

$$X e_{\dot{X}}^{-t_0 \mathcal{P}^0} = \int_{d\Sigma}^{\Sigma} \int_{\mathbb{X} | \partial \Sigma = \dot{X}}^{d\mathbb{X}} e^{-\int_{\Sigma} \mathcal{P}(\mathbb{X})}$$

$$\mathbb{X} \overbrace{e^{-t_0 \mathcal{P}^0}}^{\dot{X}} = \int^{dX} X^*_{\dot{X}} \overbrace{e^{-t_0 \mathcal{P}^0}}^{\dot{X}} = \int^{dX} X^*_{\dot{X}} \int^{d\dot{X}} X e_{\dot{X}}^{-t_0 \mathcal{P}^0} \dot{X} = \int^{dX} \int^{d\dot{X}} X^*_{\dot{X}} \dot{X} \int_{d\Sigma}^{\Sigma} \int_{\mathbb{X} | \partial \Sigma = \dot{X}}^{d\mathbb{X}} e^{-\int_{\Sigma} \mathcal{P}(\mathbb{X})}$$

$$Q_{-\infty}^{\#} S = Q_{-\infty}^{\#} S \times_{\mu} \mathbb{C}$$

$$Q_{-\infty}^{\#} S \cup \dot{S} = Q_{-\infty}^{\#} S \times Q_{-\infty}^{\#} \dot{S}$$

$$Q_{-\infty}^{\#} \underline{S} = \overbrace{Q_{-\infty}^{\#} S}^{\#}$$

$$Q_{-\infty}^{\#} \emptyset = \mathbb{C}$$

$$S \xleftarrow[\text{diffeo}]{\mathcal{U}} \dot{S} \Rightarrow Q_{-\infty}^{\#} S \xleftarrow[\text{isometric}]{Q_{-\infty}^{\#} \mathcal{U}} Q_{-\infty}^{\#} \dot{S}$$

$$Q_{-\infty}^{\#} \Sigma \in Q_{-\infty}^{\#} \partial \Sigma$$

$$\partial \Sigma = \partial \dot{\Sigma} \Rightarrow \partial \underline{\Sigma} - \dot{\Sigma} = \emptyset \Rightarrow Q_{-\infty}^{\#} \Sigma \times Q_{-\infty}^{\#} \dot{\Sigma} = Q_{-\infty}^{\#} \underline{\Sigma} - \Sigma \in \mathbb{C}$$

$$\dim Q_{-\infty}^{\#} S = Q_{-\infty}^{\#} S \times \mathbb{T} \in \mathbb{C} \leftarrow \partial(S \times \mathbb{T}) = \emptyset$$

$$\text{Diff}(S) \rightarrow \mathcal{U} | Q_{-\infty}^{\#} S$$

$$\text{tr } Q_{-\infty}^{\#} \mathcal{U} = Q_{-\infty}^{\#} S \times_{\mathcal{U}} \mathbb{I}$$

$$\partial \Sigma = \partial_1 \Sigma - \partial_0 \Sigma \Rightarrow Q_{-\infty}^{\#} \partial_1 \Sigma \xleftarrow{Q_{-\infty}^{\#} \Sigma} Q_{-\infty}^{\#} \partial_0 \Sigma$$

$$Q_{-\infty}^{\#} \Sigma = \int_{d\Phi}^{\varphi | \dot{\Phi}} \exp \left(- \int_{\Sigma} \mathcal{L}(\Phi) \right)$$

$$\begin{array}{c}
 \mathcal{Q}_{-\infty}^{\#} \partial_1 \Sigma \leftarrow \mathcal{Q}_{-\infty}^{\#} \partial_0 \Sigma = \partial_1 \dot{\Sigma} \leftarrow \mathcal{Q}_{-\infty}^{\#} \partial_1 \dot{\Sigma} \\
 \mathcal{Q}_{-\infty}^{\#} \Sigma \qquad \qquad \qquad \mathcal{Q}_{-\infty}^{\#} \dot{\Sigma} \\
 \mathcal{Q}_{-\infty}^{\#} \Sigma \cup \dot{\Sigma}
 \end{array}$$