

$$\mathbb{T}\!\!\!\!\!\mathbb{T}\!\!\!\!\!\mathbb{T} = \mathbb{L}\!\!\!\!\!\mathbb{T}\!\!\!\!\!\mathbb{T}^* \text{ pos semi-form}$$

$$\mathbb{L}\!\!\!\!\!\mathbb{T}\!\!\!\!\!\mathbb{T} = \overline{\mathbb{T}\!\!\!\!\!\mathbb{T}\!\!\!\!\!\mathbb{T}}^{1/2} = \overline{\mathbb{L}\!\!\!\!\!\mathbb{T}\!\!\!\!\!\mathbb{T}}^{1/2} \text{ semi-norm}$$

$$\mathbb{1} \underset{\mathbb{T}}{\overset{\mathbb{T}}{\subset}} \mathbb{1}\!\!\!\!\!\mathbb{T}\!\!\!\!\!\mathbb{T}$$

$$\bigvee_{u_i \in \mathbb{T}} \mathbb{L} u_i \rightsquigarrow \mathbb{T} \Rightarrow \mathbb{T} \rightsquigarrow \mathbb{L} u_i \leq \mathbb{T}^{1/2} \mathbb{L} \overline{u_i} = \mathbb{T}^{1/2} \overline{\mathbb{L} u_i^* u_i}^{1/2} \overset{\overline{u_i^* u_i} \leq 1}{\leq} \mathbb{T}^{1/2} \mathbb{T}^{1/2} = \mathbb{T} \Rightarrow \mathbb{L} \overline{u_i} \rightsquigarrow \mathbb{T}^{1/2}$$

$$\Rightarrow \widetilde{\mathbb{L} \overline{u_i - e}}^2 = \widetilde{\overbrace{u_i - e}^* \overbrace{u_i - e}} = \mathbb{L} \underbrace{u_i^* u_i}_{\mathbb{T}} - \mathbb{L} u_i - \mathbb{L} u_i^* + \mathbb{T} =$$

$$\mathbb{L} \overline{u_i}^2 - \mathbb{L} u_i - \overline{\mathbb{L} u_i}^* + \mathbb{T} \rightsquigarrow \mathbb{T} - \mathbb{T} - \mathbb{T} + \mathbb{T} = 0 \Rightarrow \mathbb{1} \ni u_i \underset{\mathbb{T}}{\rightsquigarrow} e$$

$$\mathbb{1}_{\mathbb{L}}:\alpha_{\mathbb{L}}:e_{\mathbb{L}}\text{ cycl}^*\text{-rep}$$

$$N_{\mathbb{L}}=\left\{ \begin{array}{l} 1\in \mathbb{1} \\ 1\overline{\times}_{\mathbb{L}}1=0 \end{array} \right\} =\left\{ \begin{array}{l} 1\in \mathbb{1} \\ 1\overline{\times}_{\mathbb{L}}\mathbb{1}=0 \end{array} \right\} \quad \sqsubseteq_{\text{lin}} \mathbb{1}$$

$$\bigwedge_{\mathbb{1}}\bigwedge_{\mathbb{1}}^{N_{\mathbb{L}}}\mathbb{1}\overline{\times}_{\mathbb{L}}\mathbb{1}=\mathbb{L}\underbrace{1^*\mathbb{1}}=\overline{1\overline{\times}_{\mathbb{L}}\mathbb{1}}=0\Rightarrow \mathbb{1}\in N_{\mathbb{L}}=\mathbb{1}N_{\mathbb{L}}\text{ left ideal}$$

$$\overline{\mathbb{1}+N_{\mathbb{L}}}\overline{\times}\overline{1+N_{\mathbb{L}}}=\overline{\mathbb{1}\overline{\times}_{\mathbb{L}}1}\Rightarrow \mathbb{1}\vDash N_{\mathbb{L}}\text{ pre-Hilb}$$

$$\ell_{\mathbb{1}}\overline{1+N_{\mathbb{L}}}=\overline{\mathbb{1}1+N_{\mathbb{L}}}\Rightarrow \mathbb{1}\vDash N_{\mathbb{L}}\xleftarrow[\text{contr}^*\text{-rep}]{\ell_{\mathbb{1}}}\mathbb{1}\vDash N_{\mathbb{L}}$$

$$\ell_{\mathbb{1}1}=\ell_{\mathbb{1}}\ell_1$$

$$\begin{aligned} \ell_{\mathbb{1}}\overline{1+N_{\mathbb{L}}}\overline{\times}\overline{1+N_{\mathbb{L}}}&=\overline{\mathbb{1}1+N_{\mathbb{L}}}\overline{\times}\overline{1+N_{\mathbb{L}}}=\overline{\mathbb{1}1}\overline{\times}_{\mathbb{L}}\overline{1}=\mathbb{L}\overline{\mathbb{1}1^*1}=\mathbb{L}\overline{1^*\mathbb{1}1} \\ &=\overline{1}\overline{\times}_{\mathbb{L}}\overline{\mathbb{1}1}=\overline{1+N_{\mathbb{L}}}\overline{\times}\overline{\mathbb{1}1+N_{\mathbb{L}}}=\overline{1+N_{\mathbb{L}}}\overline{\times}\overline{\ell_{\mathbb{1}}^*1+N_{\mathbb{L}}}\Rightarrow \ell_{\mathbb{1}}^*=\ell_{\mathbb{1}}^* \end{aligned}$$

$$\mathbb{L}\overline{\ell_{\mathbb{1}}\overline{1+N_{\mathbb{L}}}}^2=\overline{\mathbb{1}1}\overline{\times}_{\mathbb{L}}\overline{\mathbb{1}1}=\mathbb{L}\overline{1^*\mathbb{1}\mathbb{1}1}\leqslant\mathbb{L}\overline{1^*1}\overline{\mathbb{1}\mathbb{1}}\leqslant\mathbb{L}\overline{\mathbb{1}+N_{\mathbb{L}}}^2\overline{\mathbb{1}\mathbb{1}}^2\Rightarrow \overline{\ell_{\mathbb{1}}}\leqslant\overline{\mathbb{1}}$$

$$\mathbb{1}\overset{\wedge}{\vDash} N_{\mathbb{L}}=\overline{\mathbb{1}\vDash N_{\mathbb{L}}}^-\text{ voll Hilb }\Rightarrow {}^{\alpha}\mathbb{1}=\overline{\ell}_{\mathbb{1}}$$

$$\mathbb{1}\xrightarrow[\text{contr}^*\text{-hom}]{\alpha}\mathfrak{U}|\mathbb{1}\overset{\wedge}{\vDash} N_{\mathbb{L}}$$

$$\mathbb{1}\ni u_i\overset{\sim}{\underset{\text{hull}}{\mathbb{L}}}e\in\tilde{\mathbb{L}}\Rightarrow\tilde{\mathbb{L}}\text{ Cauchy }u_i+N_{\mathbb{L}}\overset{\sim}{\mathbb{L}}e_{\mathbb{L}}\in\mathbb{1}\overset{\wedge}{\vDash} N_{\mathbb{L}}$$

$$\alpha(\mathbb{1})e_{\mathbb{L}}=\mathbb{1}+N_{\mathbb{L}}\overset{\sqsubseteq}{\underset{\text{hull}}{\mathbb{L}}}\mathbb{1}\overset{\wedge}{\vDash} N_{\mathbb{L}}\Rightarrow \text{cyclic}$$

$$\alpha_{e_{\mathbb{L}}}\mathbb{1}=e_{\mathbb{L}}\overline{\times}^{\iota}\overline{1e_{\mathbb{L}}}=e_{\mathbb{L}}\overline{\times}\overline{\mathbb{1}+N_{\mathbb{L}}}\overset{\sim}{\mathbb{L}}\overline{u_i+N_{\mathbb{L}}}\overline{\times}\overline{\mathbb{1}+N_{\mathbb{L}}}=\mathbb{L}\overline{u_i\mathbb{1}}\overset{\sim}{\mathbb{L}}\mathbb{1}\Rightarrow \alpha_{e_{\mathbb{L}}}=\mathbb{L}$$