

$$T(E) = \text{Tr} (G_R^+(E) T^R(E) G_R(E) T^L(E)) \quad (I)$$

with $T^L(E) = (\Delta_L(E) - \Delta_L^+(E))$ & $T^R(E) = (\Delta_R(E) - \Delta_R^+(E))$

... assume that all matrix elements of $T^L(E)$ & $T^R(E)$ are zero except for $T_{LL}^L(E) = T_{RR}^R(E) = 1$

... show that (I) $\Rightarrow T_{AA}(E) = |G_{R,AB}(E)|^2$

let $T(E) = \text{Tr} \begin{pmatrix} g_{m1}^+ & \dots & g_{m1}^+ \\ \vdots & & \vdots \\ g_{m1}^+ & \dots & g_{m1}^+ \end{pmatrix} \cdot \begin{pmatrix} a_{m1} & \dots & 0 \\ \vdots & & \vdots \\ 0 & \dots & a_{mn} \end{pmatrix} \cdot \begin{pmatrix} g_{m1} & \dots & g_{m1} \\ \vdots & & \vdots \\ g_{m1} & \dots & g_{m1} \end{pmatrix} \begin{pmatrix} a_{m1} & \dots & 0 \\ \vdots & & \vdots \\ 0 & \dots & a_{mn} \end{pmatrix} =$

with $a_{m1} = a_{mn} = 1$

(Matrix-Multiplication is associative)

$$= \text{Tr} \begin{bmatrix} \begin{pmatrix} g_{m1}^+ & \dots & g_{m1}^+ \\ \vdots & & \vdots \\ g_{m1}^+ & \dots & g_{m1}^+ \end{pmatrix} \begin{pmatrix} g_{m1} & \dots & g_{m1} \\ \vdots & & \vdots \\ g_{m1} & \dots & g_{m1} \end{pmatrix} \\ \vdots \\ \begin{pmatrix} g_{m1}^+ & \dots & g_{m1}^+ \\ \vdots & & \vdots \\ g_{m1}^+ & \dots & g_{m1}^+ \end{pmatrix} \begin{pmatrix} g_{m1} & \dots & g_{m1} \\ \vdots & & \vdots \\ g_{m1} & \dots & g_{m1} \end{pmatrix} \end{bmatrix} =$$

$$= \text{Tr} \begin{bmatrix} (g_{m1}^+ \dots g_{m1}^+) \cdot (g_{m1} \dots g_{m1}) & \dots & (g_{m1}^+ \dots g_{m1}^+) \cdot (g_{m1} \dots g_{m1}) \\ \vdots & & \vdots \\ (g_{m1}^+ \dots g_{m1}^+) \cdot (g_{m1} \dots g_{m1}) & \dots & (g_{m1}^+ \dots g_{m1}^+) \cdot (g_{m1} \dots g_{m1}) \end{bmatrix}$$

with $\text{Tr}[A] = \sum_{j=1}^n a_{jj} \Rightarrow (g_{m1}^+ \dots g_{m1}^+) \cdot (g_{m1} \dots g_{m1}) + \dots + (g_{m1}^+ \dots g_{m1}^+) \cdot (g_{m1} \dots g_{m1}) =$

$$= (g_{m1} \dots g_{m1})^+ \cdot (g_{m1} \dots g_{m1}) + \dots + (g_{m1} \dots g_{m1})^+ \cdot (g_{m1} \dots g_{m1}) =$$

with $z^+ z = |z|^2$

$$= (|g_{m1}|^2) \cdot (g_{m1} \dots g_{m1}) + \dots + (|g_{mn}|^2) \cdot (g_{m1} \dots g_{m1}) =$$

$$= \underline{(|g_{m1}|^2 + \dots + |g_{mn}|^2) \cdot (g_{m1} \dots g_{m1})}$$