

$$G_H^{\text{val}}(B, T, z) = \frac{\int_0^{1/T} \mathrm{d}\tau \int \mathrm{d}y \int \mathrm{d}x}{Z(B=0, T)} \int \mathcal{D}U e^{-S_g}$$

$$\times \prod_{f=u,d,s} \det M \left( U, q_f B = 0, m_f \right) \mathcal{G}_{f_1 f_2}(B, \boldsymbol{x})$$