

$$\begin{aligned} \Gamma : \Gamma &\in \mathcal{U} | \mathbb{1} \\ \Gamma - \Gamma &\in \mathcal{U} | \mathbb{1} \text{ bes} \\ \mathcal{D}_\Gamma &= \mathcal{D}_\Gamma \Rightarrow \end{aligned}$$

$$\mathbb{1}^t \mathbb{1}^{-t} = I + \int_{ds}^{0|t} \mathbb{1}^s \underbrace{\Gamma - \Gamma} \mathbb{1}^{-s}$$

$$\Gamma_s := \mathbb{1}^s \underbrace{\Gamma - \Gamma} \mathbb{1}^{-s} \in \mathbb{C} | \mathbb{1} \text{ stop-stet} \quad \bigwedge_{\Gamma \in \mathbb{1}} \int_{ds}^{0|t} \Gamma_s \Gamma \in \mathbb{1}$$

$$\overline{\int_{ds}^{0|t} \Gamma_s \Gamma} \leq \int_{ds}^{0|t} \overline{\Gamma_s \Gamma} \leq \int_{ds}^{0|t} \underbrace{\overline{\Gamma_s}}_{\overline{\Gamma - \Gamma}} \overline{\Gamma} = \int_{ds}^{0|t} \overline{\Gamma - \Gamma} \overline{\Gamma} \Rightarrow \int_{ds}^{0|t} \Gamma_s \in \mathbb{C} | \mathbb{1}$$

$$\bigwedge_{\Gamma \in \mathcal{D}_\Gamma} \bigwedge_{\Gamma \in \mathcal{D}_\Gamma} \mathbb{1} \overline{\Gamma_s \Gamma} = -\Gamma \mathbb{1}^{-s} \mathbb{1} \overline{\mathbb{1}^{-s} \Gamma} - \mathbb{1}^{-s} \mathbb{1} \overline{\Gamma} \mathbb{1}^{-s} \Gamma$$

$$= \overline{\partial_t \mathbb{1}^{-t} \mathbb{1} \overline{\mathbb{1}^{-s} \Gamma} + \mathbb{1}^{-s} \mathbb{1} \overline{\partial_t \mathbb{1}^{-t} \Gamma}} = \overline{\partial_t \mathbb{1}^{-t} \mathbb{1} \overline{\mathbb{1}^{-t} \Gamma} + \mathbb{1}^{-t} \mathbb{1} \overline{\mathbb{1}^{-t} \Gamma}} = \overline{\partial_t \mathbb{1} \overline{\mathbb{1}^t \mathbb{1}^{-t} \Gamma}}$$

$$\Rightarrow \mathbb{1} \overline{\int_{ds}^{0|t} \Gamma_s \Gamma} = \int_{ds}^{0|t} \mathbb{1} \overline{\Gamma_s \Gamma} = \mathbb{1} \overline{\mathbb{1}^t \mathbb{1}^{-t} \Gamma} - \mathbb{1} \overline{\Gamma} = \mathbb{1} \overline{\mathbb{1}^t \mathbb{1}^{-t} - I} \mathbb{1}$$

$$\mathbb{1}^t \mathbb{1}^{-t} = \sum_m^{\mathbb{N}} \int_{dt_1 \cdots dt_m}^{\overrightarrow{0|t}^m} \mathbb{1}_{t_1} \cdots \mathbb{1}_{t_m}$$

$$\mathbb{1}_s := \mathbb{1}^s \underbrace{\mathbb{1} \cdots \mathbb{1}}_s \mathbb{1}^{-s} \in \mathbb{C} | \mathbb{1}$$

$$t \geq t_1 \geq \cdots \geq t_m \geq 0$$

$$\bigwedge_{1 \leq n} \mathbb{1}^t \mathbb{1}^{-t} - \sum_m^n \int_{dt_1 \cdots dt_m}^{\overrightarrow{0|t}^m} \mathbb{1}_{t_1} \cdots \mathbb{1}_{t_m} = \int_{dt_1 \cdots dt_n}^{\overrightarrow{0|t}^n} \mathbb{1}_{t_1} \cdots \mathbb{1}_{t_n} \mathbb{1}^{t_n} \mathbb{1}^{-t_n}$$

$$n = 1: \mathbb{1}^t \mathbb{1}^{-t} - I = \int_{dt_1}^{0|t} \mathbb{1}^{t_1} \underbrace{\mathbb{1} \cdots \mathbb{1}}_1 \mathbb{1}^{-t_1} = \int_{dt_1}^{0|t} \mathbb{1}_{t_1} \mathbb{1}^{t_1} \mathbb{1}^{-t_1}$$

$$1 \leq n \rightsquigarrow n+1: \text{LHS}_{n+1} = \text{LHS}_n - \int_{dt_1 \cdots dt_n}^{\overrightarrow{0|t}^n} \mathbb{1}_{t_1} \cdots \mathbb{1}_{t_n} \mathbb{1}^{t_n} \mathbb{1}^{-t_n}$$

$$= \int_{dt_1 \cdots dt_n}^{\overrightarrow{0|t}^n} \mathbb{1}_{t_1} \cdots \mathbb{1}_{t_n} \mathbb{1}^{t_n} \mathbb{1}^{-t_n} \underbrace{\mathbb{1}^{t_n} \mathbb{1}^{-t_n} - I}_{=0} = \int_{dt_1 \cdots dt_n}^{\overrightarrow{0|t}^n} \mathbb{1}_{t_1} \cdots \mathbb{1}_{t_n} \int_{dt_{n+1}}^{0|t_n} \mathbb{1}_{t_{n+1}} \mathbb{1}^{t_{n+1}} \mathbb{1}^{-t_{n+1}} = \text{RHS}_{n+1}$$

$$\overbrace{\mathbb{1}^t \mathbb{1}^{-t} - \sum_m^n \int_{dt_1 \cdots dt_m}^{\overrightarrow{0|t}^m} \mathbb{1}_{t_1} \cdots \mathbb{1}_{t_m}} \leq \int_{dt_1 \cdots dt_n}^{\overrightarrow{0|t}^n} \underbrace{\mathbb{1}_{t_1} \cdots \mathbb{1}_{t_n}}_{=1} \underbrace{\mathbb{1}^{t_n} \mathbb{1}^{-t_n}}_{=1} \leq \underbrace{\mathbb{1} \cdots \mathbb{1}}_n \int_{dt_1 \cdots dt_n}^{\overrightarrow{0|t}^n} 1 = \underbrace{\mathbb{1} \cdots \mathbb{1}}_n \frac{t_n}{n!}$$

$$\mathbb{1}^{-t} = \sum_n^{\mathbb{N}} \int_{dt_1 \cdots dt_n}^{\overrightarrow{0|t}^n} \underbrace{\mathbb{1}^{t_n-t}}_1 \underbrace{\mathbb{1} \cdots \mathbb{1}}_1 \underbrace{\mathbb{1}^{t_{n-1}-t_n}}_1 \underbrace{\mathbb{1} \cdots \mathbb{1}}_1 \cdots \underbrace{\mathbb{1}^{t_1-t_2}}_1 \underbrace{\mathbb{1} \cdots \mathbb{1}}_1 \mathbb{1}^{-t_1}$$