

# Hamiltonian RG flow equation

Definition of electron-hole transition operator

$$\eta_{j,l} = Tr(c_{j,l}^\dagger H_{j,l}) c_{j,l} \frac{1}{\hat{\omega}_{j,l} - Tr_{j,l}(H_{j,l}^D \hat{n}_{j,l}) \hat{n}_{j,l}}$$

off-diagonal scattering operation between e-h configuration

Quantum fluctuation operator

diag. part of H

$$\hat{\omega}_{j,l} = \boxed{H_{j,l}^D} + \boxed{H_{j,l}^X - H_{j,l-1}^X}$$

renormalized off diag. part of H

$$H_{j,l}^X = \sum_{\alpha} \Gamma_{\alpha}^2 c_{\mathbf{k}\sigma}^{\dagger} c_{\mathbf{k}'\sigma'} + \sum_{\beta} \Gamma_{\beta}^2 c_{\mathbf{k}\sigma}^{\dagger} c_{\mathbf{k}'\sigma'}^{\dagger} c_{\mathbf{k}'_1\sigma'_1} c_{\mathbf{k}_1\sigma_1} + \dots$$

Number off-diagonal Hamiltonian composed of 1-p scattering vertex and higher order terms.