γ_{AB} Matrix:

$$\frac{1}{2}\sum_{\mu\nu} P^{\alpha}_{\mu\nu}\left(\cancel{H_{\mu\nu}} + F^{\alpha}_{\mu\nu}\right) + \frac{1}{2}\sum P^{\beta}_{\mu\nu}\left(\cancel{H_{\mu\nu}} + F^{\beta}_{\mu\nu}\right)$$ + Nuclear w/o γ so drop terms

for off diagonals $H_{\mu\nu}$ doesn't have γ_{AB} component so drops out → $\underline{F^{\alpha} = \cancel{\ldots} - P^{\alpha}_{\mu\nu}\gamma_{AB}}$

$$\frac{1}{2}\sum_{\mu\nu} P^{\alpha}_{\mu\nu}\left(\cancel{\ldots} - P^{\alpha}_{\mu\nu}\gamma_{AB}\right) + \frac{1}{2}\sum P^{\beta}_{\mu\nu}\left(\cancel{\ldots} - P^{\beta}_{\mu\nu}\gamma_{AB}\right)$$

$$\sum_{\mu\nu} {P^{\alpha}_{\mu\nu}}^{2}\gamma_{AB} + \sum_{\mu\nu} {P^{\beta}_{\mu\nu}}^{2}\gamma_{AB} = \boxed{-\sum_{\mu\nu} {P^{\alpha}}^{2} + {P^{\beta}}^{2}} \qquad \frac{\partial}{\partial\gamma_{AB}}$$

term #1 for γ_{AB}

for on-diagonal terms

$$\frac{1}{2}\sum \rho^{\alpha}\left(H+F^{\alpha}\right)+\frac{1}{2}\sum \rho^{\beta}\left(H+F^{\beta}\right)$$

swapped F and H by accident!

drop all γ_{AA} terms too

now H and F have γ_{AB} terms

$$\frac{1}{2}\sum \rho^{\alpha}\left(\cancel{\ } + \sum_{B\neq A}(P_{BB}-Z_B)\gamma_{AB} + \sum Z_B\gamma_{AB}\right)+\frac{1}{2}\sum \rho^{\beta}\left(\cancel{\ } + \sum_{B\neq A}(P_{AA}-Z_A)\gamma_{AB}+\sum Z_A\gamma_{AB}\right)$$

Summing over $\mu\nu$ ρ^{α} is equivalent to P_{AA} since it ends up being the total density of all N

Same for $\sum \rho^{\beta} \rightarrow P_{BB}$

$$P_{AA}\left(\sum_{A\neq B}(P_{BB}-Z_B)\gamma_{AB} + \sum_{A\neq B} Z_B\gamma_{AB}\right)+P_{BB}\left(\sum_{A\neq B}(P_{AA}-Z_A)\gamma + \sum_{A\neq B} Z_A\gamma_{AB}\right)$$

charge on atom B seen by atom A?

reverse?

??? I'm really not sure... guess and check from here...

$$-\frac{1}{2}P_{AA}Z_B \qquad \frac{1}{2}P_{AA}P_{BB} \quad -\frac{1}{2}P_{AA}Z_B \qquad \frac{1}{2}P_{BB}P_{AA} \qquad -\frac{1}{2}P_{BB}Z_A \quad -\frac{1}{2}P_{BB}Z_{\cancel{A}}$$

$$+P_{BB}P_{AA} \quad -P_{BB}Z_A \quad -P_{AA}Z_B \quad + \text{term \#1}$$