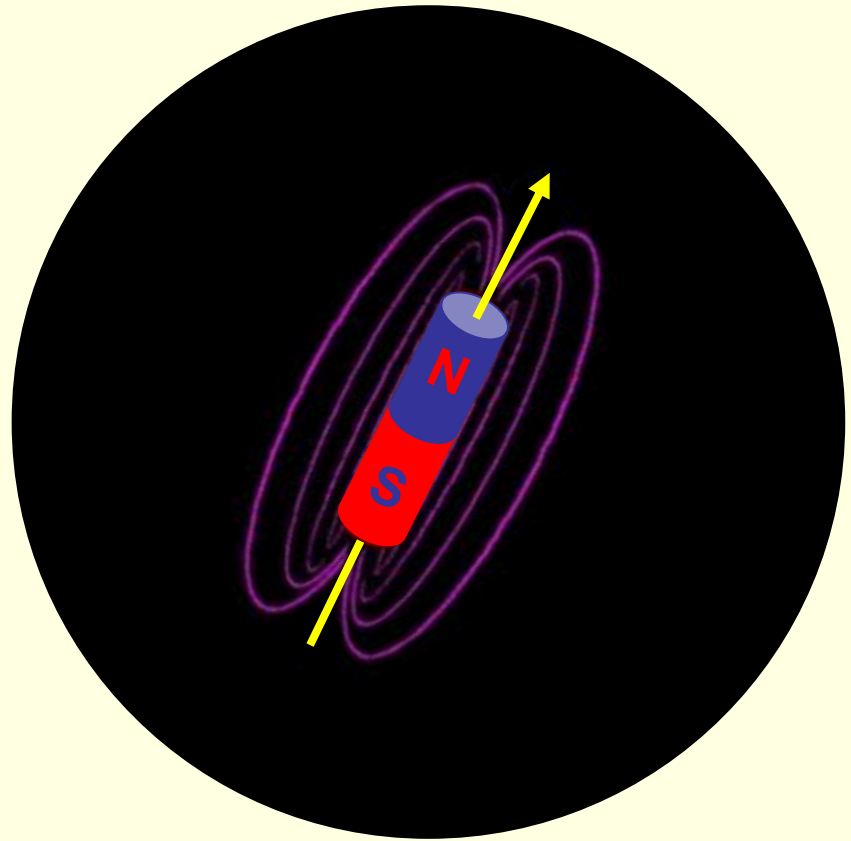
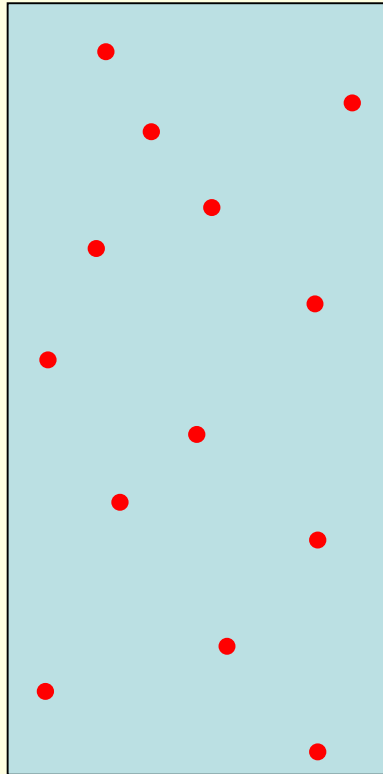


NMR (nuclear magnetic resonance)

field with very broad applications
pl. organic-inorganic chemistry, physics,
biology, medical appl.
different, problem oriented construction of
devices

HERE:

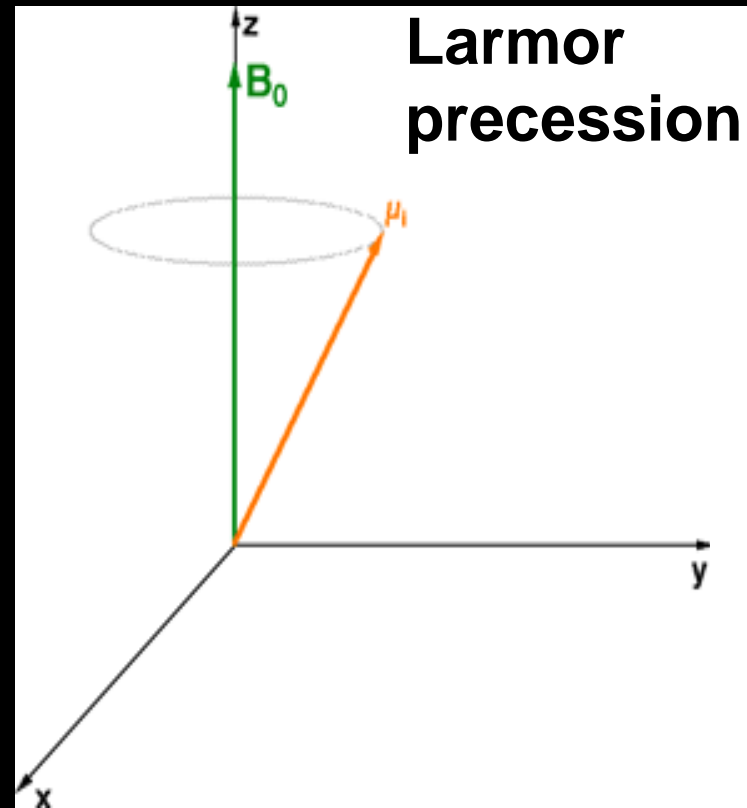
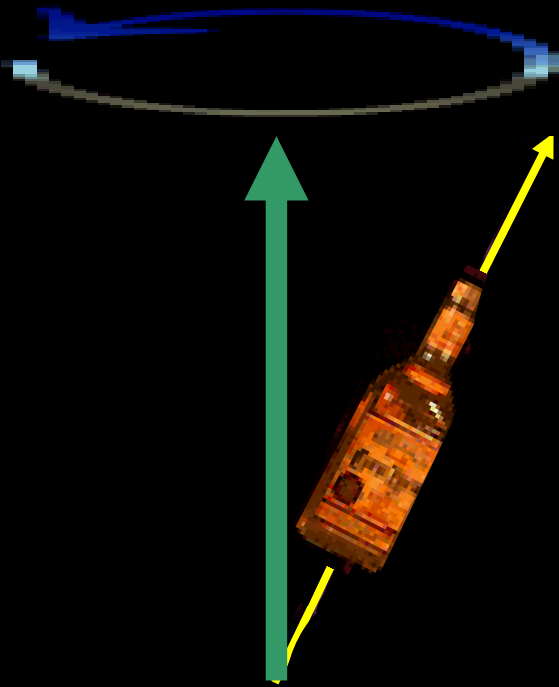
structure elucidation of SMALL molecules
($M < 1000$), liquid phase

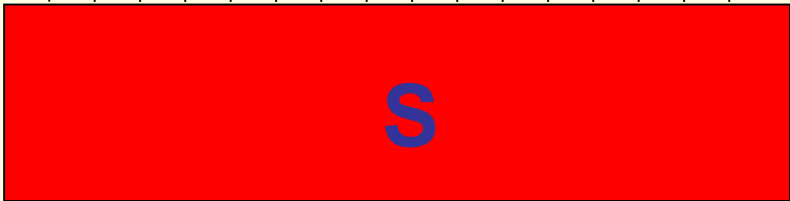
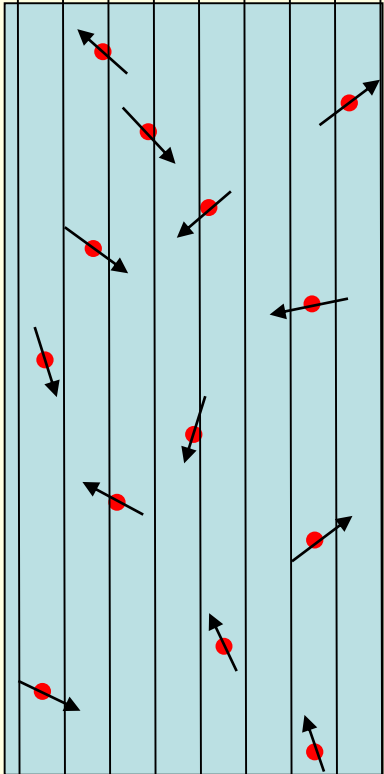


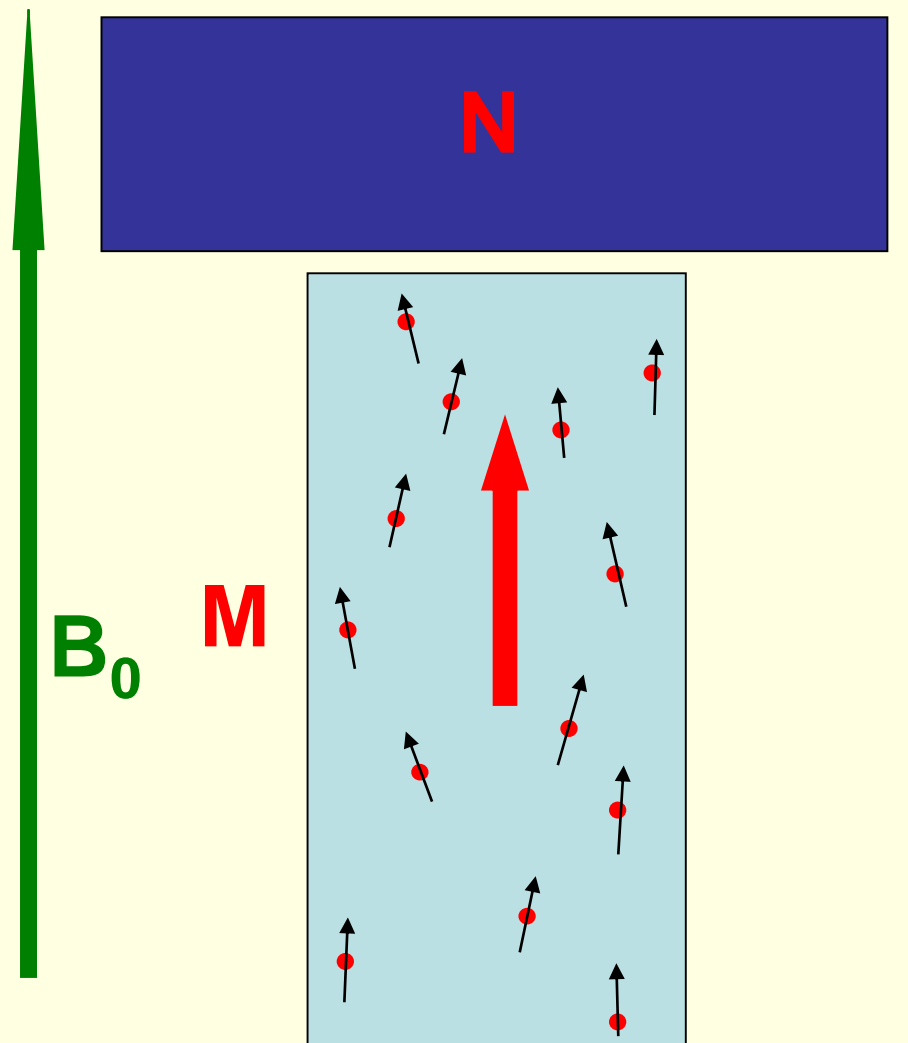
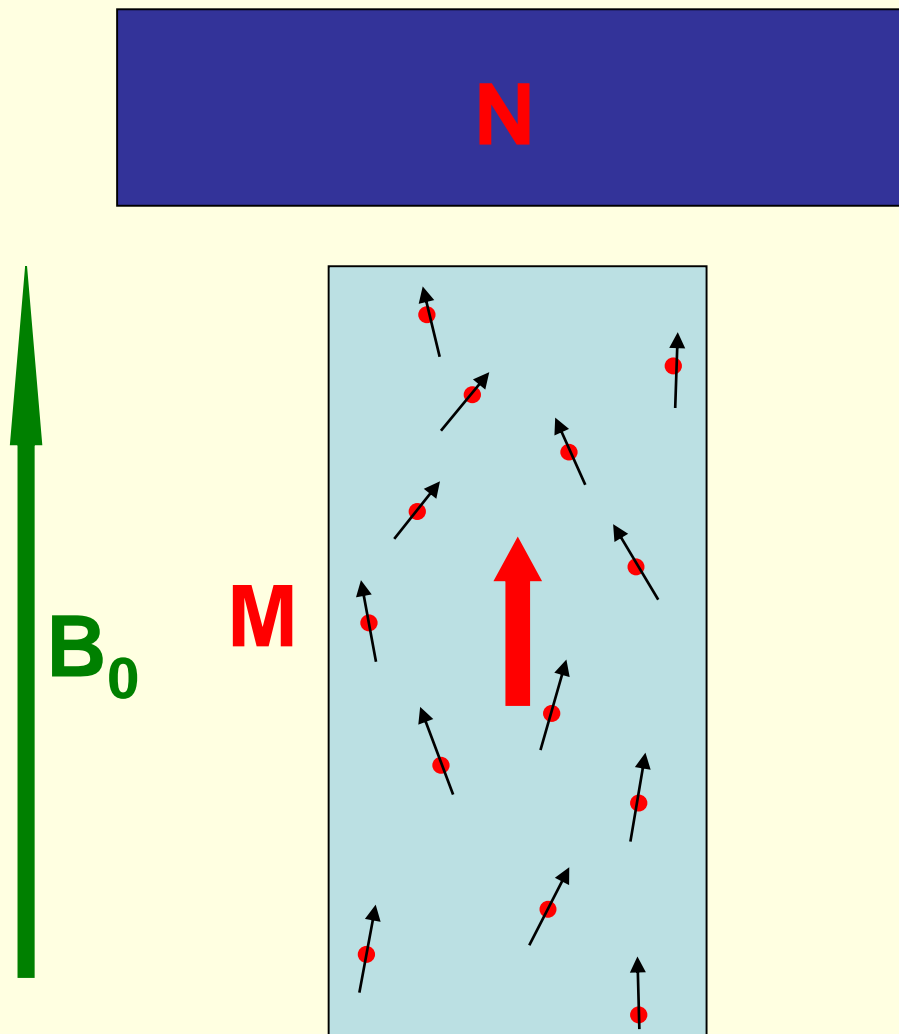
SPIN!

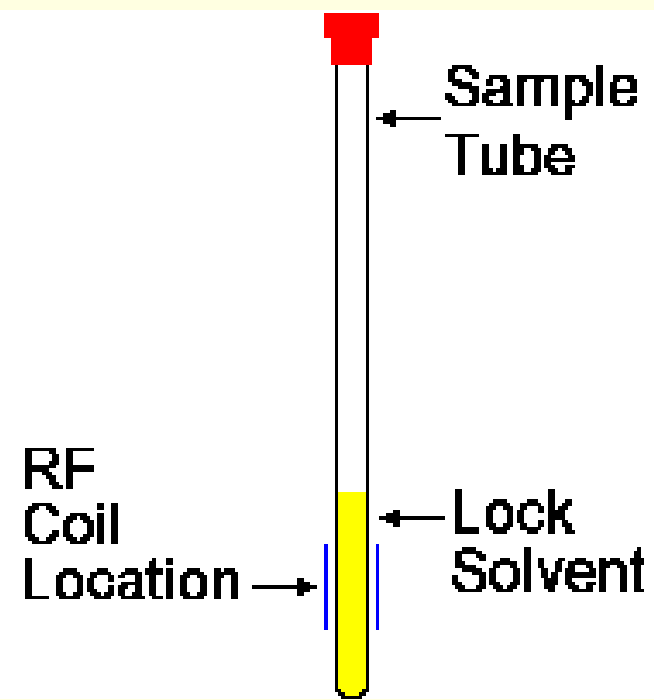
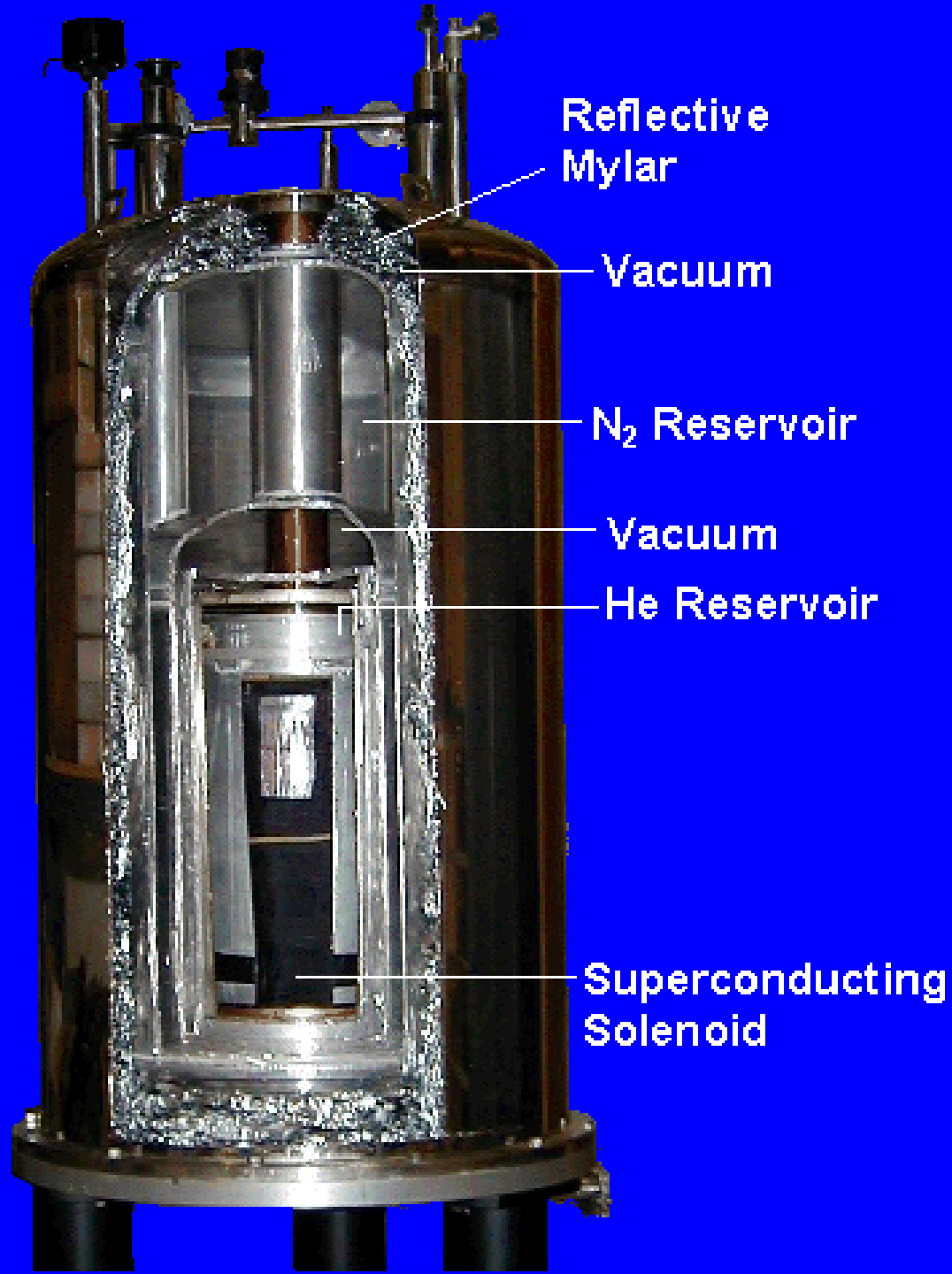
spin ~ tiny rotating compass!

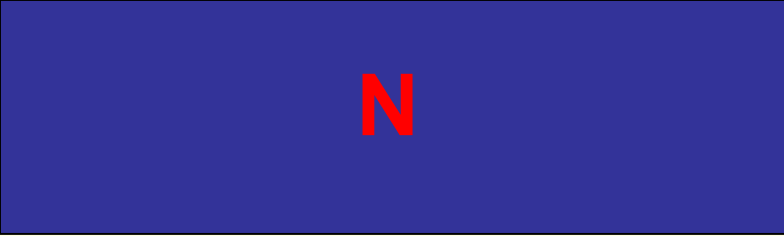
$$d\mu/dt = \mu \times B$$









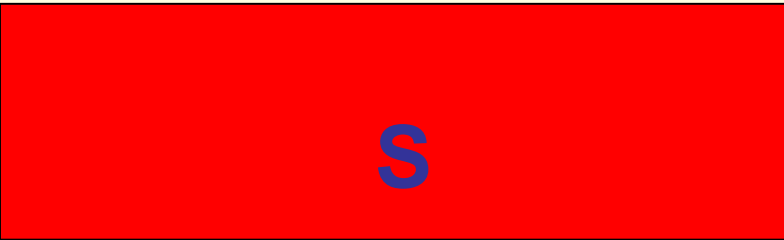


B_0

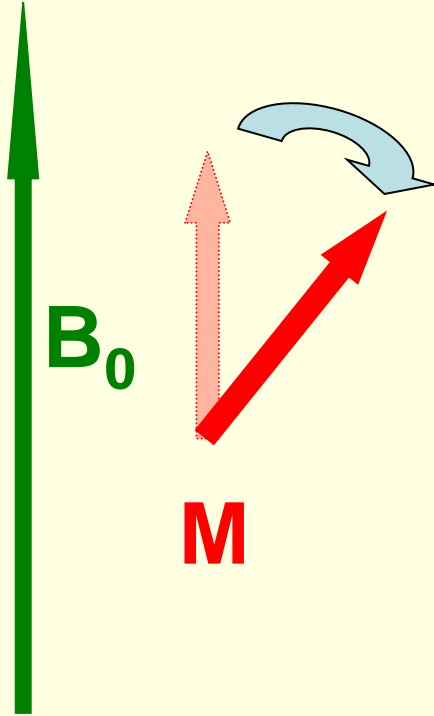


M

thermic equilibrium



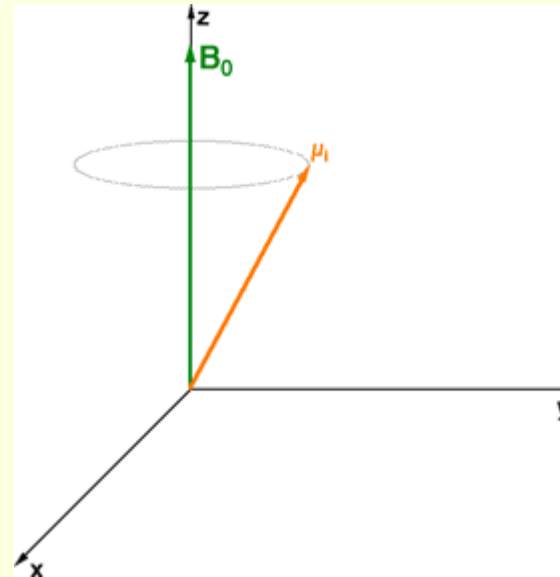
N



M

S

Larmor precession



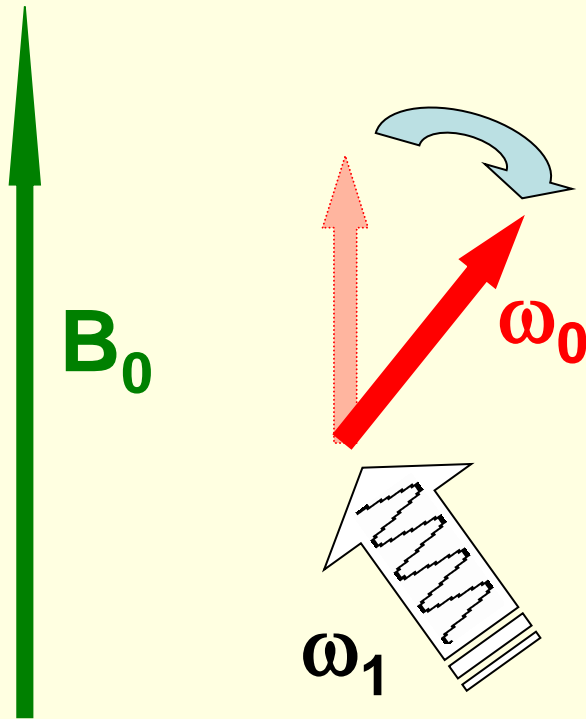
$$\frac{dM}{dt} = M \times B$$

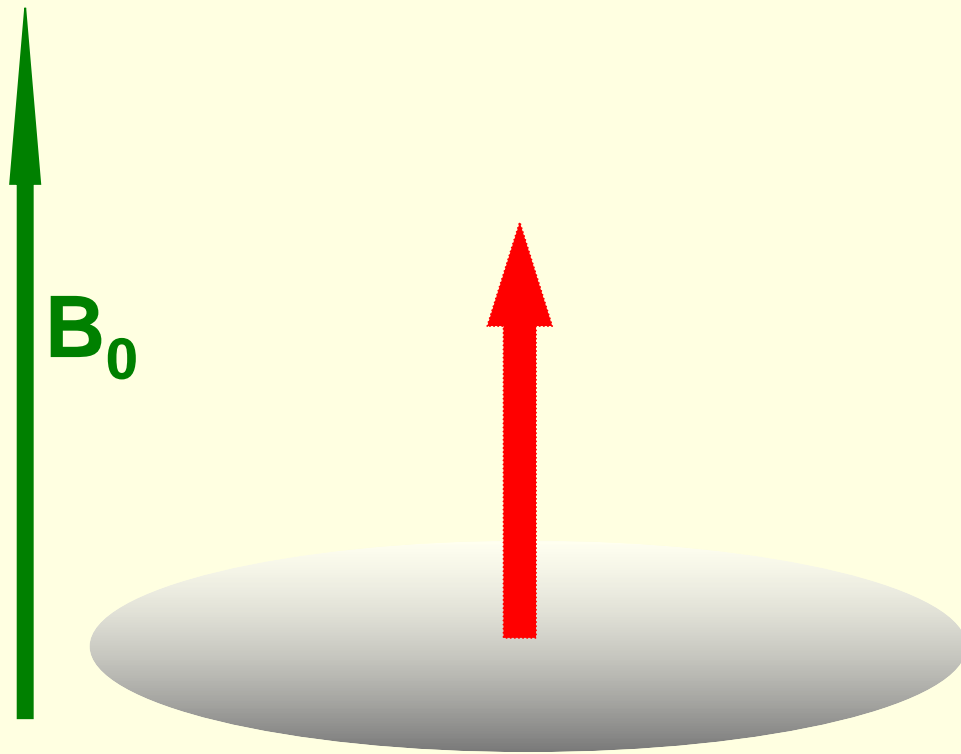
$$\omega_0 = \gamma B_0$$

MHz!

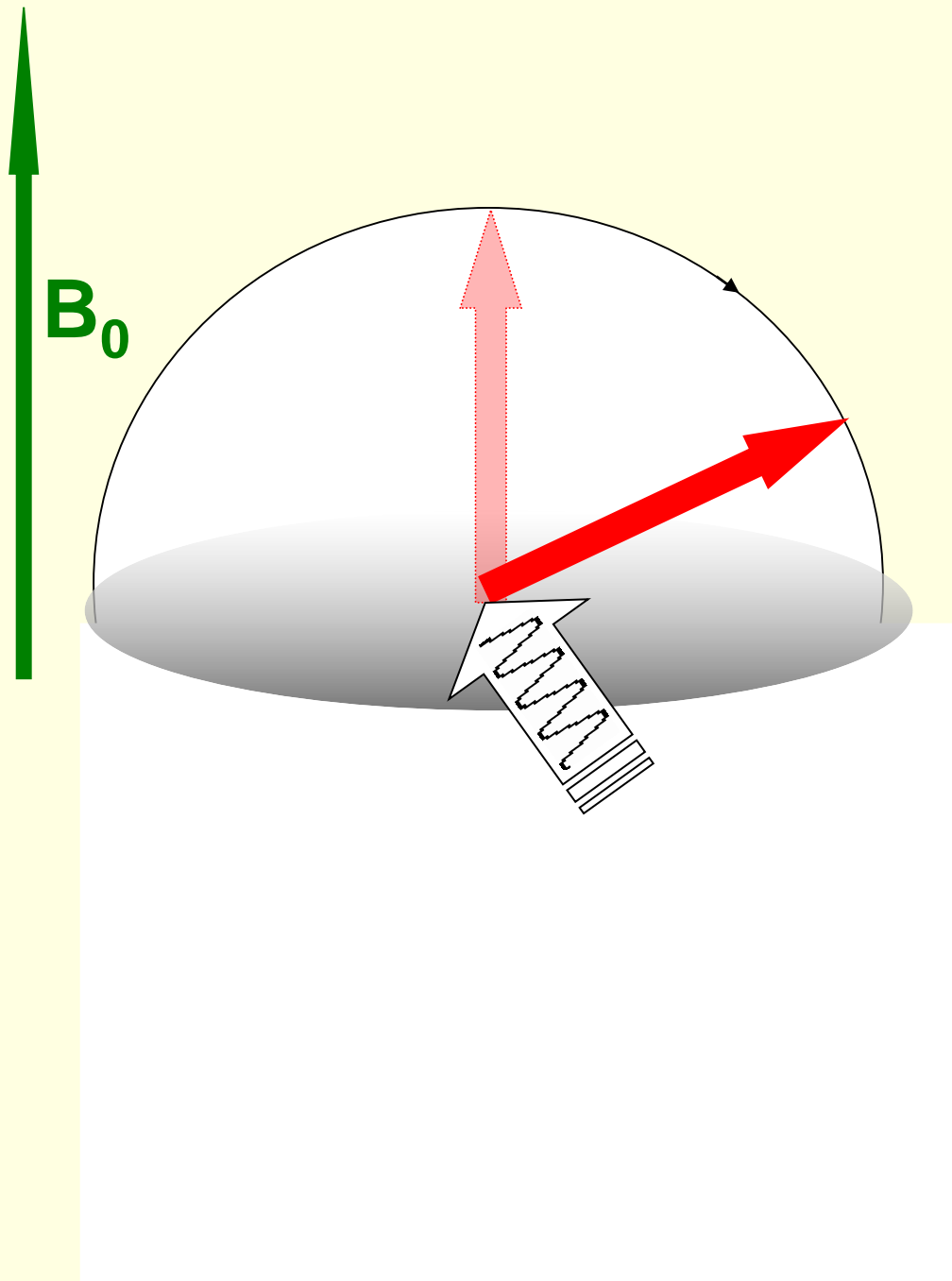
How to tilt away M?

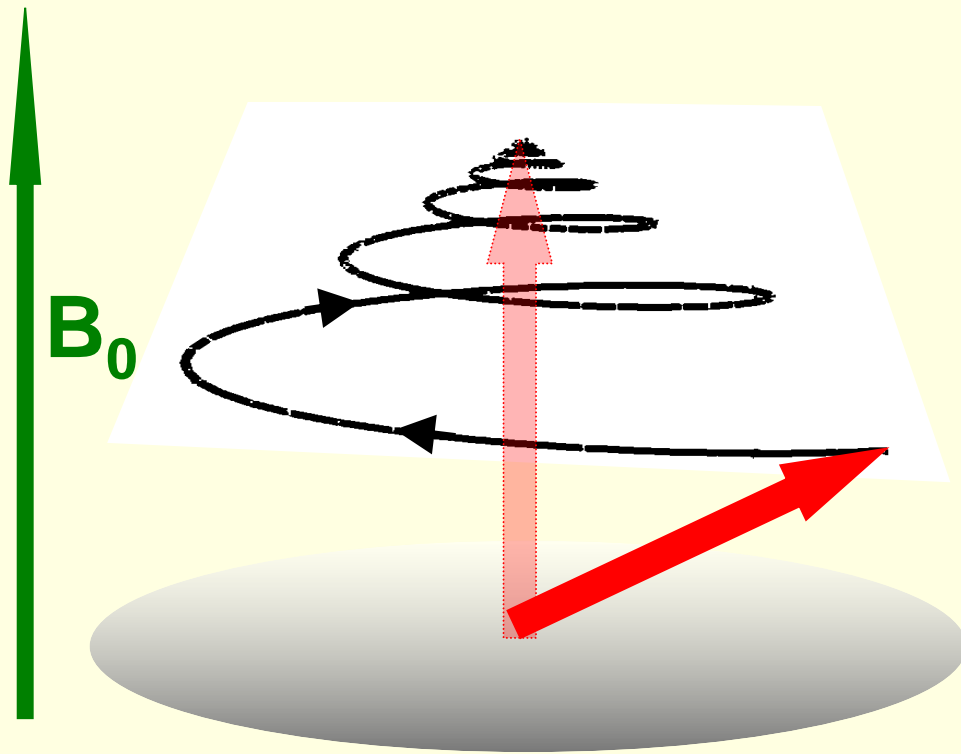
with an $\omega_1 \sim \omega_0$ RF radiation



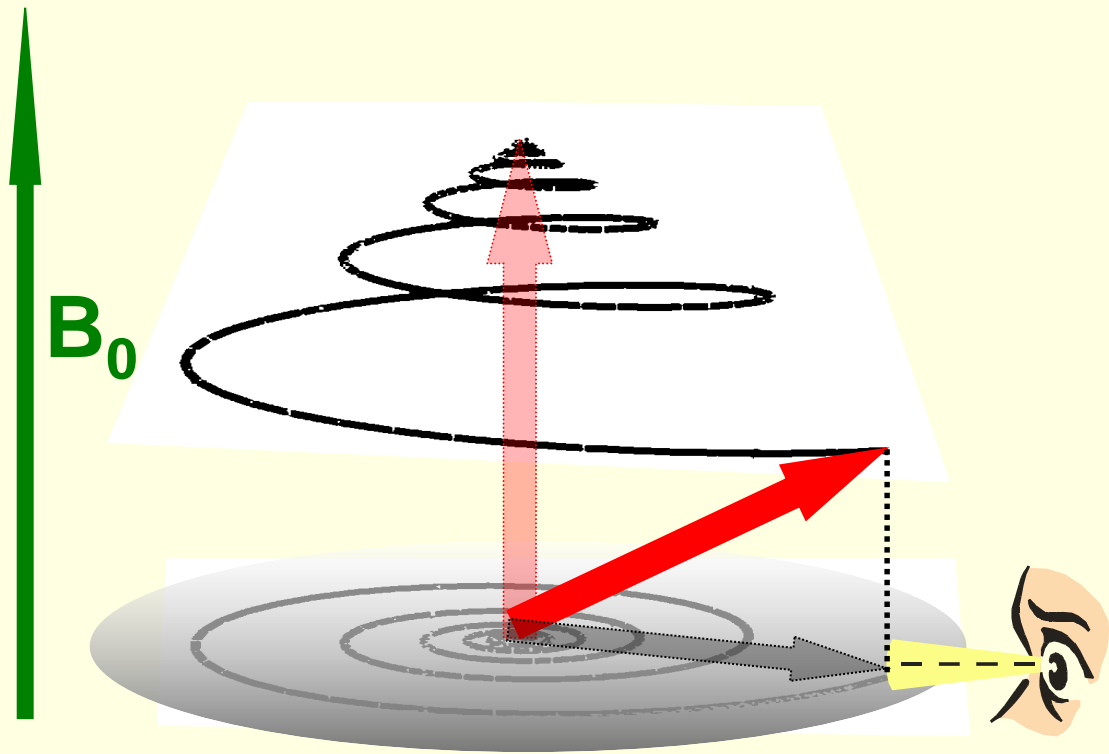


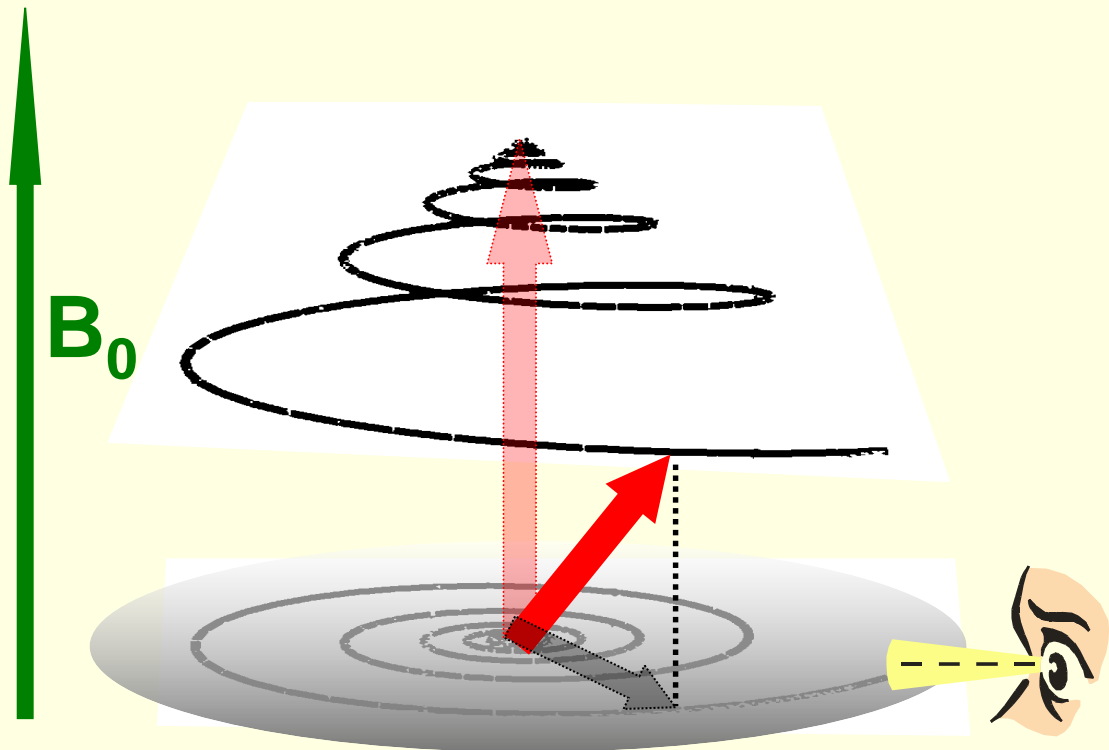
pulse radiation!

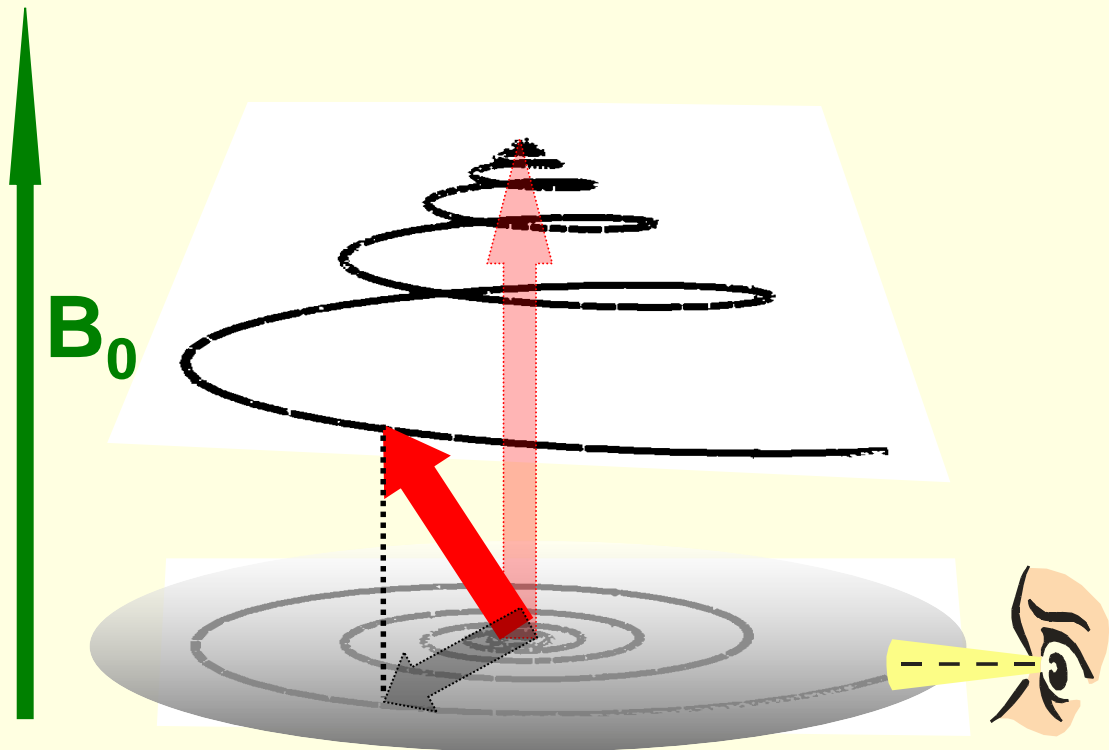


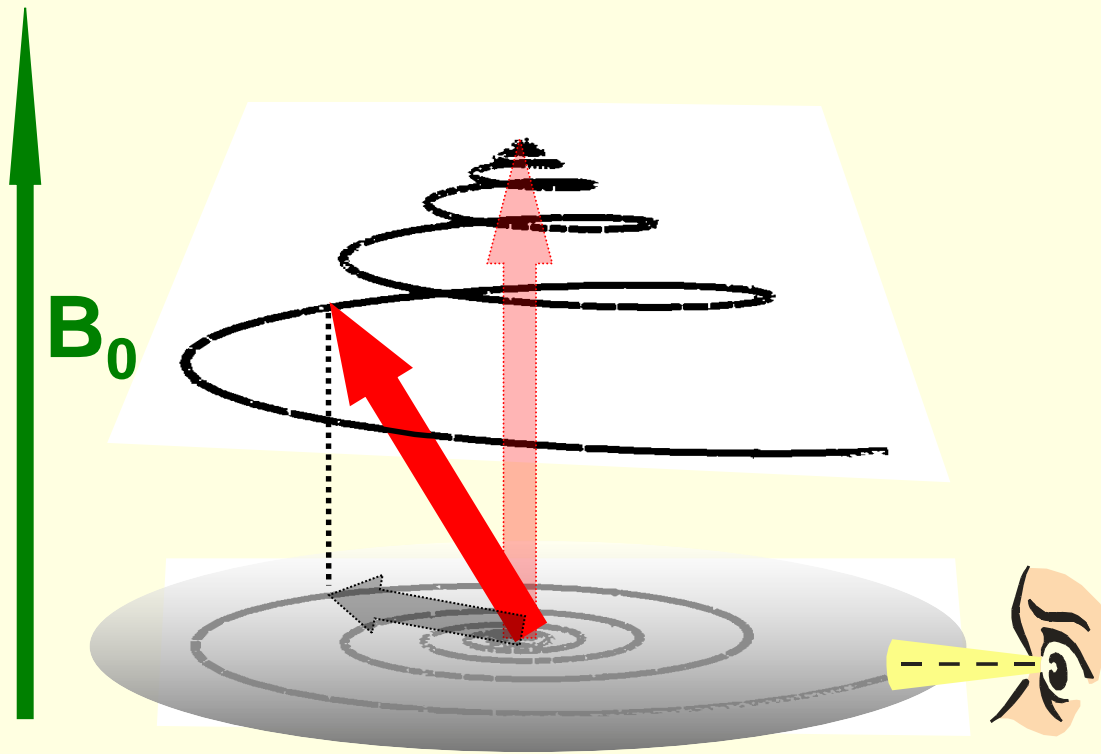


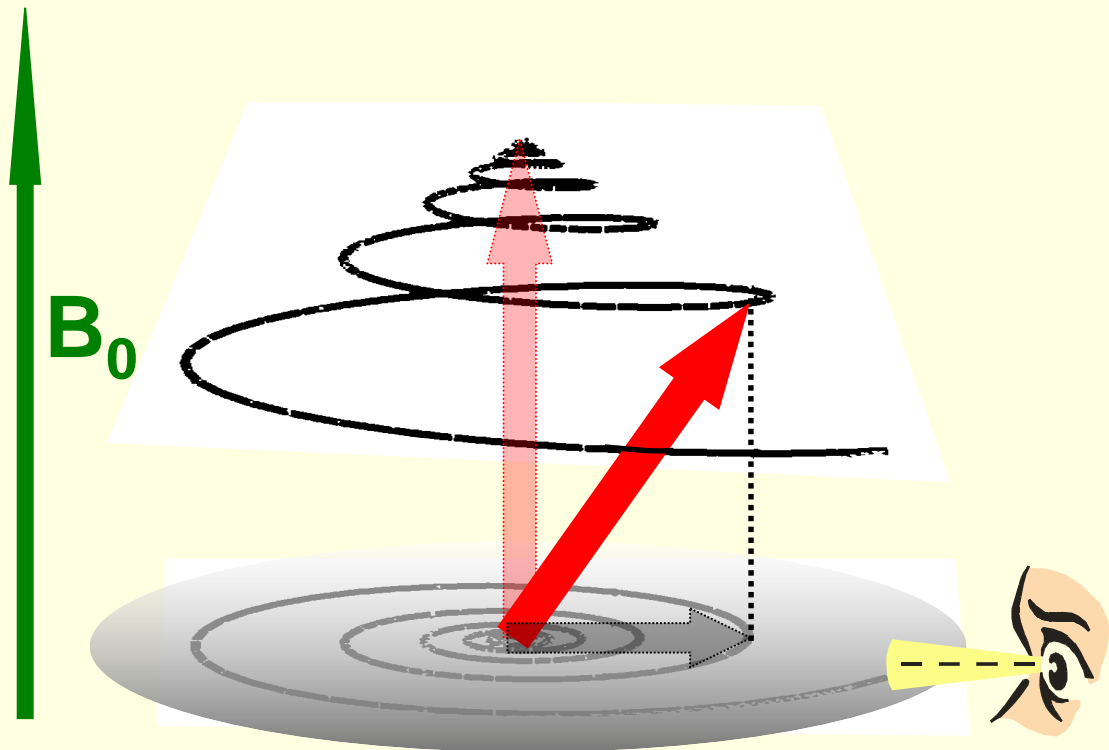
Larmor precession+ relaxation

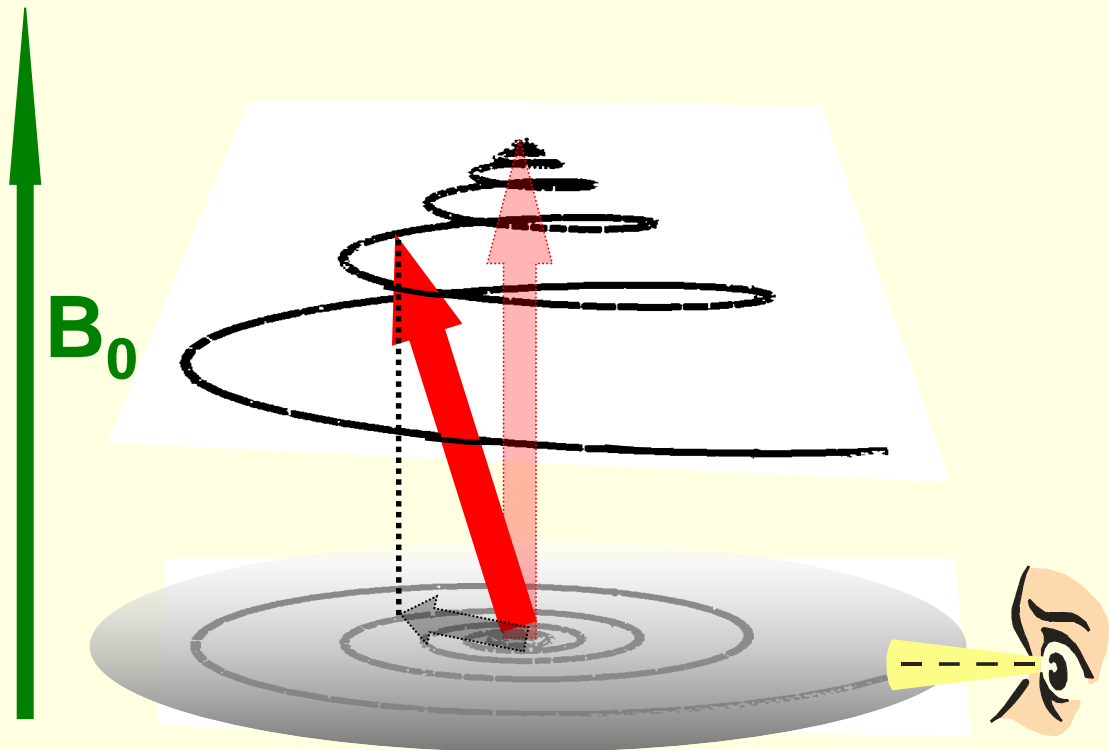


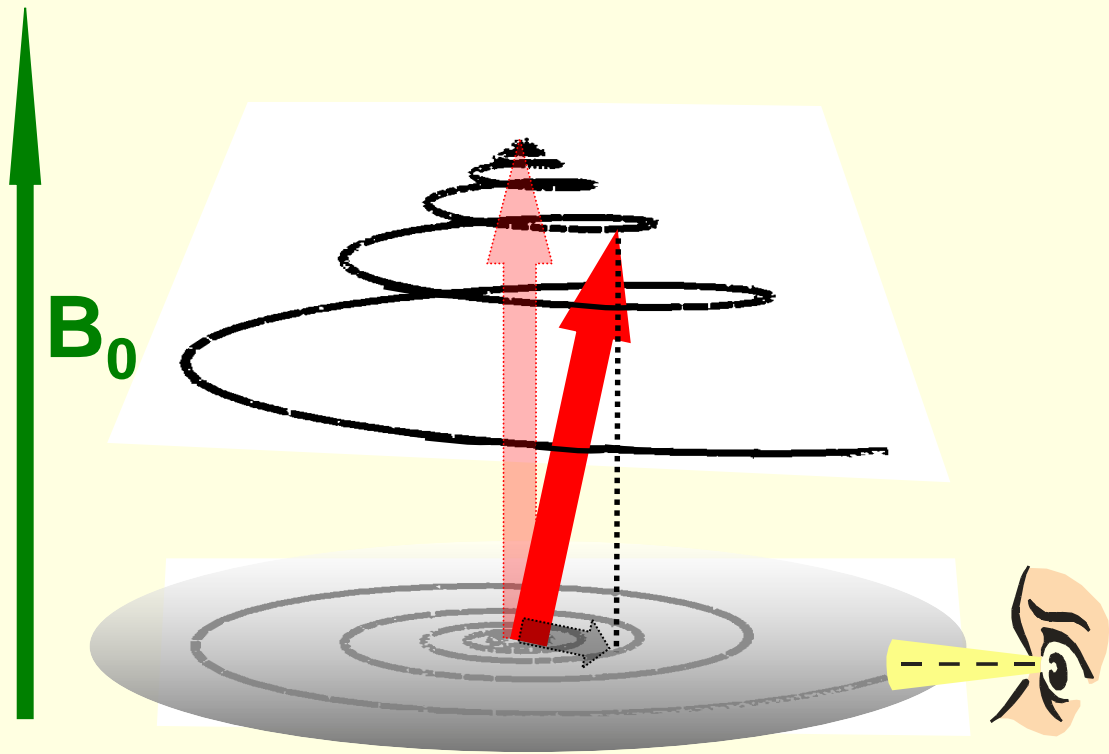


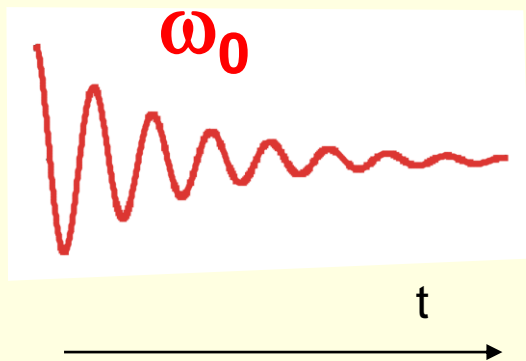
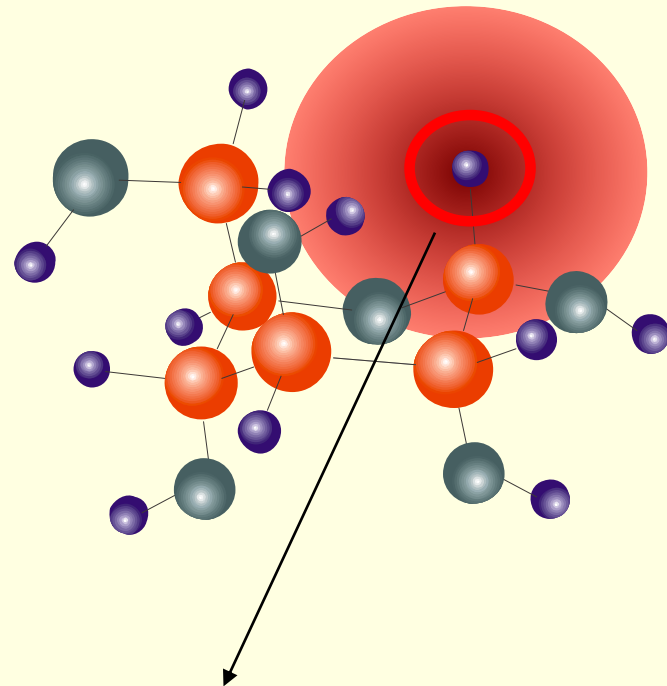
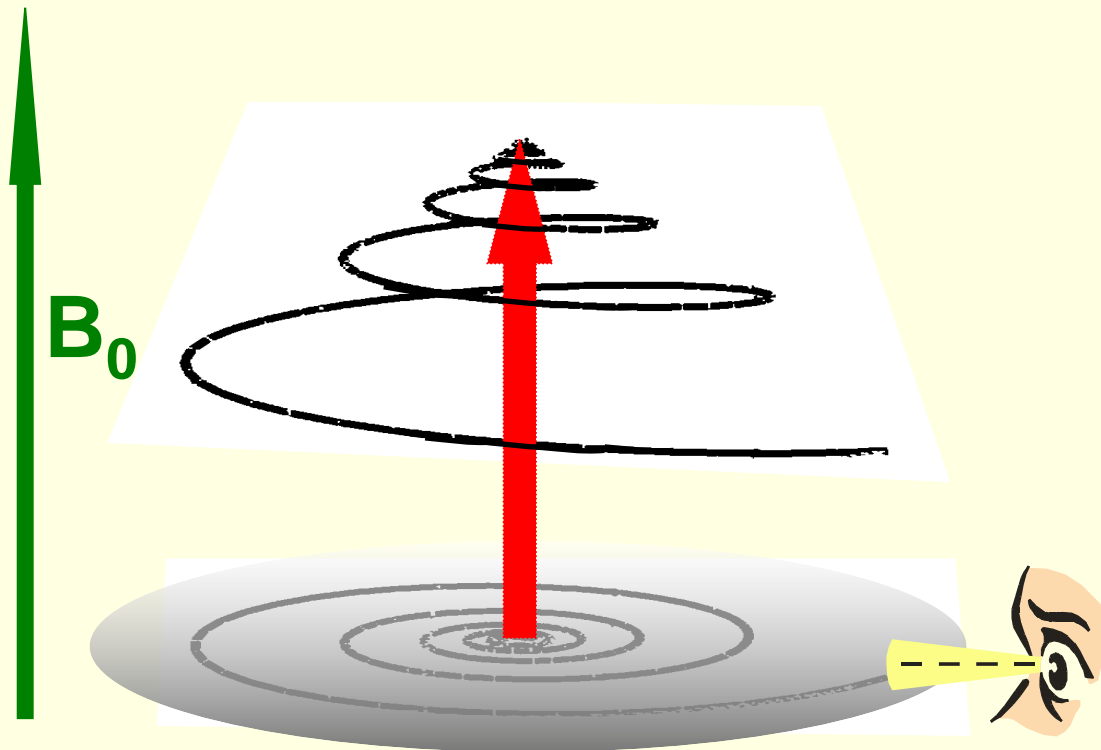




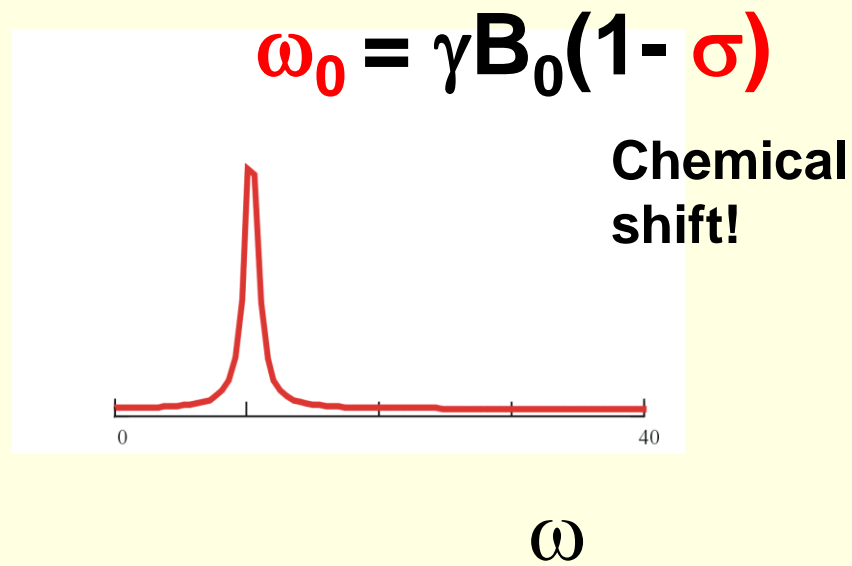
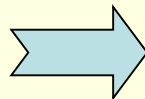


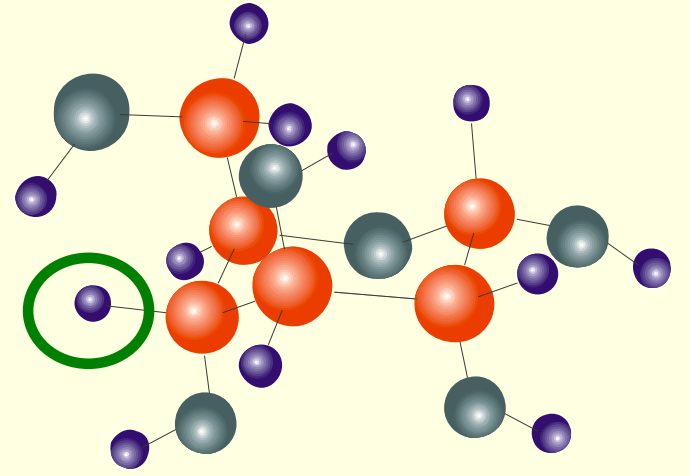
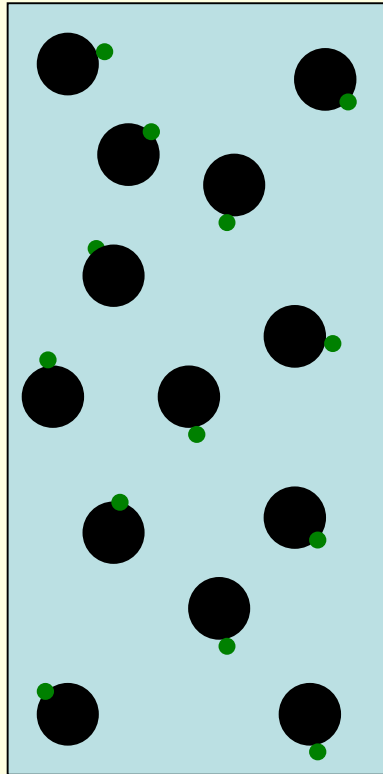


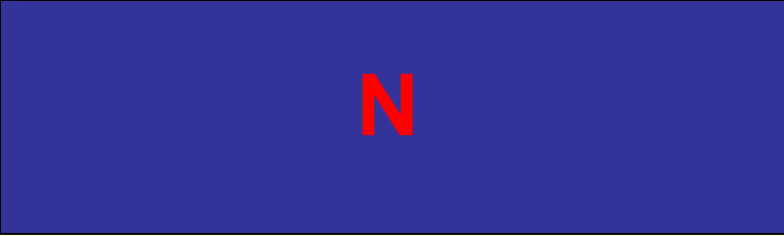




FT







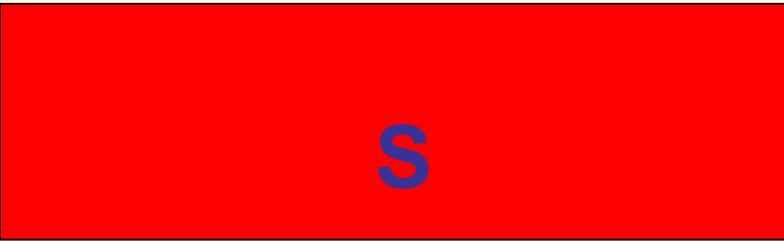
N



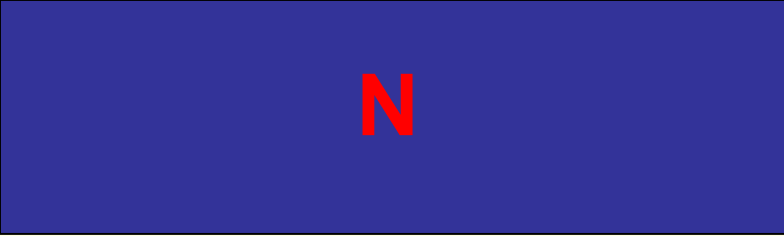
B_0



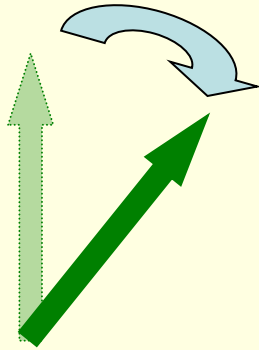
M



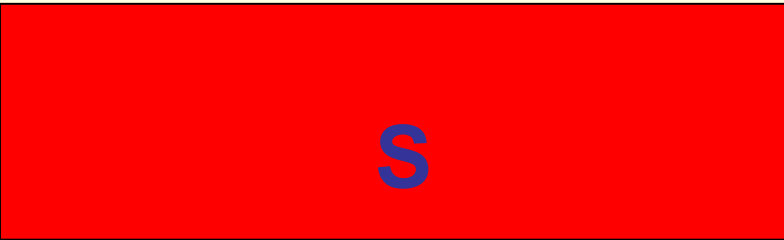
S

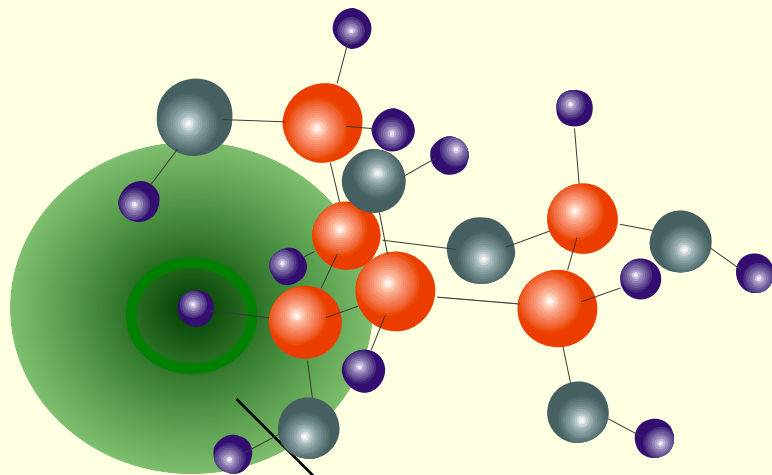
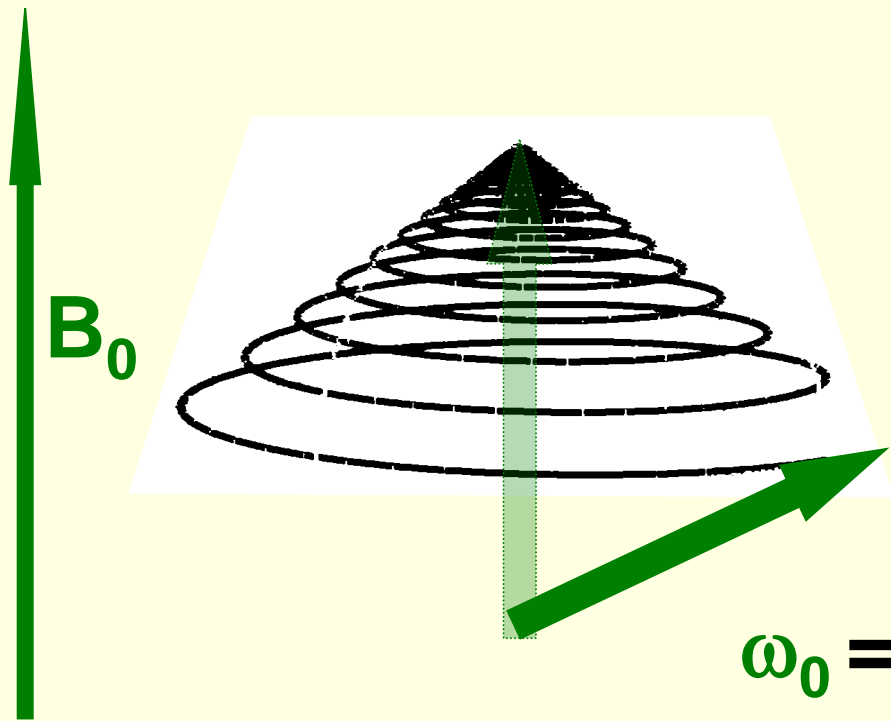


B_0

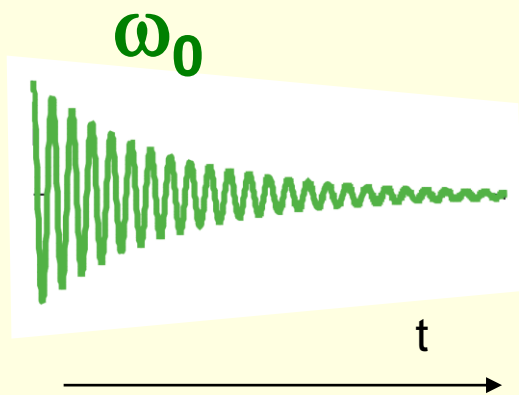


M

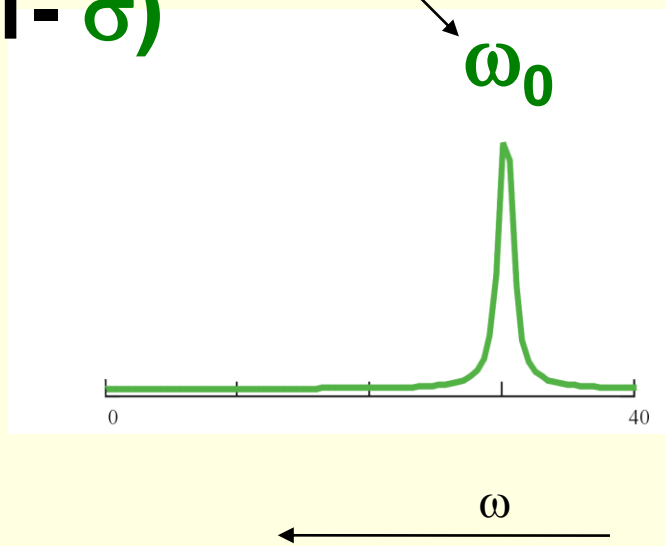
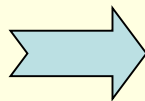


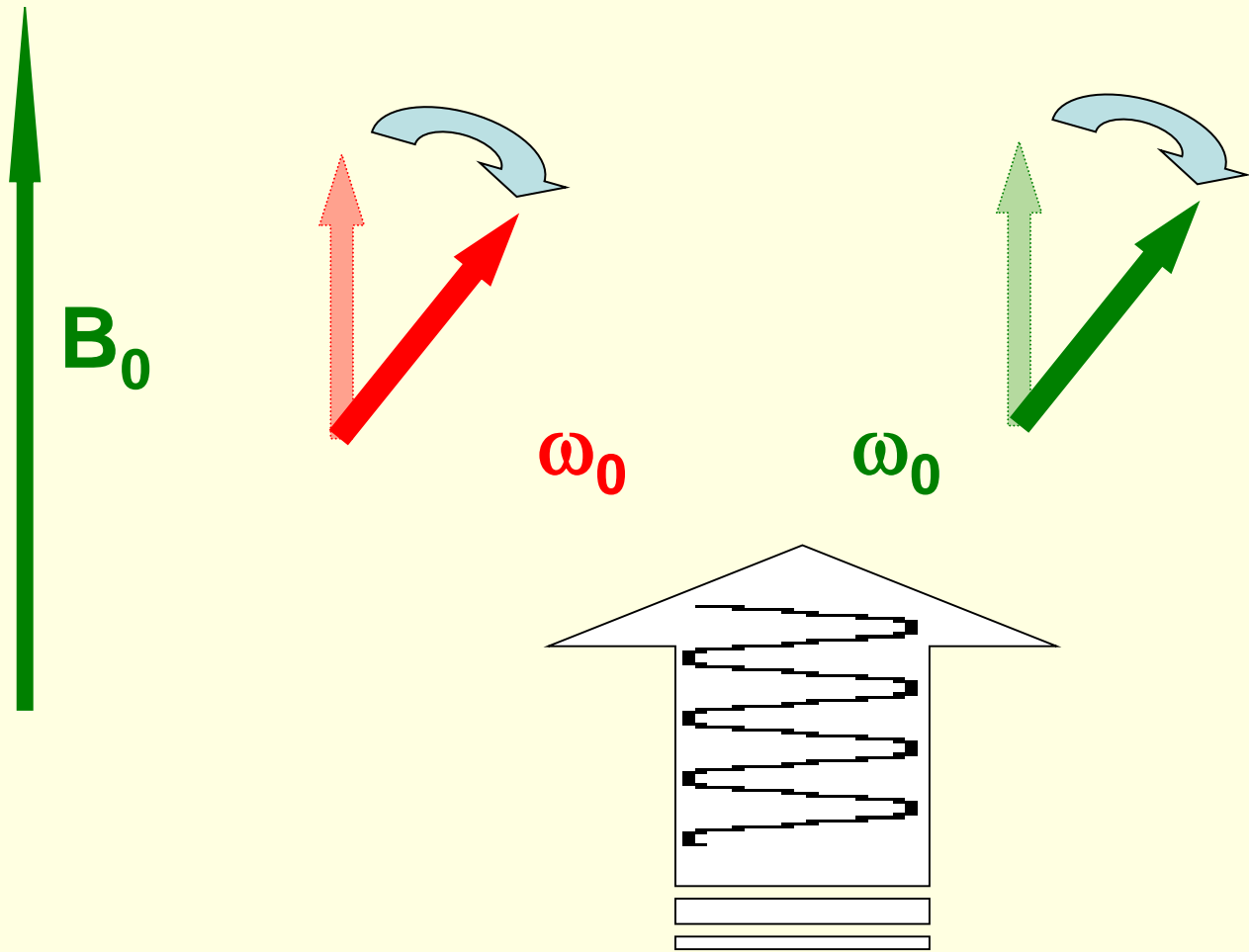


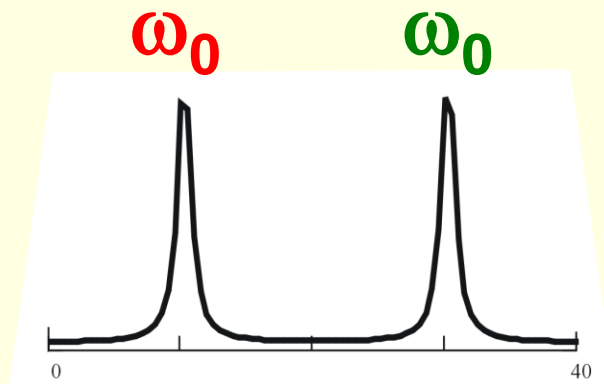
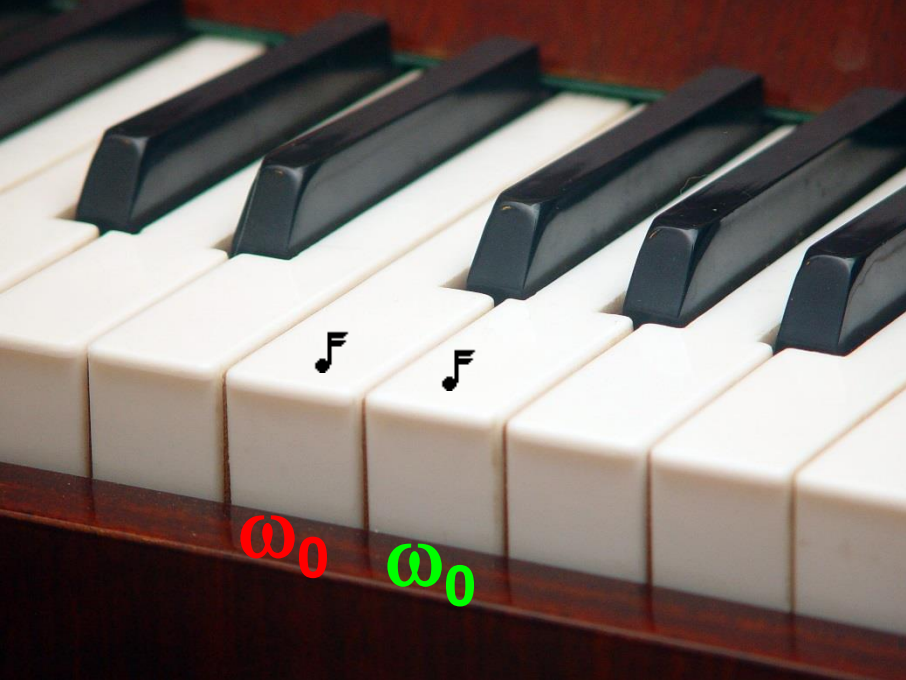
$$\omega_0 = \gamma B_0 (1 - \sigma)$$



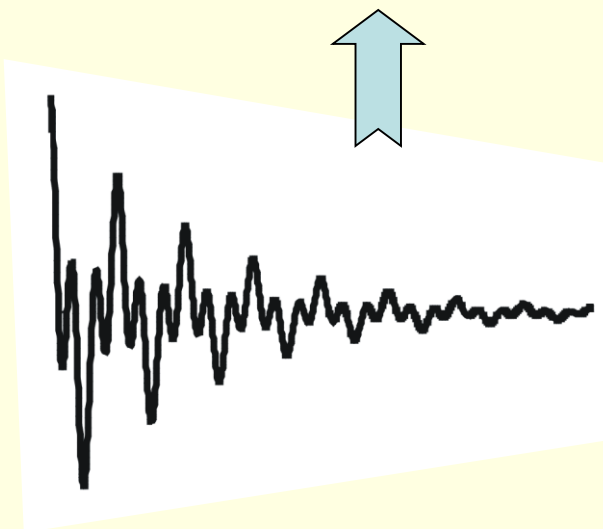
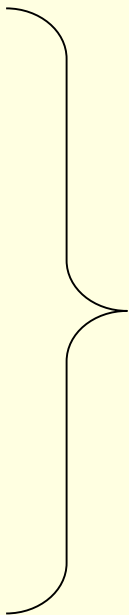
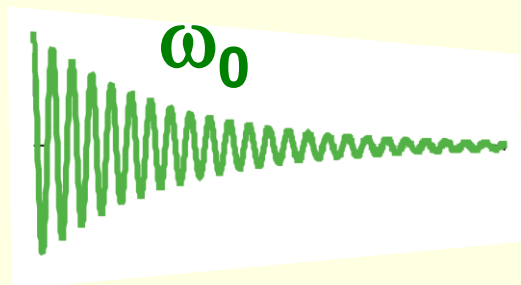
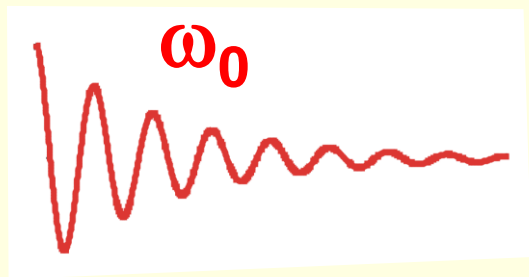
FT



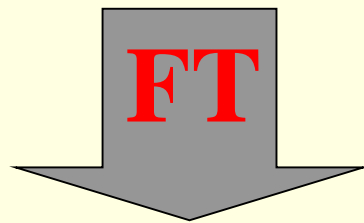
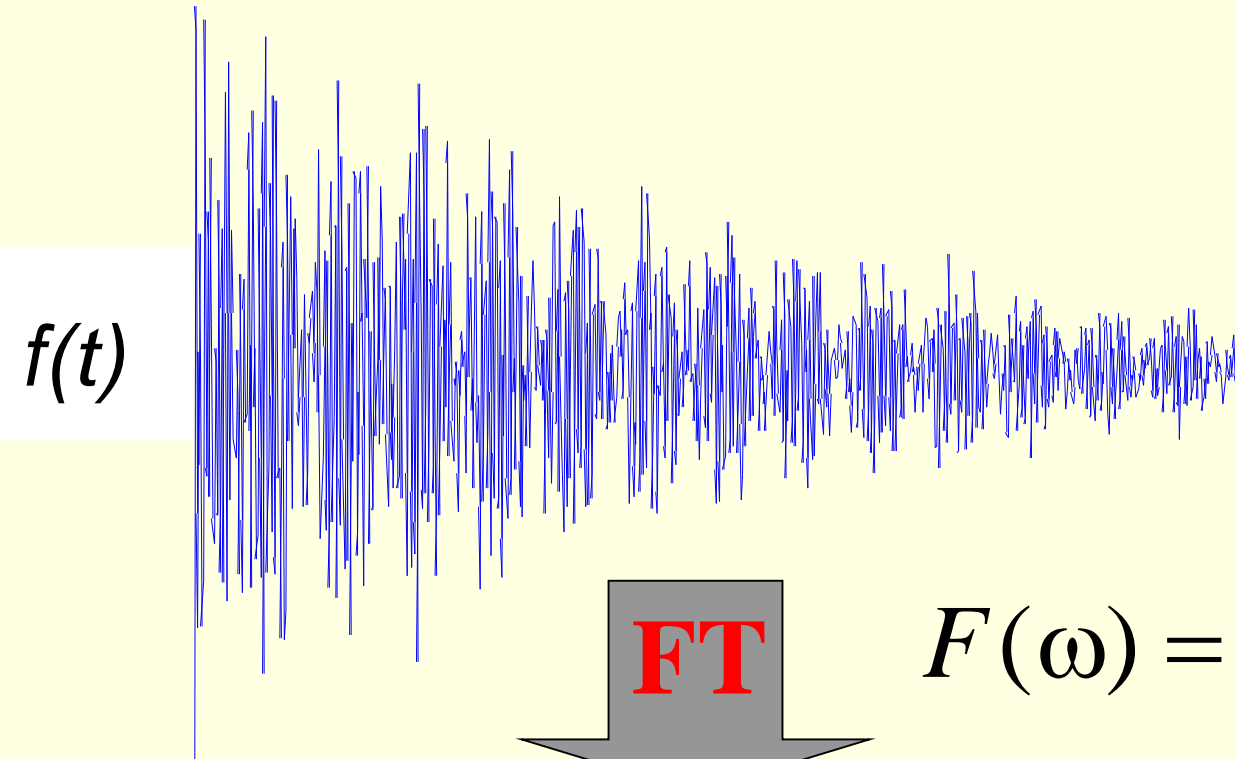




FT



FID= Free Induction Decay



$$F(\omega) = \int_{-\infty}^{\infty} f(t) e^{-i\omega t} dt$$

