

## GHZ Appendix

This appendix show another way of "doing the math" in the GHZ experiment.

$$\Psi_{yyx} = \frac{1}{\sqrt{2}} \cdot (H_1 \cdot H_2 \cdot H_3 + V_1 \cdot V_2 \cdot V_3)$$

substitute, $H_1 = \frac{1}{\sqrt{2}} \cdot (R_1 + L_1)$	
substitute, $H_2 = \frac{1}{\sqrt{2}} \cdot (R_2 + L_2)$	
substitute, $H_3 = \frac{1}{\sqrt{2}} \cdot (H'_3 + V'_3)$	$\rightarrow \Psi_{yyx} = \frac{1}{2} \cdot R_1 \cdot R_2 \cdot V'_3 + \frac{1}{2} \cdot R_1 \cdot L_2 \cdot H'_3 + \frac{1}{2} \cdot L_1 \cdot R_2 \cdot H'_3 + \frac{1}{2} \cdot L_1 \cdot L_2 \cdot V'_3$
substitute, $V_1 = \frac{i}{\sqrt{2}} \cdot (L_1 - R_1)$	
substitute, $V_2 = \frac{i}{\sqrt{2}} \cdot (L_2 - R_2)$	
substitute, $V_3 = \frac{1}{\sqrt{2}} \cdot (H'_3 - V'_3)$	
simplify	

$$\Psi_{xyy} = \frac{1}{\sqrt{2}} \cdot (H_1 \cdot H_2 \cdot H_3 + V_1 \cdot V_2 \cdot V_3)$$

substitute, $H_1 = \frac{R_1 + L_1}{\sqrt{2}}$	
substitute, $H_2 = \frac{H'_2 + V'_2}{\sqrt{2}}$	
substitute, $H_3 = \frac{R_3 + L_3}{\sqrt{2}}$	$\rightarrow \Psi_{xyy} = \frac{1}{2} \cdot R_1 \cdot H'_2 \cdot L_3 + \frac{1}{2} \cdot R_1 \cdot V'_2 \cdot R_3 + \frac{1}{2} \cdot L_1 \cdot H'_2 \cdot R_3 + \frac{1}{2} \cdot L_1 \cdot V'_2 \cdot L_3$
substitute, $V_1 = \frac{i}{\sqrt{2}} \cdot (L_1 - R_1)$	
substitute, $V_2 = \frac{H'_2 - V'_2}{\sqrt{2}}$	
substitute, $V_3 = \frac{i \cdot (L_3 - R_3)}{\sqrt{2}}$	
simplify	

$$\Psi_{xyx} = \frac{1}{\sqrt{2}} \cdot (H_1 \cdot H_2 \cdot H_3 + V_1 \cdot V_2 \cdot V_3)$$

substitute, $H_1 = \frac{H'_1 + V'_1}{\sqrt{2}}$	
substitute, $H_2 = \frac{R_2 + L_2}{\sqrt{2}}$	
substitute, $H_3 = \frac{R_3 + L_3}{\sqrt{2}}$	$\rightarrow \Psi_{xyx} = \frac{1}{2} \cdot H'_1 \cdot R_2 \cdot L_3 + \frac{1}{2} \cdot H'_1 \cdot L_2 \cdot R_3 + \frac{1}{2} \cdot V'_1 \cdot R_2 \cdot R_3 + \frac{1}{2} \cdot V'_1 \cdot L_2 \cdot L_3$
substitute, $V_1 = \frac{H'_1 - V'_1}{\sqrt{2}}$	
substitute, $V_2 = \frac{i \cdot (L_2 - R_2)}{\sqrt{2}}$	
substitute, $V_3 = \frac{i \cdot (L_3 - R_3)}{\sqrt{2}}$	
simplify	

$$\Psi_{xxx} = \frac{1}{\sqrt{2}} \cdot (H_1 \cdot H_2 \cdot H_3 + V_1 \cdot V_2 \cdot V_3)$$

$$\begin{array}{l} \text{substitute, } H_1 = \frac{H'_1 + V'_1}{\sqrt{2}} \\ \text{substitute, } H_2 = \frac{H'_2 + V'_2}{\sqrt{2}} \\ \text{substitute, } H_3 = \frac{H'_3 + V'_3}{\sqrt{2}} \\ \text{substitute, } V_1 = \frac{H'_1 - V'_1}{\sqrt{2}} \\ \text{substitute, } V_2 = \frac{H'_2 - V'_2}{\sqrt{2}} \\ \text{substitute, } V_3 = \frac{H'_3 - V'_3}{\sqrt{2}} \\ \text{simplify} \end{array} \rightarrow \Psi_{xxx} = \frac{1}{2} \cdot H'_1 \cdot H'_2 \cdot H'_3 + \frac{1}{2} \cdot H'_1 \cdot V'_2 \cdot V'_3 + \frac{1}{2} \cdot V'_1 \cdot H'_2 \cdot V'_3 + \frac{1}{2} \cdot V'_1 \cdot V'_2 \cdot H'_3$$