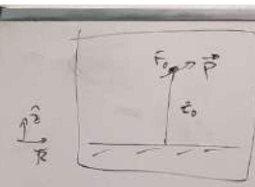


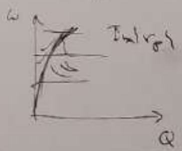
$e^{-i\omega t}$

$$\phi(\bar r) = \frac{\bar p\cdot\bar r}{r^3} + \phi_1^{ind}(\bar r)$$

$$\phi_1^{ind}(\bar r) = -\int \frac{d^2\bar Q}{(2\pi)^2}\,\frac{2\pi}{Q}\, e^{i\bar Q\cdot\bar R - Q(z+z_0)}\, r_p\, \bar p\cdot(i\bar Q - Q\hat z) = \bar p\cdot\bar F(\bar R, z+z_0)$$

$$\bar p = \frac{1}{1/\alpha - \underbrace{\mathcal{G}}_{\hookrightarrow\left(\int d\bar Q \cdots\right)}}\cdot \bar E^{ext}(\bar r_0)$$

$\leftarrow$ w/o approx.



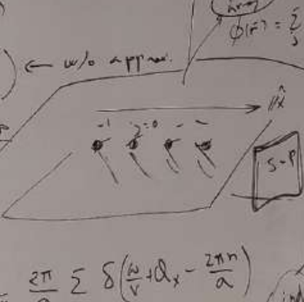
$$r_p^{pp} \simeq \frac{Q_0 R_p}{Q - Q_0}$$

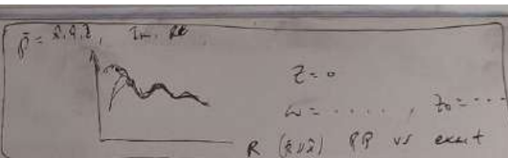
2D matter $\rightarrow R_p = 1$ ☺

finite array

$$\phi(\bar r) = \sum_j \frac{\bar E_0^{ext}\, e^{i\omega x_j/v}}{1/\alpha - \mathcal{G}}\cdot\left(\frac{\bar r - \bar r_j}{|\bar r - \bar r_j|^3} + \bar F(\bar R - \bar R_j, z+z_0)\right)$$

$\bar r_j = \bar R_j + z_0\hat z$





$$\bar F(\bar R, z+z_0) = \hat z\, F_\perp(R, z+z_0) + \hat R\, F_\parallel(R, z+z_0)$$

$$F_{\binom{\perp}{\parallel}} = -\int \frac{d^2\bar Q}{2\pi}\, e^{iQR\cos\varphi - Q(z+z_0)} \begin{bmatrix} -1 \\ i\cos\varphi \end{bmatrix} r_p$$

$$= \int_0^\infty Q\,dQ\; e^{-Q(z+z_0)} \begin{bmatrix} J_0(QR) \\ J_1(QR) \end{bmatrix} r_p$$

$$\approx i\pi Q_0^2 R_p\, e^{-Q_0(z+z_0)} \begin{bmatrix} H_0^{(1)}(Q_0R) \\ H_1^{(1)}(Q_0R) \end{bmatrix}$$

$|Q_0R| \gg 1$

$0 < \mathrm{Im}\{Q_0\} \ll |Q_0|$

??

$|Q_0 x|^{?}$

∞ array

$$\sum_j e^{i\omega x_j/v} e^{iQ_x x_j} = \frac{2\pi}{a}\sum_n \delta\left(\frac{\omega}{v} + Q_x - \frac{2\pi n}{a}\right)$$

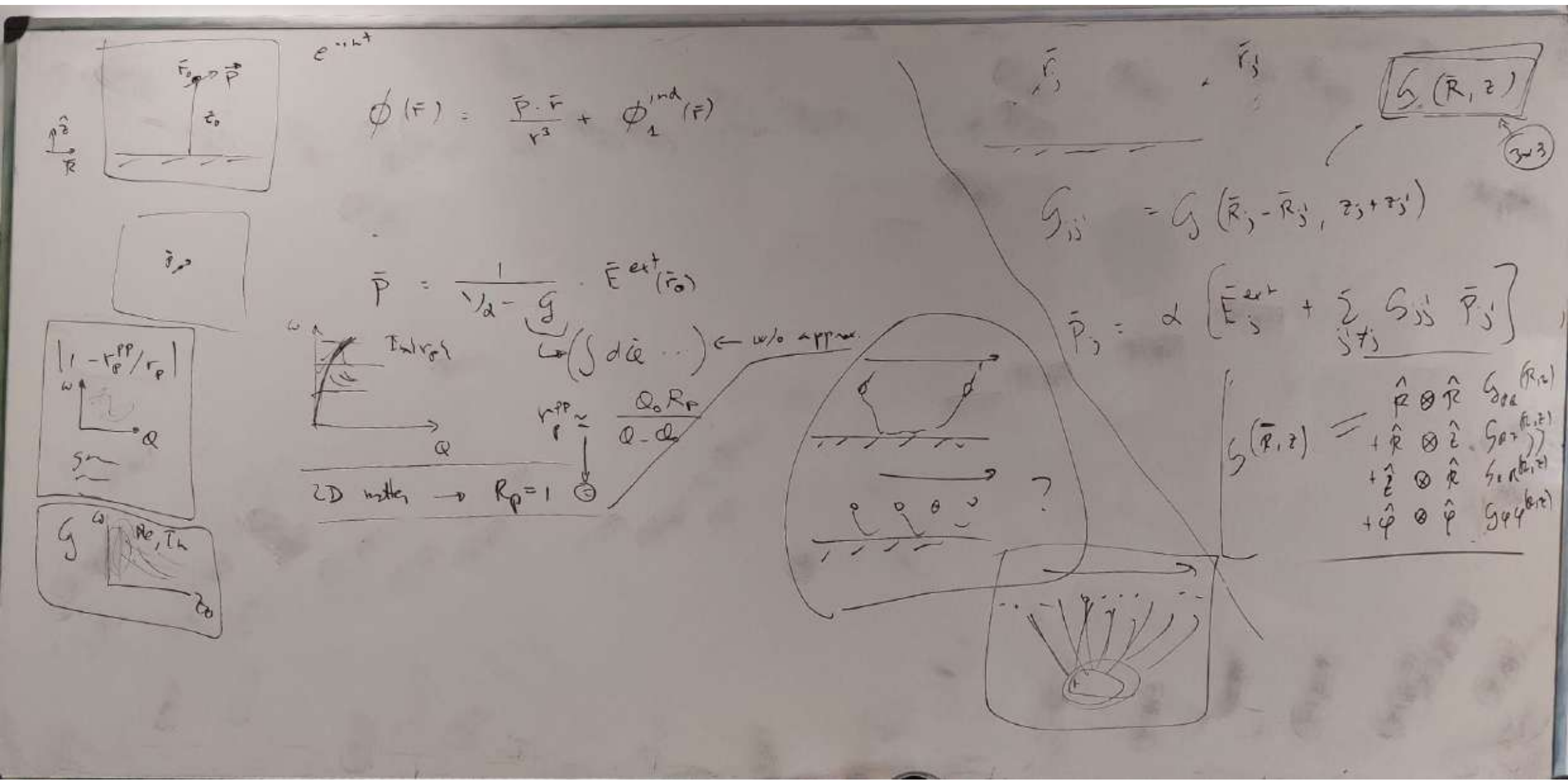
periodic $x_j = ja$

$$\phi^{ind}(\bar r) = \frac{1}{2\pi a}\sum_n \int dQ_y\; e^{iQ_y y - Q(z+z_0)}\, r_p \begin{pmatrix} -1 \\ i\frac{Q_x}{Q} \end{pmatrix} = \sum_n \phi_n^{ind}$$

$$Q_x = \frac{2\pi n}{a} - \frac{\omega}{v}$$

plot combi

$\omega, \Pi, \ldots$


$e^{-i\omega t}$
$\phi(\bar{r}) = \frac{\bar{p}\cdot\bar{r}}{r^3} + \phi_1^{ind}(\bar{r})$
$\bar{P} = \frac{1}{1/\alpha - G} \cdot \bar{E}^{ext}(\bar{r}_0)$
$\int dQ \ldots$ ← w/o approx.
Im r_p
$r_p^{pp} \simeq \frac{Q_0 R_p}{Q - Q_p}$
2D matter → $R_p = 1$
$|1 - r_p^{pp}/r_p|$
Re, Im
z_0
$G_{jj'} = G(\bar{R}_j - \bar{R}_{j'}, z_j + z_{j'})$
$\bar{P}_j = \alpha \left[\bar{E}_j^{ext} + \sum_{j' \neq j} G_{jj'} \bar{P}_{j'} \right]$
$G(\bar{R}, z)$
3×3
$G(\bar{R}, z) = \hat{R}\otimes\hat{R}\, G_{RR}(R,z) + \hat{R}\otimes\hat{z}\, G_{Rz}(R,z) + \hat{z}\otimes\hat{R}\, G_{zR}(R,z) + \hat{\varphi}\otimes\hat{\varphi}\, G_{\varphi\varphi}(R,z)$
?