electron

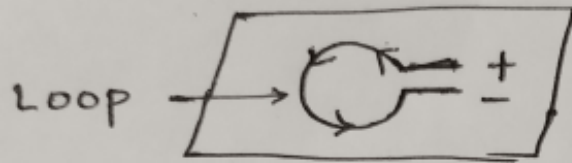
- Electron revolves around nucleus with spinning around itself.



Magnetic effect of electric current



Movement of charge

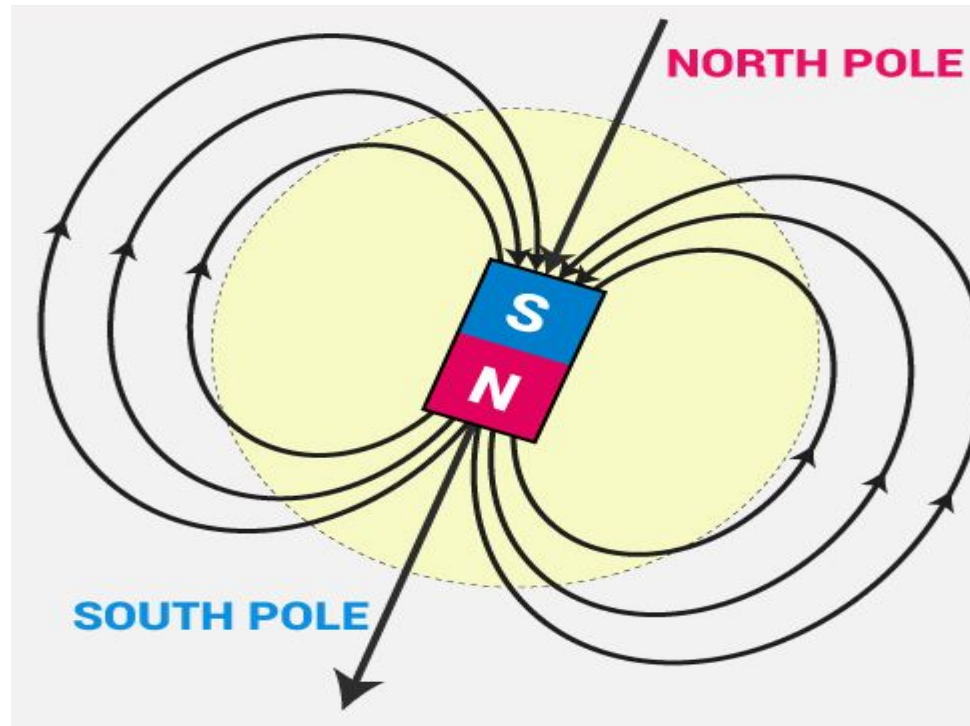


feature of e^- as a magnet \rightarrow movement of charged particles i.e. e^- / proton.

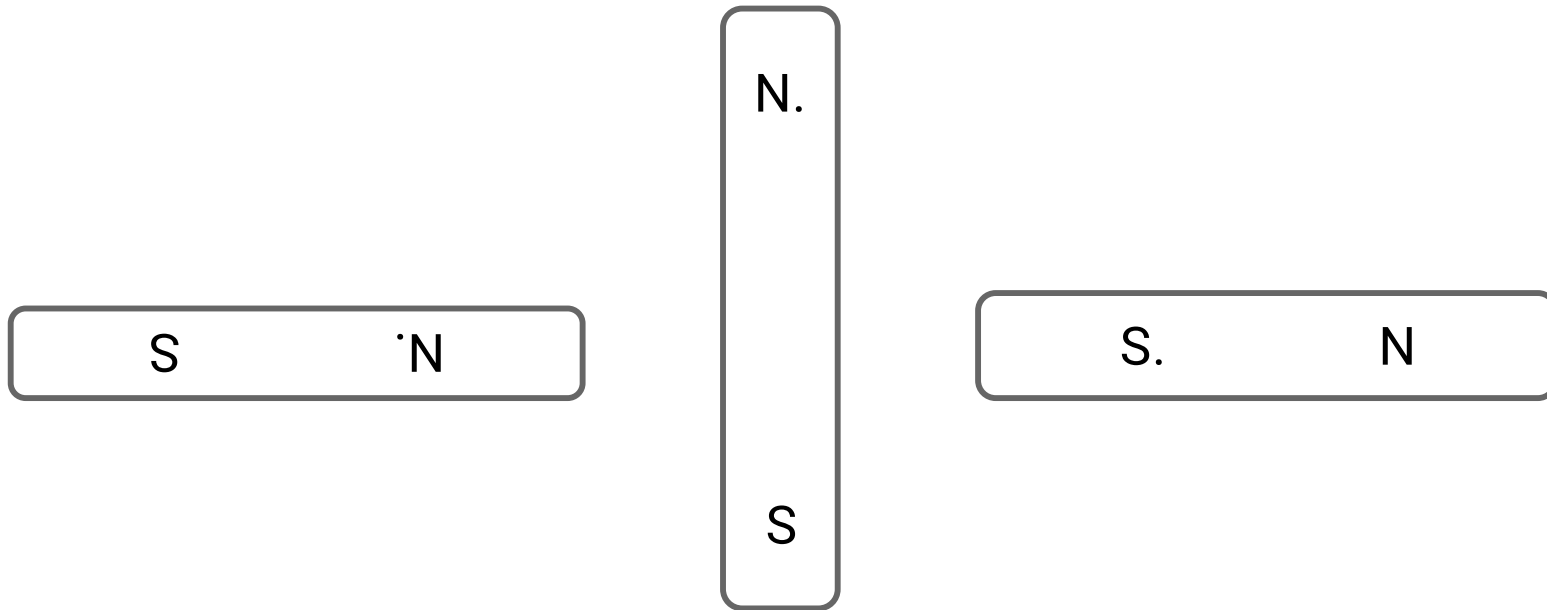
When we have a coil, & current is flowing from that coil, then it produces magnetic field around that coil, because moving charge always produce magnetic field.

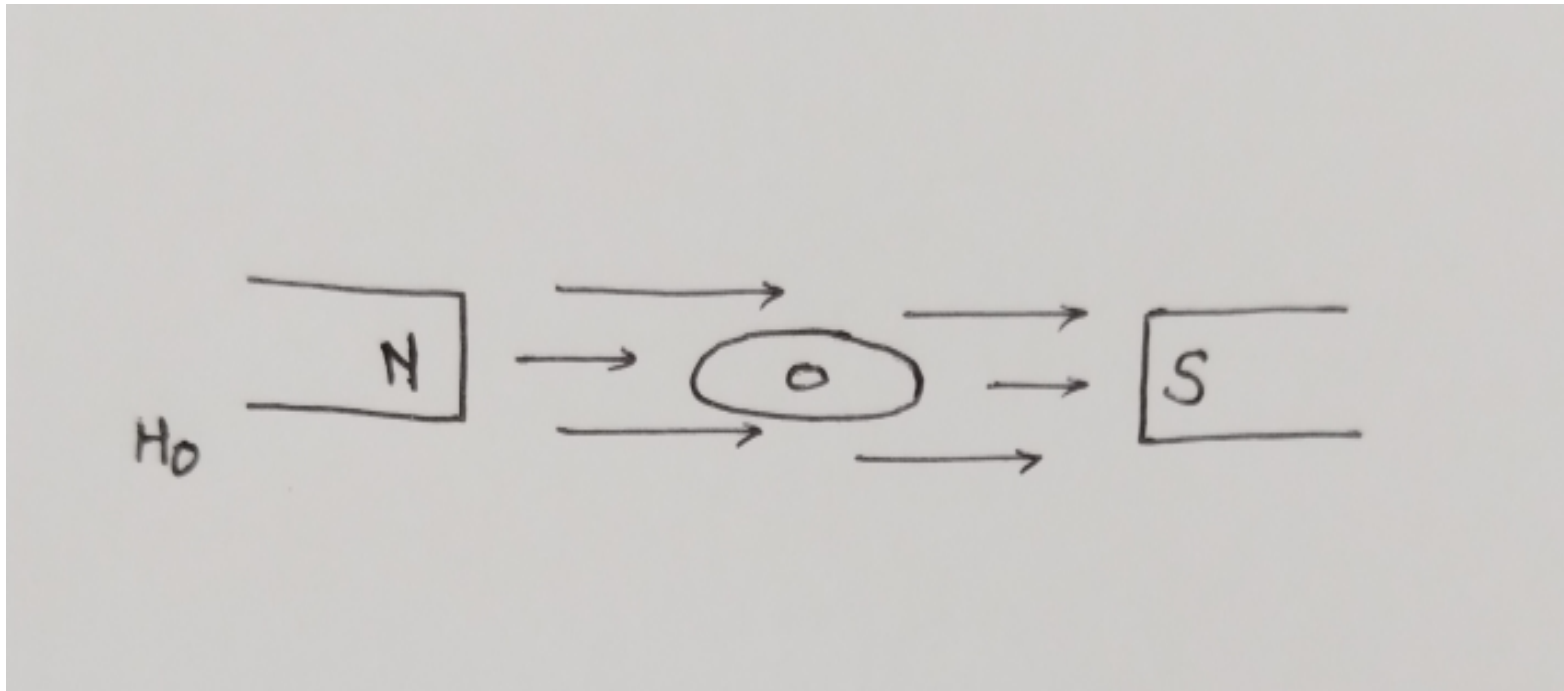


Basics of magnetism:

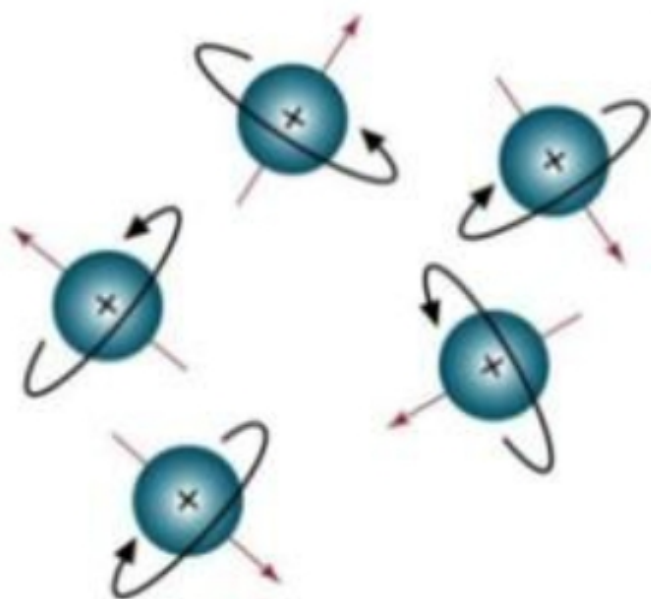
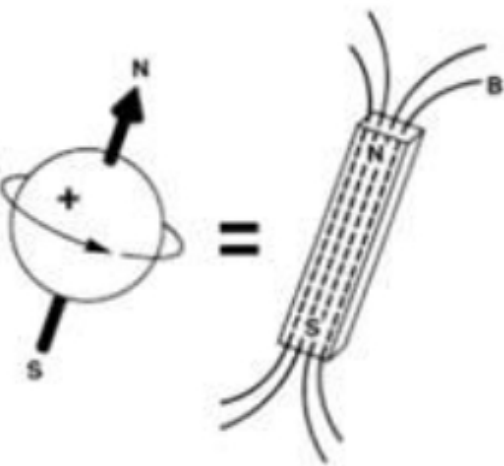


Principle of NMR:

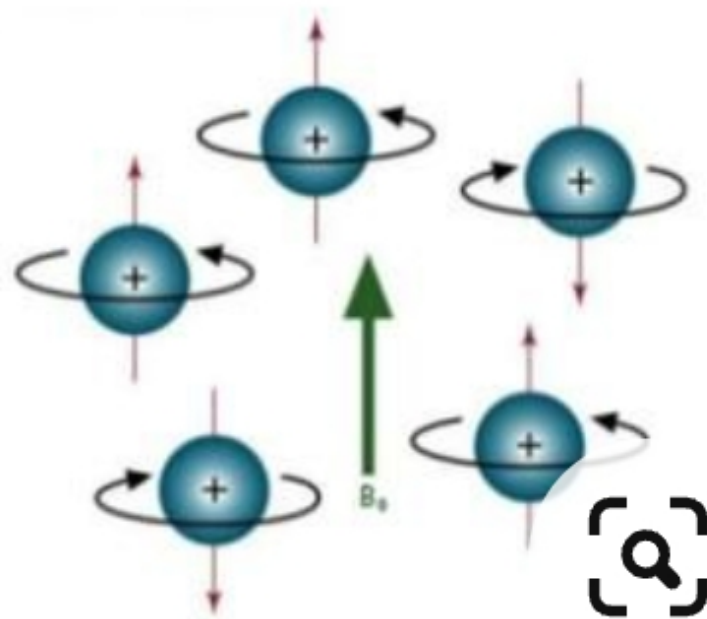




- Atom will align itself with the magnetic field applied.



No external magnetic field

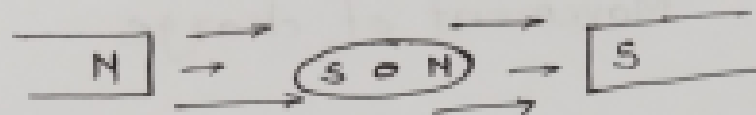


Apply external magnetic field B_0



α spin : spinning of nuclei with the applied magnetic field.
(Ground state)

β spin : spinning of nuclei against the applied magnetic field.
(Excited state)

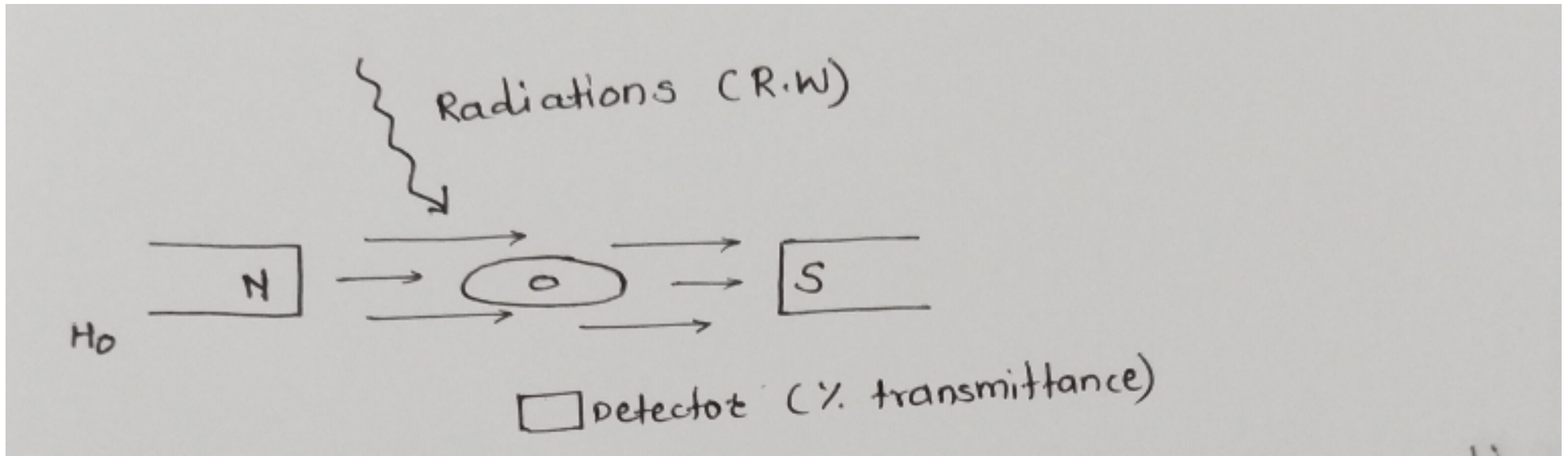


α -spin

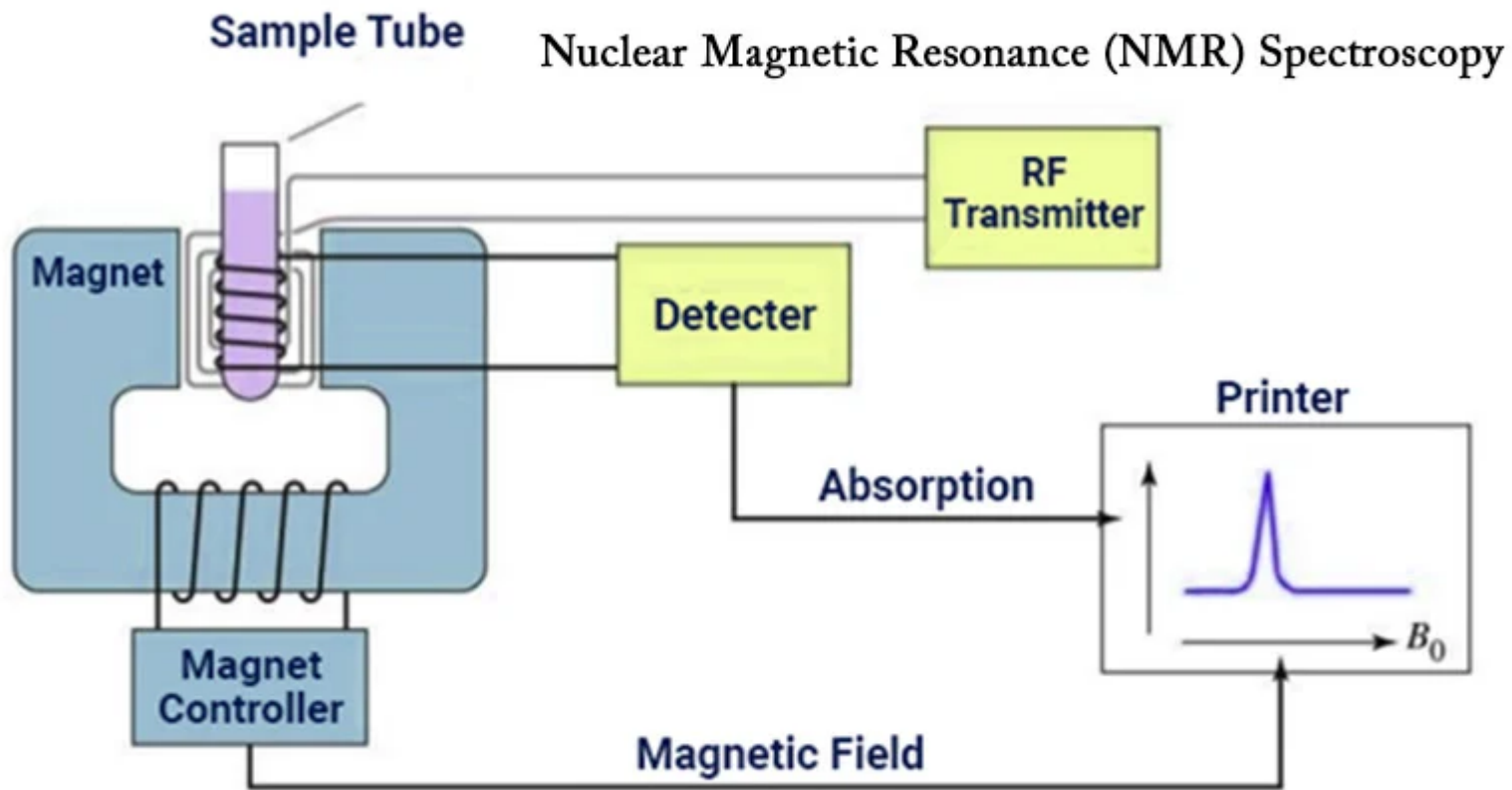


β -spin





- The specific wavelength of radiation is absorbed by the atom, which is required exactly to go against the magnetic field for the beta spin.
- When absorbed, **signal** is detected.



- The energy transfer takes place at a wavelength that corresponds to radio frequencies and when the spin returns to its base level, energy is emitted at the same frequency.



Instrumentation :

- **Sample holder:**

Glass tube with 8.5 cm long, 0.3 cm in diameter.

- **Permanent magnet:**

It provides homogeneous magnetic field at 60-100 MHZ

- **Magnetic coils:**

These coils induce magnetic field when current flows through them



- **Sweep generator:**

To produce the equal amount of magnetic field pass through the sample.

- **Radio frequency transmitter:**

A radio transmitter coil transmitter that produces a short powerful pulse of radio waves.

- **Radio frequency receiver:**

A radio receiver coil that detects radio frequencies emitted as nuclei relax to a lower energy level.

- **Read out systems:**

A computer that analyses and record the data.