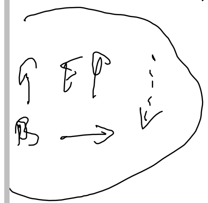
Systematic Error

Geometric Phase

$$B_v = \left(\frac{\vec{v}}{c}\times\vec{E}\right) \quad \left[\vec{B}_{tot} = \left\{\vec{B}_r(\vec{r}) + \frac{\vec{v}}{c}\times\vec{E}\right\}\right]$$

$$B_{tot}^2 = B_r^2 + \underbrace{2\vec{B}_r\cdot\left(\frac{\vec{v}}{c}\times\vec{E}\right)} + \left(\frac{\vec{v}}{c}\times\vec{E}\right)^2$$



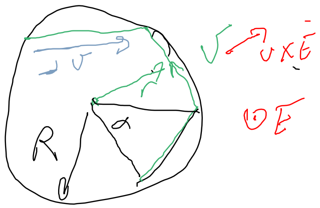
$$\vec{\nabla}\cdot\vec{B}_r = 0$$

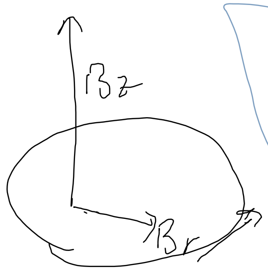
$$\frac{\partial B_z}{\partial z} + \frac{1}{r}\frac{\partial}{\partial r}(rB_r) = 0 \qquad \frac{\partial B_z}{\partial z} = a$$

$$\frac{1}{r}\frac{\partial}{\partial r}(rB_r) = -ar$$

$$rB_r = -\frac{ar^2}{2}$$

$$\left(B_r = -\frac{a\vec{r}}{2}\right)$$





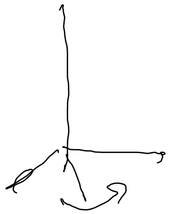
$$\boxed{\omega_r \sim \frac{v}{R}}$$

Bloch-Siegert effect

B_1, ω_r

$$\delta\omega = \frac{\omega_1^2}{(\omega_0+\omega_r)}$$

$\omega_1 = \gamma B_1$

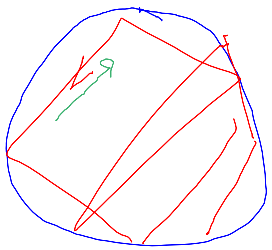


$$B_1^2 = B_r^2 = \cdots + \left(\frac{a\hat{r}}{2}\right)\left(\frac{v}{c}\times E\right)$$

$$\gamma^2 \frac{ar}{2}\left(\frac{v}{c}\times E\right)\left\{\frac{1}{(\omega_0-\omega_r)} - \frac{1}{\omega_0+\omega_r}\right]$$

$$\left\{2\gamma^2 a r v_\perp E \cdot \frac{2\omega_r}{[\omega_0^2-\omega_r^2]}\right\}$$

$$\int \frac{[\psi(\omega)]}{(\omega^2-\omega_0^2)}\, d\omega$$



$$\psi_{vv}(\omega) = \int \psi(\tau) \cos\omega\tau \, d\tau$$

$$\psi_{vv}(\tau) = \left\langle \int v(t)\, v(t-\tau)\, dt \right\rangle$$

$$-\psi_{vv}(\tau) = \frac{\partial \psi_{rv}(\tau)}{\partial \tau}$$

$$\left\{ 2\gamma^2 a r v_\perp E \cdot \frac{2\omega}{\omega_0^2 \cdot} \right\}$$

$$\cancel{\gamma^2}\left(\frac{\partial B}{\partial z}\right)\frac{v^2 \cancel{E}}{\cancel{\omega_0^2} B_0^2 c} = \delta\omega = e\, x_{cm} \cancel{E} \frac{(2\times10^{14})}{(2\pi)}$$

$$x_{cm} = \left(\frac{\partial B}{\partial z}\frac{v^2}{c B_0^2}\right)\frac{1}{2\pi \times 2\times10^{14}}$$

$$\left[10^{-7}\ \text{gauss/cm}\right] \quad 10^{-7}\ \frac{\cancel{10^5}\ 10^{-20}}{3\times\cancel{10^{10}}\times 10\ \cancel{\times 10^{14}}} \sim 10^{-27}\ \underline{e\,cm}$$

$(CH_2)_n$ $\quad N_c \quad N_H$

$$V_{vcn} \sim N_c a_c + N_H a_p$$

$\sigma_{abs}(H) \to U$

$$R = \frac{\sqrt{k} - \sqrt{k'}}{\sqrt{k} + k'}$$

$$k = (E - V)$$

$$|R|^2 < 1$$
$$= (1 - \epsilon)$$

$\epsilon(E/V)$

zero alloy

$N_1 a_1 + N_2 a_2 + \cdots$

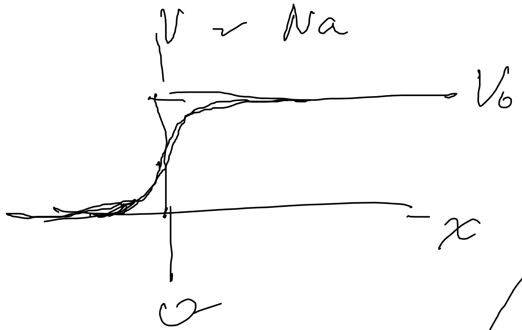
$= 0$

$a_H < 0$

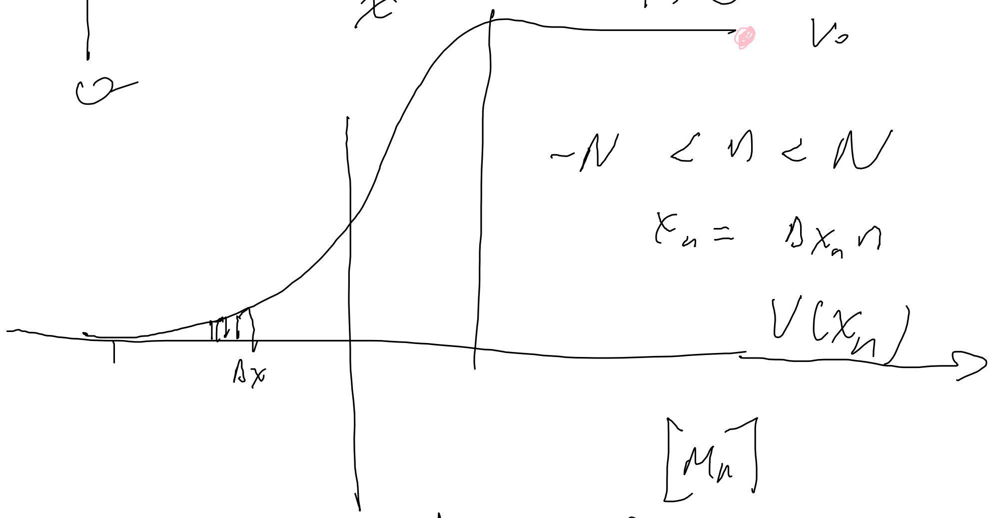
$a_{Ti} < 0$

$V + iU = iU$

$|R|^2(E)$



$$\frac{V_0}{1+e^{-x/a}} = V(x)$$



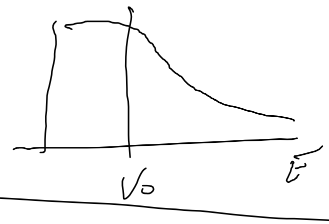
$-N < n < N$

$x_n = \Delta x_n n$

$V(x_n)$

$[M_n]$

$|R(E)|^2$

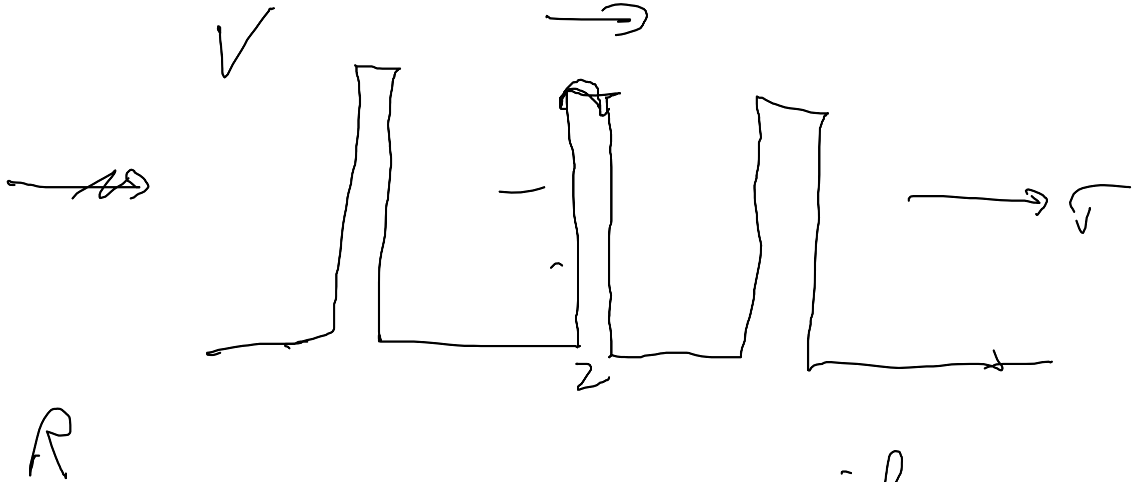


$\psi_{inc} = \cancel{A} e^{ikz} + R e^{-ikz}$ $\quad z << 0$

$\psi_{tran} = T e^{ikz}$ $\quad z >> 0$

$A e^{ikz} + B e^{-ikz}$

$T = (1/A)$



$\rightarrow \quad Ae^{ik_z z} + Be^{-ik_z z}$

$U = N\sigma_{abs}$

$\int_z |\psi|^2 U \, dz$

$$g(\omega) = \frac{3\omega^2}{\Theta^3} \quad \omega < \Theta$$

$$\int g(\omega)\, d\omega = 1 \qquad = 0 \quad \omega \geq \Theta \qquad \frac{d^2 n}{d\Omega\, d\omega} \sim g(\omega)$$

$$\int_0^{\Theta} \frac{\omega^4\, d\omega}{\left(e^{\omega/T} - 1\right)}$$