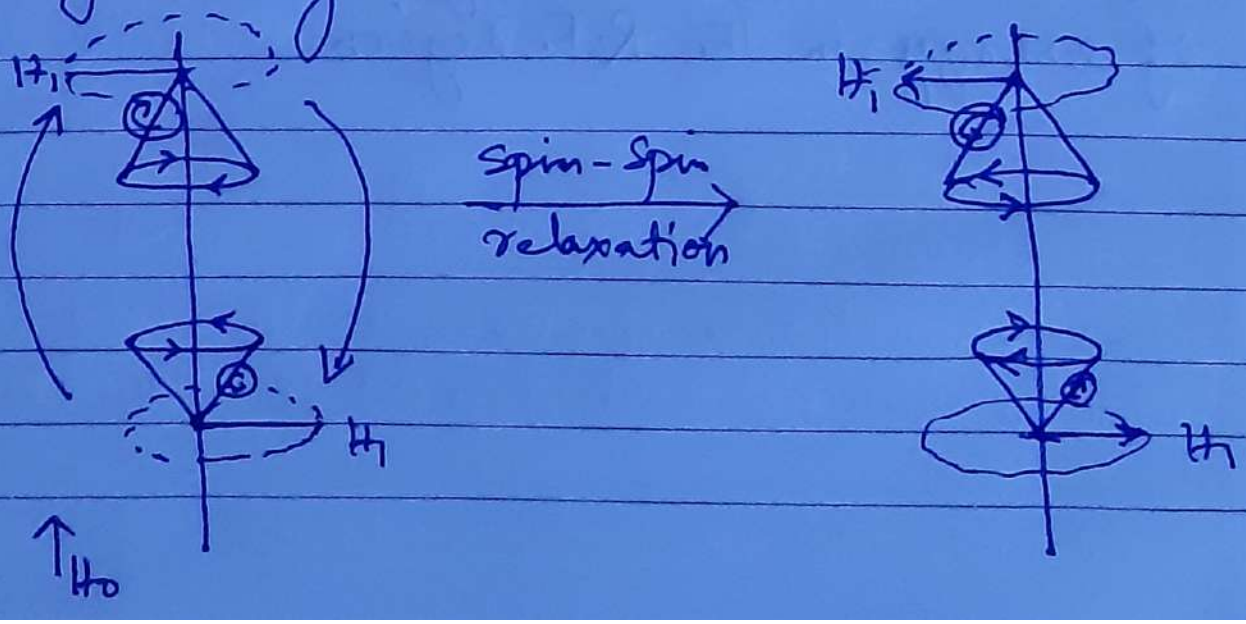
① Spin - Spin or Transverse Relaxation :-

Spin - Spin relaxation is effected by the mutual exchange of spins by the two processing nuclei in close proximity to each other. Associated with each precessing nucleus there is a magnetic vector component rotating in a plane perpendicular to the main field (H_0). If two nuclei are in very close proximity, this small rotating magnetic field is exactly what is required to induce a transition in the neighbouring nucleus.



Although the Spin-spin relaxation shortens the life time of an individual nucleus in the higher energy states, it does not Contribute to the maintainance of the required excess of nuclei in a lower energy state which is necessary Condition for NMR.

(ii) Spin-lattice or longitudinal Relaxation:-

The required excess of nuclei in the lower energy state is maintain by spin-lattice relaxation. The term lattice refers to the framework of molecules (sample & solvent, liquid, gas or solid) containing the precessing nuclei. All of the molecules are undergoing translational, rotational & vibrational motion and have magnetic properties. Hence a variety of small magnetic field is present in the lattice.

So, a particular small magnetic field, properly oriented in the lattice, can induce a transition in a particular processing nuclear magnet from an upper state to a lower state. The energy from this transition is transferred to the Components of the lattice as an additional translational, rotational and vibrational energy, which is ultimately transferred to the thermal energy. Thus a nucleus returns to the lower state from an upper state by radiationless transition and which maintain an excess of nuclei in the lower energy state and ensure the necessary Condition for NMR signal.