

$$\begin{aligned}
\chi_{1,2} &= \langle \overline{\psi}_2 \psi_2 \overline{\psi}_1 \psi_1 \rangle_0 - V_{34} \langle \overline{\psi}_2 \psi_2 \overline{\psi}_3 \overline{\psi}_4 \psi_4 \psi_3 \overline{\psi}_1 \psi_1 \rangle_0 - V_{34} \langle \overline{\psi}_2 \psi_2 \overline{\psi}_3 \overline{\psi}_4 \psi_4 \psi_3 \overline{\psi}_1 \psi_1 \rangle_0 + \cdots \\
&= \xi g_{12} g_{21} + (-1) V_{34} g_{13} g_{31} g_{24} g_{42} + (-1) \xi V_{34} g_{13} g_{32} g_{24} g_{41} + \cdots
\end{aligned}$$

$$= \text{Diagram 1} + \text{Diagram 2} + \text{Diagram 3} + \cdots$$

The diagrams are Feynman diagrams representing terms in a series expansion. The first diagram is a bubble diagram with two external wavy lines labeled 1 and 2. The second diagram is a chain of two bubble diagrams connected by a wavy line, with external wavy lines labeled 1, 3, 4, and 2. The third diagram is a bubble diagram with a vertical wavy line in the center, with external wavy lines labeled 1 and 2, and vertices labeled 3 and 4.