

$$\begin{aligned}
\Gamma_{12\rightarrow 34}(\vec{p}_1) &= \int d^3k w_{12\rightarrow 34}(\vec{p}_1, \vec{k}) = \frac{\gamma_2}{2E_1} \int \frac{d^3p_2}{(2\pi)^3 2E_2} \int \frac{d^3p_3}{(2\pi)^3 2E_3} \int \frac{d^3p_4}{(2\pi)^3 2E_4} \\
&\times f_2(\vec{p}_2) \left[ 1 \pm f_3(\vec{p}_1 - \vec{k}) \right] \left[ 1 \pm f_4(\vec{p}_2 + \vec{k}) \right] S_2(s, t, u) \\
&\times (2\pi)^4 \delta^{(4)}(p_1 + p_2 - p_3 - p_4) |\mathcal{M}_{12\rightarrow 34}|^2
\end{aligned}$$