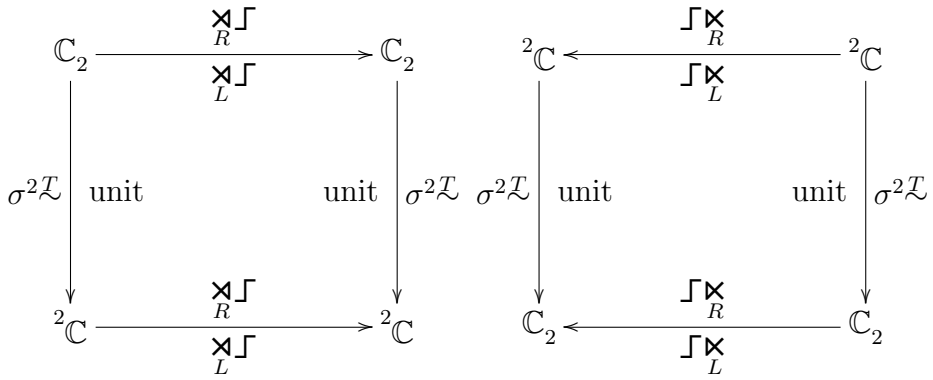
$$\mathcal{Y} = \begin{bmatrix} \mathcal{Y}_1 & \mathcal{Y}_2 \end{bmatrix} \in \mathbb{C}_2$$

$$\mathcal{H} = \begin{bmatrix} \mathcal{H}^1 \\ \mathcal{H}^2 \end{bmatrix} \in {}^2\mathbb{C}$$

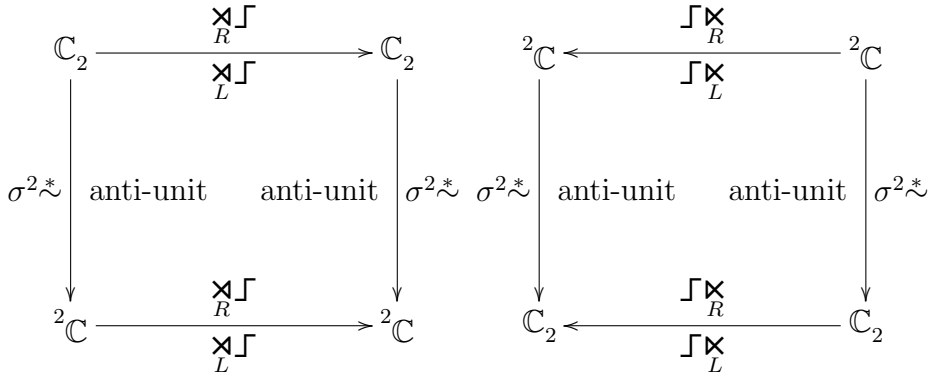
$$\begin{cases} \mathcal{Y} \underset{R}{\rtimes} \mathcal{L} = \mathcal{Y}\mathcal{L} & \mathcal{L} \underset{R}{\ltimes} \mathcal{Y} = \mathcal{Y}\mathcal{L}^{-1} \\ \mathcal{H} \underset{R}{\rtimes} \mathcal{L} = \mathcal{L}^{-1}\mathcal{H} & \mathcal{L} \underset{R}{\ltimes} \mathcal{H} = \mathcal{L}\mathcal{H} \end{cases}$$

$$\begin{cases} \mathcal{Y} \underset{L}{\rtimes} \mathcal{L} = \mathcal{Y}\bar{\mathcal{L}} & \mathcal{L} \underset{L}{\ltimes} \mathcal{Y} = \mathcal{Y}\bar{\mathcal{L}}^{-1} \\ \mathcal{H} \underset{L}{\rtimes} \mathcal{L} = \bar{\mathcal{L}}^{-1}\mathcal{H} & \mathcal{L} \underset{L}{\ltimes} \mathcal{H} = \bar{\mathcal{L}}\mathcal{H} \end{cases}$$



$$\sigma^2 \overbrace{\mathcal{Y} \underset{R}{\rtimes} \mathcal{L}}^{T} = \sigma^2 \overbrace{\mathcal{Y}\mathcal{L}}^{T} = \sigma^2 \overset{T}{\mathcal{L}} \overset{T}{\mathcal{Y}} = \sigma^2 \overset{T}{\mathcal{L}} \sigma^2 \sigma^2 \overset{T}{\mathcal{Y}} = \overset{-1}{\mathcal{L}} \sigma^2 \overset{T}{\mathcal{Y}} = \sigma^2 \overset{T}{\mathcal{Y}} \underset{R}{\ltimes} \mathcal{L}$$

$$\sigma^2 \overbrace{\mathcal{Y} \underset{L}{\rtimes} \mathcal{L}}^{T} = \sigma^2 \overbrace{\mathcal{Y}\bar{\mathcal{L}}}^{T} = \sigma^2 \overset{*}{\mathcal{L}} \overset{T}{\mathcal{Y}} = \sigma^2 \overset{*}{\mathcal{L}} \sigma^2 \sigma^2 \overset{T}{\mathcal{Y}} = \bar{\mathcal{L}}^{-1} \sigma^2 \overset{T}{\mathcal{Y}} = \sigma^2 \overset{T}{\mathcal{Y}} \underset{L}{\ltimes} \mathcal{L}$$



$$\sigma^2 \overbrace{\Psi \underset{R}{\rtimes} \lrcorner}^{*} = \sigma^2 \overbrace{\Psi \lrcorner}^{*} = \sigma^2 \overset{*}{\lrcorner} \overset{*}{\Psi} = \sigma^2 \overset{*}{\lrcorner} \sigma^2 \sigma^2 \overset{*}{\Psi} = \overset{-1}{\lrcorner} \sigma^2 \overset{*}{\Psi} = \sigma^2 \overset{*}{\Psi} \underset{R}{\rtimes} \lrcorner$$

$$\sigma^2 \overbrace{\Psi \underset{L}{\rtimes} \lrcorner}^{*} = \sigma^2 \overbrace{\Psi \bar{\lrcorner}}^{*} = \sigma^2 \overset{T}{\lrcorner} \overset{*}{\Psi} = \sigma^2 \overset{T}{\lrcorner} \sigma^2 \sigma^2 \overset{*}{\Psi} = \lrcorner^{-1} \sigma^2 \overset{*}{\Psi} = \sigma^2 \overset{*}{\Psi} \underset{L}{\rtimes} \lrcorner$$