

$$\mathcal{Z} = \int \mathcal{D}\Psi(r, \tau) \exp \left(- \int d^2r d\tau \left[|\partial_\tau \Psi|^2 + c^2 |\nabla_r \Psi|^2 + V(\Psi) \right] \right)$$

$$V(\Psi) = (\lambda - \lambda_c) |\Psi|^2 + u \left(|\Psi|^2 \right)^2$$