

The theory of fluctuations about the large  $N$  saddle point are expressed in terms of a bilocal time Green's function,  $G(\tau_1, \tau_2)$ . This theory is invariant at low energies under a time reparameterization  $f$ , and an emergent gauge transformation  $g$

$$\tau = f(\sigma)$$

$$G(\tau_1, \tau_2) = [f'(\sigma_1)f'(\sigma_2)]^{-1/4} \frac{g(\sigma_1)}{g(\sigma_2)} \tilde{G}(\sigma_1, \sigma_2)$$

where  $f(\sigma)$  and  $g(\sigma)$  are arbitrary functions.