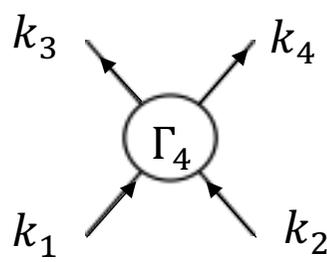
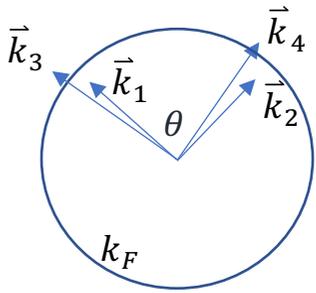


- 4-point vertex function:
 $k = (\vec{k}, i\omega_n), q = (\vec{q}, i\Omega_n)$

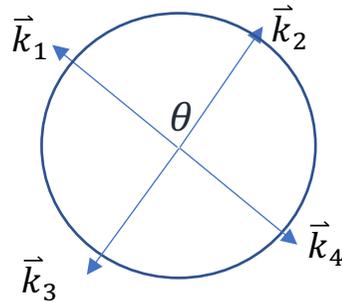


Transfer momentum-frequency:
 $q = k_3 - k_1 = k_2 - k_4$

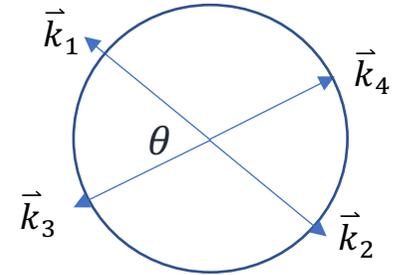
Forward scattering



Backward scattering



Cooper channel



- Non-analytic.
- Landau parameters:
 $F(\theta) \equiv \Gamma_4(q \rightarrow 0, \Omega \rightarrow 0)$
- Scattering amplitudes:
 $A(\theta) \equiv \Gamma_4(q \rightarrow 0, \Omega = 0)$
- $A_l = \frac{F_l}{1+F_l}$

- Non-analytic
 $B(\theta) \equiv \Gamma_4(q \rightarrow 2k_F, \Omega \rightarrow 0)$
- Friedel oscillations.
- Kohn-Luttinger superconductivity.
- Singular spin susceptibility in 2D.

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- Non-analytic near superconducting phase transition temperature.
- $V(\theta) \equiv \Gamma_4(k_2 = -k_1, k_4 = -k_3)$