

Quadratic pole

Pole residue:

$$-\frac{1}{r_3(2r_3+r_5)(r_3+2r_5)p^2} > 0$$

Polarisations:

2

Unitarity conditions

$$r_3 < 0 \&\& (r_5 < -\frac{r_3}{2} \parallel r_5 > -2r_3) \parallel r_3 > 0 \&\& -2r_3 < r_5 < -\frac{r_3}{2}$$

(No massive particles)

Lagrangian density

$$\begin{aligned} &\frac{2}{3}t_3\omega_{\lambda'}^{\alpha\prime}\omega_{\kappa\alpha}^{\kappa}+f^{\alpha\beta}\tau_{\alpha\beta}+\omega^{\alpha\beta\chi}\sigma_{\alpha\beta\chi}^{}-\frac{1}{2}r_3\partial_{\lambda'}\omega_{\kappa}^{\kappa\lambda}\partial'_{\lambda}\omega_{\alpha}^{\alpha}-r_5\partial_{\lambda'}\omega_{\kappa}^{\kappa\lambda}\partial'_{\kappa}\omega_{\lambda}^{\alpha}+\\ &\frac{2}{3}r_2\partial^{\beta}\omega_{\kappa}^{\theta\alpha}\partial_{\theta}\omega_{\alpha\beta}^{\kappa}-\frac{1}{3}r_2\partial_{\theta}\omega_{\alpha\beta}^{\kappa}\partial_{\kappa}\omega^{\alpha\beta\theta}-\frac{2}{3}r_2\partial_{\theta}\omega_{\alpha\beta}^{\kappa}\partial_{\kappa}\omega^{\theta\alpha\beta}+\\ &\frac{1}{2}r_3\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\theta}^{\theta\kappa\lambda}-r_5\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\theta}^{\theta\kappa\lambda}-\frac{1}{2}r_3\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega^{\theta\kappa\lambda}+\\ &r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega^{\theta\kappa\lambda}-\frac{1}{2}r_3\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\theta}^{\kappa\lambda\theta}-r_5\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\theta}^{\kappa\lambda\theta}+r_3\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega^{\kappa\lambda\theta}+\\ &2r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\alpha}^{\kappa}f_{\lambda'}^{\prime}+\frac{2}{3}t_3\omega_{\kappa\alpha}^{\alpha}\partial^{\kappa}f_{\lambda'}^{\prime}-\frac{2}{3}t_3\omega_{\kappa\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\prime}-\frac{4}{3}t_3\partial^{\alpha}f_{\kappa\alpha}\partial^{\kappa}f_{\lambda'}^{\prime}+\\ &\frac{2}{3}t_3\partial_{\kappa}f_{\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\prime}+\frac{2}{3}t_3\omega_{\lambda\alpha}^{\alpha}\partial^{\kappa}f_{\kappa}^{\prime}+\frac{2}{3}t_3\omega_{\lambda\lambda}^{\lambda}\partial^{\kappa}f_{\kappa}^{\prime}+\frac{2}{3}t_3\partial^{\alpha}f_{\alpha}^{\lambda}\partial^{\kappa}f_{\lambda\kappa}^{\prime}+\\ &\frac{1}{3}r_2\partial_{\kappa}\omega^{\alpha\beta\theta}\partial^{\kappa}\omega_{\alpha\beta\theta}+\frac{2}{3}r_2\partial_{\kappa}\omega^{\theta\alpha\beta}\partial^{\kappa}\omega_{\alpha\beta\theta}-\frac{2}{3}r_2\partial^{\beta}\omega_{\lambda'}^{\alpha\lambda}\partial_{\lambda}\omega_{\alpha\beta}^{\prime}-\frac{1}{2}r_3\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\kappa}^{\theta\kappa}+\\ &\frac{2}{3}r_2\partial^{\beta}\omega_{\lambda'}^{\lambda\alpha}\partial_{\lambda}\omega_{\alpha\beta}^{\prime}-4r_3\partial^{\beta}\omega_{\lambda'}^{\lambda\alpha}\partial_{\lambda}\omega_{\alpha\beta}^{\prime}-\frac{1}{2}r_3\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\kappa}^{\theta\kappa}+\\ &r_5\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\theta}^{\theta\kappa\kappa}+\frac{1}{\kappa}r_3\partial_{\theta}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\kappa}^{\theta\kappa}-r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\kappa}^{\theta\kappa} \end{aligned}$$

	$\omega_{1+}^{\#1} \dagger \alpha\beta$	$\omega_{1+}^{\#2} \alpha\beta$	$f_{1+}^{\#1} \alpha\beta$	$\omega_{1-}^{\#1} \alpha$	$\omega_{1-}^{\#2} \alpha$	$f_{1-}^{\#1} \alpha$	$f_{1-}^{\#2} \alpha$
$\omega_{1+}^{\#1} \dagger \alpha\beta$	$k^2(2r_3+r_5)$	0	0	0	0	0	0
$\omega_{1+}^{\#2} \dagger \alpha\beta$	0	0	0	0	0	0	0
$f_{1+}^{\#1} \dagger \alpha\beta$	0	0	0	0	0	0	0
$\omega_{1-}^{\#1} \dagger \alpha$	0	0	0	$k^2(\frac{r_3}{2}+r_5)+\frac{2t_3}{3}$	$-\frac{\sqrt{2}t_3}{3}$	0	$-\frac{2}{3}i\frac{k t_3}{3}$
$\omega_{1-}^{\#2} \dagger \alpha$	0	0	0	$-\frac{\sqrt{2}t_3}{3}$	$\frac{t_3}{3}$	0	$\frac{1}{3}i\sqrt{2}kt_3$
$f_{1-}^{\#1} \dagger \alpha$	0	0	0	0	0	0	0
$f_{1-}^{\#2} \dagger \alpha$	0	0	0	$\frac{2ikt_3}{3}$	$-\frac{1}{3}i\sqrt{2}kt_3$	0	$\frac{2k^2t_3}{3}$

Source constraints

SO(3) irreps	#
$\tau_{0+}^{\#2} == 0$	1
$\tau_{0+}^{\#1} - 2i\frac{k}{3}\sigma_{0+}^{\#1} == 0$	1
$\tau_{1-}^{\#2\alpha} + 2i\frac{k}{3}\sigma_{1-}^{\#2\alpha} == 0$	3
$\tau_{1-}^{\#1\alpha} == 0$	3
$\tau_{1+}^{\#1\alpha\beta} == 0$	3
$\sigma_{1+}^{\#2\alpha\beta} == 0$	3
$\sigma_{2-}^{\#1\alpha\beta\chi} == 0$	5
$\tau_{2+}^{\#1\alpha\beta} == 0$	5
Total #:	24

	$\sigma_{0+}^{\#1} \dagger$	$\tau_{0+}^{\#1} \dagger$	$\tau_{0+}^{\#2} \dagger$	$\sigma_{0+}^{\#1}$
$\sigma_{0+}^{\#1} \dagger$	0	0	0	$\frac{1}{k^2r_2}$
$\tau_{0+}^{\#1} \dagger$	$\frac{i\sqrt{2}k}{(1+2k^2)^2t_3}$	$-\frac{i\sqrt{2}k}{(1+2k^2)^2t_3}$	0	0
$\tau_{0+}^{\#2} \dagger$	0	0	0	0

	$\sigma_{2+}^{\#1} \dagger \alpha\beta$	$\tau_{2+}^{\#1} \dagger \alpha\beta$	$\sigma_{2-}^{\#1} \alpha\beta\chi$
$\sigma_{2+}^{\#1} \dagger \alpha\beta$	$-\frac{2}{3k^2r_3}$	0	0
$\tau_{2+}^{\#1} \dagger \alpha\beta$	0	0	0
$\sigma_{2-}^{\#1} \dagger \alpha\beta\chi$	0	0	0

	$\omega_{2+}^{\#1} \dagger \alpha\beta$	$f_{2+}^{\#1} \alpha\beta$	$\omega_{2-}^{\#1} \alpha\beta\chi$
$\omega_{2+}^{\#1} \dagger \alpha\beta$	$-\frac{3k^2r_3}{2}$	0	0
$f_{2+}^{\#1} \dagger \alpha\beta$	0	0	0
$\omega_{2-}^{\#1} \dagger \alpha\beta\chi$	0	0	0

	$\omega_{0+}^{\#1}$	$f_{0+}^{\#1}$	$f_{0+}^{\#2}$	$\omega_{0-}^{\#1}$
$\omega_{0+}^{\#1} \dagger$	t_3	$-i\sqrt{2}kt_3$	0	0
$f_{0+}^{\#1} \dagger$	$i\sqrt{2}kt_3$	$2k^2t_3$	0	0
$f_{0+}^{\#2} \dagger$	0	0	0	0
$\omega_{0-}^{\#1} \dagger$	0	0	0	k^2r_2