



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_2\omega_{\kappa\lambda}^{\prime}\omega_{\kappa\lambda}^{\prime}+\frac{1}{3}t_2\omega_{\kappa\lambda}^{\prime}\omega_{\kappa\lambda}^{\prime\prime}-\frac{1}{2}r_3\partial_{\lambda}\omega_{\kappa\lambda}^{\prime}\partial_{\kappa}\omega_{\lambda}^{\alpha}-r_5\partial_{\lambda}\omega_{\kappa\lambda}^{\prime}\partial_{\kappa}\omega_{\lambda}^{\alpha}+\\ &\frac{1}{2}r_3\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\lambda}^{\theta\kappa\lambda}-r_5\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\lambda}^{\theta\kappa\lambda}-\frac{1}{2}r_3\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\lambda}^{\theta\kappa\lambda}+\\ &r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\lambda}^{\theta\kappa\lambda}-\frac{1}{2}r_3\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\lambda}^{\kappa\lambda\theta}-r_5\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\lambda}^{\kappa\lambda\theta}+\\ &r_3\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\lambda}^{\kappa\lambda\theta}+2r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\lambda}^{\kappa\lambda\theta}+\frac{1}{6}t_2\partial^{\alpha}f_{\theta\kappa}^{\kappa}\partial^{\kappa}f_{\alpha\lambda}^{\theta}+\frac{1}{3}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\alpha\lambda}^{\theta}-\frac{2}{3}t_2\omega_{\kappa\theta}\partial^{\kappa}f_{\lambda}^{\theta}-\\ &\frac{1}{6}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\alpha}^{\theta}+\frac{1}{6}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\alpha\lambda}^{\theta}-\frac{1}{6}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\lambda}^{\theta}-\frac{1}{3}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\alpha\lambda}^{\theta}-\frac{1}{6}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\lambda}^{\theta}+\\ &\frac{1}{3}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\alpha}^{\theta}+\frac{2}{3}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\alpha\lambda}^{\theta}-\frac{1}{6}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\lambda}^{\theta}-\frac{1}{6}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\alpha\lambda}^{\theta}-\frac{1}{6}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\lambda}^{\theta}+\\ &\frac{1}{6}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f_{\alpha}^{\theta}-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_{\kappa}^{\theta\kappa}+\frac{1}{2}r_3\partial_{\theta}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\alpha}^{\theta\kappa}-r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\alpha}^{\theta\kappa} \end{aligned}$$

Added source term:  $\left| f^{\alpha\beta} \tau_{\alpha\beta} + \omega^{\alpha\beta\chi} \sigma_{\alpha\beta\chi} \right.$

$\omega_{1+}^{\#1} \dagger^{\alpha\beta}$	$\omega_{1+}^{\#2} \dagger^{\alpha\beta}$	$f_{1+}^{\#1} \dagger^{\alpha\beta}$	$\omega_{1-}^{\#1} \dagger^{\alpha}$	$\omega_{1-}^{\#2} \dagger^{\alpha}$	$f_{1-}^{\#1} \dagger^{\alpha}$	$f_{1-}^{\#2} \dagger^{\alpha}$
$k^2(2r_3+r_5)+\frac{2t_2}{3}$	$\frac{\sqrt{2}t_2}{3}$	$\frac{1}{3}i\sqrt{2}kt_2$	0	0	0	0
$\frac{\sqrt{2}t_2}{3}$	$\frac{t_2}{3}$	$\frac{ikt_2}{3}$	0	0	0	0
$-\frac{1}{3}i\sqrt{2}kt_2$	$-\frac{1}{3}ik t_2$	$\frac{k^2t_2}{3}$	0	0	0	0
0	0	0	$\frac{1}{2}k^2(r_3+2r_5)$	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0

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

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

$\omega_{0+}^{\#1} \dagger$	$f_{0+}^{\#1} \dagger$	$f_{0+}^{\#2} \dagger$	$\omega_{0-}^{\#1} \dagger$
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	$t_2$

$\sigma_{0+}^{\#1} \dagger$	$\tau_{0+}^{\#1} \dagger$	$\tau_{0+}^{\#2} \dagger$	$\sigma_{0-}^{\#1} \dagger$
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	$\frac{1}{t_2}$

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