

$$\underbrace{\mathbb{L}:\mathcal{M}} \times \underbrace{\mathbb{L}:\mathbb{L}} = \underbrace{\mathbb{L}\mathbb{L}+\mathbb{L}}:\underbrace{\mathbb{L}^{-1}\times\mathcal{M}} = \mathbb{L}\mathcal{N}:\mathcal{M}_{\mathcal{N}}$$

$$\overline{[\times]}^{\nu} = \mathbb{L}^{\mu}{}_{\mu} \mathbb{L}^{\nu}$$

$$\underbrace{i^A}_{\mathcal{N}} = A^{-1} \mathbb{L}_B i^B$$

$$\det {}^x \mathcal{N} = \det \mathbb{L} = 1$$

$$\underbrace{\partial_{\nu} i^A}_{\mathcal{N}} = 0$$

$$\frac{\partial i^A}{\partial i^B} = A^{-1} \mathbb{L}_B$$

Poincare invariance $\mathcal{L}_{\mathcal{N};\mathcal{N}} = \mathcal{L}^{\times \mathcal{T} + \mathcal{L}}_{A^{-1} \mathcal{T}_B \overset{jB}{\mathcal{N}}; \mu \mathcal{T}^{-1\nu} A^{-1} \mathcal{T}_B \overset{jB}{\mathcal{N}}}$

$$\mathcal{T} \times \mathcal{T}' = \mathcal{T}^\mu \mathcal{T}'^\nu$$

$$\mathcal{L}(\mathcal{T} \times \mathcal{T}') = \mathcal{L}(\mathcal{T} \times \mathcal{T}')^\nu = \overline{(\mathcal{T} \times \mathcal{T}')^\nu} = \mathcal{L}^\mu \mathcal{T}^\nu = \mathcal{L}(\mathcal{T}^\mu \mathcal{T}^\nu) = \mathcal{L}(\mathcal{T}^\mu \mathcal{T}^\nu)$$

$$\mathcal{L}(\mathcal{T} \times \mathcal{T}^\mu) \mathcal{T}^{-1\nu} = \mathcal{T}^\nu$$

$$\text{LHS} = \underbrace{\mathcal{T}^\lambda \mathcal{T}^\mu}_\mu \mathcal{T}^{-1\nu} = \mathcal{T}^\lambda \underbrace{(\mathcal{T}^\mu \mathcal{T}^{-1\nu})}_{=\lambda\delta^\nu} = \mathcal{T}^\nu$$

$$\overline{A^{-1} \mathcal{T}_B \overset{jB}{\mathcal{N}} \overset{iA}{-1}} A \mathcal{T}_C^\mu \mathcal{T}^{-1\nu} C^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}} = \overset{jB}{\mathcal{N}}^* A^{-1} \mathcal{T}_B \overset{iA}{-1} A \mathcal{T}_C^\mu \mathcal{T}^{-1\nu} C^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}} \stackrel{\text{ev}}{=} \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} A^{-1} \mathcal{T}_B A \mathcal{T}_C^\mu \mathcal{T}^{-1\nu} C^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}} \stackrel{\text{unit}}{=} \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} B \mathcal{T}_D \overset{D}{\mathcal{N}}$$

$$= \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} \underbrace{B \mathcal{T}_D^{-1}}_D \mathcal{T}^{-1\nu} \mathcal{T}_D \overset{D}{\mathcal{N}} = \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} B \underbrace{(\mathcal{T} \times \mathcal{T}^\mu)}_D \mathcal{T}^{-1\nu} \mathcal{T}_D \overset{D}{\mathcal{N}} = \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} B \mathcal{T}_D \overset{D}{\mathcal{N}}$$

$$\overline{A^{-1} \mathcal{T}_B \overset{jB}{\mathcal{N}} \overset{iA}{-1}} A^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}} = \overset{jB}{\mathcal{N}}^* A^{-1} \mathcal{T}_B \overset{iA}{-1} A^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}} \stackrel{\text{ev}}{=} \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} A^{-1} \mathcal{T}_B A^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}} \stackrel{\text{unit}}{=} \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} \underbrace{B \mathcal{T}_A^{-1} \mathcal{T}_D}_D \overset{D}{\mathcal{N}} = \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} \overset{jB}{\mathcal{N}} \stackrel{=B\delta_D}{}$$

$$\text{RHS} = \overline{A^{-1} \mathcal{T}_B \overset{jB}{\mathcal{N}} \overset{iA}{-1}} \underbrace{A \mathcal{T}_C^\mu \mathcal{T}^{-1\nu} C^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}} - m A^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}}}_{=} = \overline{A^{-1} \mathcal{T}_B \overset{jB}{\mathcal{N}} \overset{iA}{-1}} A \mathcal{T}_C^\mu \mathcal{T}^{-1\nu} C^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}} - m \overline{A^{-1} \mathcal{T}_B \overset{jB}{\mathcal{N}} \overset{iA}{-1}} A^{-1} \mathcal{T}_D \overset{D}{\mathcal{N}}$$

$$= \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} B \mathcal{T}_D \overset{D}{\mathcal{N}} - m \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} \overset{jB}{\mathcal{N}} = \overset{jB}{\mathcal{N}}^* \overset{jB}{-1} \underbrace{B \mathcal{T}_D^\mu \mathcal{T}_D \overset{D}{\mathcal{N}} - m \overset{jB}{\mathcal{N}}}_{=} = \text{LHS}$$