

goldstone

$$a_p \equiv \begin{array}{c} p \\ \circ \\ \uparrow \end{array} \quad a_p^\dagger \equiv \begin{array}{c} \circ \\ \uparrow \\ p \end{array} \quad b_a \equiv \begin{array}{c} a \\ \bullet \\ \uparrow \end{array} \quad b_i \equiv \begin{array}{c} i \\ \bullet \\ \downarrow \end{array} \quad b_a^\dagger \equiv \begin{array}{c} \bullet \\ \downarrow \\ a \end{array} \quad b_i^\dagger \equiv \begin{array}{c} \bullet \\ \uparrow \\ i \end{array} \quad (1)$$

$$a_{q_1 q_2 \cdots q_n}^{p_1 p_2 \cdots p_n} \equiv \begin{array}{c} p_1 \quad p_2 \quad p_n \\ \uparrow \quad \uparrow \quad \uparrow \\ \bigcirc \text{---} \bigcirc \text{---} \cdots \text{---} \bigcirc \\ \uparrow \quad \uparrow \quad \uparrow \\ q_1 \quad q_2 \quad q_n \end{array} \quad \tilde{a}_{q_1 q_2 \cdots q_n}^{p_1 p_2 \cdots p_n} \equiv \begin{array}{c} p_1 \quad p_2 \quad p_n \\ \uparrow \quad \uparrow \quad \uparrow \\ \bigodot \text{---} \bigodot \text{---} \cdots \text{---} \bigodot \\ \uparrow \quad \uparrow \quad \uparrow \\ q_1 \quad q_2 \quad q_n \end{array} \quad (2)$$

$$\left(\frac{1}{n!}\right)^2 v_{p_1 p_2 \dots p_n}^{q_1 q_2 \dots q_n} \tilde{\alpha}_{q_1 q_2 \dots q_n}^{p_1 p_2 \dots p_n} \equiv \boxed{\textbf{v}} \begin{array}{c} \circ \\ \updownarrow \end{array} - \begin{array}{c} \updownarrow \\ \circ \end{array} - \dots - \begin{array}{c} \circ \\ \updownarrow \end{array} \quad (3)$$

$$h_p^q a_q^p \equiv \text{diagram} \quad (4)$$

$$\text{Diagram 1} = \text{Diagram 2} + \text{Diagram 3} \quad (5)$$

$$\text{Diagram 1} = \text{Diagram 2} + \text{Diagram 3} + \text{Diagram 4} + \text{Diagram 5} + \text{Diagram 6} \quad (6)$$

$$\frac{1}{4}\overline{g}_{pq}^{rs}a_{rs}^{pq} = \text{diagram of a wavy line between two vertical lines} \quad (7)$$

$$\text{Diagram 1} = \text{Diagram 2} + \text{Diagram 3} + \text{Diagram 4} \quad (8)$$

$$\text{Diagram 1} = \text{Diagram 2} + \text{Diagram 3} + \text{Diagram 4} + \text{Diagram 5} + \text{Diagram 6} + \text{Diagram 7} + \text{Diagram 8} + \text{Diagram 9} + \text{Diagram 10} + \text{Diagram 11} \quad (9)$$

[illegible]

$$\begin{array}{c}
1 + \text{diagram} \\
\hline
\text{diagram} + \text{diagram} = \text{diagram} + \text{diagram} + \text{diagram} + \text{diagram} + \text{diagram} \\
\hline
1 + \text{diagram}
\end{array} \quad (11)$$

$$\begin{array}{c}
\text{---} \otimes \text{---} \\
\text{---} \otimes \text{---} \\
\text{---} \otimes \text{---}
\end{array}
+
\begin{array}{c}
\text{---} \otimes \text{---} \\
\text{---} \otimes \text{---} \\
\text{---} \otimes \text{---}
\end{array}
=
\begin{array}{c}
\text{---} \otimes \text{---} \\
\text{---} \otimes \text{---} \\
\text{---} \otimes \text{---}
\end{array}
\exp \left(\text{---} \otimes \text{---} \right)
\quad (12)$$

$$\begin{aligned}
& \text{Diagram 1} + \text{Diagram 2} = \\
& \exp\left(\text{Diagram 3}\right) \\
& + \text{Diagram 4} + \text{Diagram 5} + \text{Diagram 6} + \text{Diagram 7} \\
& + \text{Diagram 8} + \text{Diagram 9} + \text{Diagram 10}
\end{aligned} \tag{13}$$

(14)

(15)

$E^{(2)} =$

(16)

$E^{(3)} =$

(17)