

Singlet ground state in the AF regime

$$H_0^*(\omega) = \frac{J^*(\omega)}{2} \sum_{\Lambda, \Lambda' < \Lambda^*, \hat{s}\hat{s}'} \mathbf{S} \cdot c_{\mathbf{k}_{\Lambda\hat{s}}, \alpha}^\dagger \boldsymbol{\sigma}_{\alpha\beta} c_{\mathbf{k}_{\Lambda'\hat{s}'}, \alpha}^\dagger$$

zero mode IR theory

$$|\Psi\rangle = \frac{1}{\sqrt{2}} \left[|\uparrow\rangle \sum_{\Lambda\hat{s}} |1_{\mathbf{k}_{\Lambda\hat{s},\downarrow}}\rangle \otimes_{\Lambda' \neq \Lambda, \hat{s}' \neq \hat{s}} |\Lambda'\hat{s}', \sigma\rangle - |\downarrow\rangle \sum_{\Lambda\hat{s}} |1_{\mathbf{k}_{\Lambda\hat{s},\uparrow}}\rangle \otimes_{\Lambda' \neq \Lambda, \hat{s}' \neq \hat{s}} |\Lambda'\hat{s}', \sigma\rangle \right]$$

ground state wavefunction

A electronic local quantum liquid couples with the impurity spin in AF side

Note: in Ferromagnetic side the electronic state is a Fermi liquid

Could this be a local non Fermi Liquid?

Note: not not to be confused with Nozieres local Fermi liquid obtained by tracing out Kondo singlet

