

$$\mathcal{U}(t_{\text{f}}, t_2) = \underbrace{\mathcal{N}(t_{\text{f}}, t_2)} + \overbrace{\int_{t_2}^{t_{\text{f}}} dt_3 \mathcal{U}(t_{\text{f}}, t_3) \mathcal{H}_I(t_3) \mathcal{N}(t_3, t_2)}$$