كلية التربية - الفرقة الرابعة - فيزياء
مقرر: الرنين المغناطيسي c.c. ١٤/١٠

Torque and Larmor precession:

The torque on a magnetic moment $\vec{\mu_l}$ in the presence of a magnetic field $\vec{B_o}$ is:

$$\vec{\tau} = \vec{\mu_l} \times \vec{B_o} \quad (1)$$

for $\vec{\mu_l} = -\frac{g_l \mu_B}{\hbar} \vec{L}$ (2)

$$\therefore \vec{\tau} = -\frac{g_l \mu_B}{\hbar} \vec{L} \times \vec{B_o} \quad (3)$$

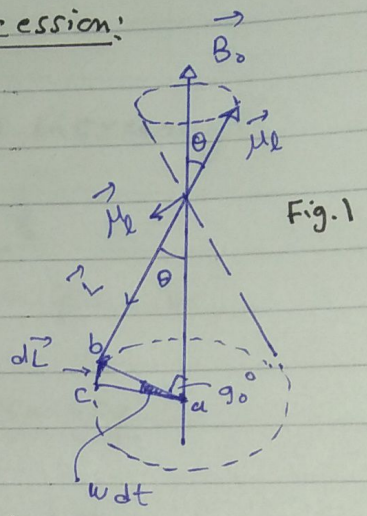

Fig.1

$ab = L\sin\theta$
$bc = dL$

Now from fig.1:

$$dL = (L\sin\theta)\,\omega dt \quad (4)$$

$$\therefore \frac{dL}{dt} = L\omega\sin\theta \quad \text{---- (5)}$$

but from eq. 3:

$$\tau = \frac{g_l \mu_B}{\hbar} L B_o \sin\theta \quad \text{-(6)}$$

and $\therefore \tau = \frac{dL}{dt}$

$\therefore$ from eqs 5 and 6

$$\boxed{\vec{\omega} = \frac{g_l \mu_B}{\hbar} \vec{B_o}} \quad \text{... (7)}$$