

$$\begin{aligned}
 C(\bar{r}g \rightarrow r\bar{g}) &= \frac{1}{4} \left( \lambda_{21}^1 \lambda_{12}^1 + \lambda_{21}^2 \lambda_{12}^2 \right) \\
 &= \frac{1}{4} \left( 1 \times 1 + (i) \times (-i) \right) \\
 &= \frac{1}{4} (2) \\
 &= \frac{1}{2}
 \end{aligned}$$

$$\begin{aligned}
 C(r\bar{r} \rightarrow g\bar{g}) &= \frac{1}{4} \left( \lambda_{11}^3 \lambda_{22}^3 + \lambda_{11}^8 \lambda_{22}^8 \right) \\
 &= \frac{1}{4} \left( 1 \times (-1) + \frac{1}{\sqrt{3}} \times \frac{1}{\sqrt{3}} \right) \\
 &= \frac{1}{4} \left( -1 + \frac{1}{3} \right) \\
 &= \frac{1}{4} \left( -\frac{2}{3} \right) \\
 &= -\frac{1}{6}
 \end{aligned}$$