

Quadratic pole

Pole residue:

$$-\frac{1}{r_1(r_1+r_5)(2r_1+r_5)p^2} > 0$$

Polarisations:

2

Unitarity conditions

$$r_1 < 0 \&\& (r_5 < -r_1 \parallel r_5 > -2r_1) \parallel r_1 > 0 \&\& -2r_1 < r_5 < -r_1$$

(No massive particles)

$\sigma_{1+}^{\#1} \dagger \alpha \beta$	$\sigma_{1+}^{\#2} \dagger \alpha \beta$	$\tau_{1+}^{\#1} \dagger \alpha \beta$	$\sigma_{1-}^{\#1} \dagger \alpha$	$\sigma_{1-}^{\#2} \dagger \alpha$	$\tau_{1-}^{\#1} \dagger \alpha$	$\tau_{1-}^{\#2} \dagger \alpha$
$\sigma_{1+}^{\#1} \dagger \alpha \beta$	$\frac{1}{k^2(2r_1+r_5)}$	0	0	0	0	0
$\sigma_{1+}^{\#2} \dagger \alpha \beta$	0	0	0	0	0	0
$\tau_{1+}^{\#1} \dagger \alpha \beta$	0	0	0	0	0	0
$\sigma_{1-}^{\#1} \dagger \alpha$	0	0	$\frac{1}{k^2(r_1+r_5)}$	$\frac{\sqrt{2}}{k^2(1+2k^2)(r_1+r_5)}$	0	$\frac{2i}{k(1+2k^2)(r_1+r_5)}$
$\sigma_{1-}^{\#2} \dagger \alpha$	0	0	$\frac{\sqrt{2}}{k^2(1+2k^2)(r_1+r_5)}$	$\frac{3k^2(r_1+r_5)+2t_3}{(k+2k^3)^2(r_1+r_5)t_3}$	0	$\frac{i\sqrt{2}(3k^2(r_1+r_5)+2t_3)}{k(1+2k^2)^2(r_1+r_5)t_3}$
$\tau_{1-}^{\#1} \dagger \alpha$	0	0	0	0	0	0
$\tau_{1-}^{\#2} \dagger \alpha$	0	0	$-\frac{2i}{k(1+2k^2)(r_1+r_5)}$	$-\frac{i\sqrt{2}(3k^2(r_1+r_5)+2t_3)}{k(1+2k^2)^2(r_1+r_5)t_3}$	0	$\frac{6k^2(r_1+r_5)+4t_3}{(1+2k^2)^2(r_1+r_5)t_3}$

$\omega_{1+}^{\#1} \dagger \alpha \beta$	$\omega_{1+}^{\#2} \dagger \alpha \beta$	$f_{1+}^{\#1} \dagger \alpha \beta$	$\omega_{1-}^{\#1} \dagger \alpha$	$\omega_{1-}^{\#2} \dagger \alpha$	$f_{1-}^{\#1} \dagger \alpha$	$f_{1-}^{\#2} \dagger \alpha$
$\omega_{1+}^{\#1} \dagger \alpha \beta$	$k^2(2r_1+r_5)$	0	0	0	0	0
$\omega_{1+}^{\#2} \dagger \alpha \beta$	0	0	0	0	0	0
$f_{1+}^{\#1} \dagger \alpha \beta$	0	0	0	0	0	0
$\omega_{1-}^{\#1} \dagger \alpha$	0	0	$k^2(r_1+r_5)+\frac{2t_3}{3}$	$-\frac{\sqrt{2}t_3}{3}$	0	$-\frac{2}{3}i k t_3$
$\omega_{1-}^{\#2} \dagger \alpha$	0	0	$-\frac{\sqrt{2}t_3}{3}$	$\frac{t_3}{3}$	0	$\frac{1}{3}i\sqrt{2} k t_3$
$f_{1-}^{\#1} \dagger \alpha$	0	0	0	0	0	0
$f_{1-}^{\#2} \dagger \alpha$	0	0	$\frac{2i k t_3}{3}$	$-\frac{1}{3}i\sqrt{2} k t_3$	0	$\frac{2k^2t_3}{3}$

Lagrangian density

$$\frac{2}{3}t_3\omega_{\lambda}^{\alpha\prime}\omega_{\kappa\alpha}^{}+f^{\alpha\beta}\tau_{\alpha\beta}+\omega^{\alpha\beta\chi}\sigma_{\alpha\beta\chi}-r_5\partial_{\lambda}\omega_{\kappa}^{\lambda}\partial_{\lambda}^{}\omega_{\alpha}^{}-\frac{2}{3}r_1\partial^{\beta}\omega_{\kappa}^{\theta\alpha}\partial_{\kappa}\omega_{\alpha\beta}^{}-\frac{2}{3}r_1\partial_{\theta}\omega_{\alpha\beta}^{}\partial_{\kappa}\omega^{\kappa\alpha\beta\theta}+\frac{2}{3}r_1\partial_{\theta}\omega_{\alpha\beta}^{}\partial_{\kappa}\omega^{\kappa\alpha\beta\theta}-r_5\partial_{\alpha}\omega_{\lambda}^{}\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega^{\theta\kappa\lambda}+r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\alpha}\omega_{\lambda}^{\theta\kappa\lambda}-r_5\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\theta}\omega_{\lambda}^{\kappa\lambda\theta}+2r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\alpha}\omega_{\lambda}^{\kappa\lambda\theta}-\frac{2}{3}t_3\omega_{\kappa\alpha}^{}\partial_{\kappa}^{\alpha}f^{\prime}_{\lambda}+\frac{2}{3}t_3\omega_{\kappa\lambda}^{\lambda}\partial_{\kappa}f^{\prime}_{\lambda}-\frac{4}{3}t_3\partial^{\alpha}f_{\kappa\alpha}\partial^{\kappa}f^{\prime}_{\lambda}+\frac{2}{3}t_3\partial_{\kappa}f^{\lambda}_{\lambda}\partial^{\kappa}f^{\prime}_{\lambda}+\frac{2}{3}t_3\omega_{\alpha}^{\alpha}\partial_{\lambda}^{\kappa}f^{\prime}_{\kappa}+\frac{2}{3}t_3\omega_{\lambda}^{\lambda}\partial_{\lambda}^{\kappa}f^{\prime}_{\kappa}+\frac{2}{3}t_3\partial^{\alpha}f_{\kappa}^{\lambda}\partial_{\alpha}^{\kappa}f^{\lambda}_{\lambda}+\frac{2}{3}r_1\partial_{\kappa}\omega^{\alpha\beta\theta}\partial^{\kappa}\omega_{\alpha\beta\theta}-\frac{2}{3}r_1\partial_{\kappa}\omega^{\theta\alpha\beta}\partial^{\kappa}\omega_{\alpha\beta\theta}+\frac{2}{3}r_1\partial^{\beta}\omega_{\alpha}^{\alpha\lambda}\partial_{\lambda}\omega_{\alpha\beta}^{}-\frac{8}{3}r_1\partial^{\beta}\omega_{\alpha}^{\lambda\alpha}\partial_{\lambda}\omega_{\alpha\beta}^{}+r_5\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\theta}^{\theta\kappa}-r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\alpha}^{\lambda}\omega_{\kappa}^{\theta\kappa}$$

Source constraints	#
SO(3) irreps	
$\sigma_{0-}^{\#1} == 0$	1
$\tau_{0+}^{\#2} == 0$	1
$\tau_{0+}^{\#1} - 2i k \sigma_{0+}^{\#1} == 0$	1
$\tau_{1-}^{\#2\alpha} + 2i k \sigma_{1-}^{\#2\alpha} == 0$	3
$\tau_{1-}^{\#1\alpha} == 0$	3
$\tau_{1+}^{\#1\alpha\beta} == 0$	3
$\sigma_{1+}^{\#2\alpha\beta} == 0$	3
$\tau_{2+}^{\#1\alpha\beta} == 0$	5
$\sigma_{2+}^{\#1\alpha\beta} == 0$	5
Total #:	25

$\sigma_{2+}^{\#1} \dagger \alpha \beta$	$\tau_{2+}^{\#1} \dagger \alpha \beta$	$\sigma_{2-}^{\#1} \dagger \alpha \beta \chi$
$\sigma_{2+}^{\#1} \dagger \alpha \beta$	0	0
$\tau_{2+}^{\#1} \dagger \alpha \beta$	0	0
$\sigma_{2-}^{\#1} \dagger \alpha \beta \chi$	0	$\frac{1}{k^2r_1}$

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

$\omega_{2+}^{\#1} \dagger \alpha \beta$	$f_{2+}^{\#1} \dagger \alpha \beta$	$\omega_{2-}^{\#1} \dagger \alpha \beta \chi$
$\omega_{2+}^{\#1} \dagger \alpha \beta$	0	0
$f_{2+}^{\#1} \dagger \alpha \beta$	0	0
$\omega_{2-}^{\#1} \dagger \alpha \beta \chi$	0	k^2r_1

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