



Massive particle	
Pole residue:	$-\frac{1}{r_2} \succ 0$
Polarisations:	1
Square mass:	$-\frac{t_2}{r_2} \succ 0$
Spin:	0
Parity:	Odd

Unitarity conditions

$r_2 < 0 \ \&\& \ t_2 > 0$

(No massless particles)

Lagrangian density

$$\begin{aligned} &\frac{2}{3}t_3\omega_{\kappa\alpha}^{\alpha\prime}\omega_{\kappa\alpha}^{\kappa}+\frac{2}{3}t_2\omega_{\kappa\lambda}^{\kappa\lambda}\omega_{\kappa\lambda}^{\prime}+\frac{1}{3}t_2\omega_{\kappa\lambda}^{\prime}\omega_{\kappa\lambda}^{\kappa\lambda}+ \\ &2r_1\partial_{\prime}\omega_{\kappa}^{\kappa\lambda}\partial^{\prime}\omega_{\lambda}^{\alpha}-\frac{2}{3}r_1\partial^{\beta}\omega_{\kappa}^{\theta\alpha}\partial_{\theta}\omega_{\alpha\beta}^{\kappa}+\frac{2}{3}r_2\partial^{\beta}\omega_{\kappa}^{\theta\alpha}\partial_{\theta}\omega_{\alpha\beta}^{\kappa}- \\ &\frac{2}{3}r_1\partial_{\theta}\omega_{\alpha\beta}^{\kappa}\partial_{\kappa}\omega_{\alpha\beta}^{\theta}-\frac{1}{3}r_2\partial_{\theta}\omega_{\alpha\beta}^{\kappa}\partial_{\kappa}\omega_{\alpha\beta}^{\theta\theta}+\frac{2}{3}r_1\partial_{\theta}\omega_{\alpha\beta}^{\kappa}\partial_{\kappa}\omega_{\alpha\beta}^{\theta\alpha\beta}- \\ &\frac{2}{3}r_2\partial_{\theta}\omega_{\alpha\beta}^{\kappa}\partial_{\kappa}\omega_{\alpha\beta}^{\theta\alpha\beta}+2r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\lambda}^{\theta\kappa\lambda}-2r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\alpha}^{\theta\kappa\lambda}+ \\ &2r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\theta}\omega_{\lambda}^{\kappa\lambda\theta}-4r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\alpha}^{\kappa\lambda\theta}+\frac{1}{6}t_2\partial^{\alpha}f_{\theta\kappa}^{\kappa}f_{\alpha}^{\theta}- \\ &\frac{1}{6}t_2\partial^{\alpha}f_{\kappa\theta}^{\kappa}f_{\alpha}^{\theta}+\frac{1}{6}t_2\partial^{\alpha}f_{\lambda}^{\lambda}\partial_{\kappa}^{\kappa}f_{\alpha\lambda}^{\alpha}-\frac{2}{3}t_3\omega_{\kappa\alpha}^{\alpha}\partial_{\kappa}^{\kappa}f_{\alpha}^{\prime}- \\ &\frac{2}{3}t_3\omega_{\kappa\lambda}^{\lambda}\partial_{\kappa}^{\kappa}f_{\lambda}^{\prime}-\frac{4}{3}t_3\partial^{\alpha}f_{\kappa\alpha}\partial_{\kappa}^{\kappa}f_{\lambda}^{\prime}+\frac{2}{3}t_3\partial_{\kappa}f_{\lambda}^{\lambda}\partial_{\kappa}^{\kappa}f_{\lambda}^{\prime}+\frac{1}{3}t_2\omega_{\prime\theta\kappa}\partial_{\kappa}^{\kappa}f^{\prime\theta}- \\ &\frac{2}{3}t_2\omega_{\prime\kappa\theta}\partial_{\kappa}^{\kappa}f^{\prime\theta}-\frac{1}{3}t_2\omega_{\theta\prime\kappa}\partial_{\kappa}^{\kappa}f^{\prime\theta}+\frac{2}{3}t_2\omega_{\theta\kappa\prime}\partial_{\kappa}^{\kappa}f^{\prime\theta}+\frac{2}{3}t_3\omega_{\prime\alpha}\partial_{\kappa}^{\kappa}f_{\alpha}^{\prime}+ \\ &\frac{2}{3}t_3\omega_{\lambda\prime}^{\lambda}\partial_{\kappa}^{\kappa}f_{\lambda}^{\prime}-\frac{1}{6}t_2\partial^{\alpha}f_{\lambda}^{\lambda}\partial_{\kappa}^{\kappa}f_{\alpha\lambda}^{\alpha}-\frac{1}{6}t_2\partial_{\kappa}f_{\theta}^{\lambda}\partial_{\lambda}^{\kappa}f_{\theta}^{\theta}+ \\ &\frac{1}{6}t_2\partial_{\kappa}f_{\theta}^{\lambda}\partial_{\kappa}^{\kappa}f_{\lambda}^{\theta}+\frac{2}{3}t_3\partial^{\alpha}f_{\lambda}^{\lambda}\partial_{\kappa}^{\kappa}f_{\alpha\lambda}^{\alpha}+\frac{2}{3}r_1\partial_{\kappa}\omega^{\alpha\beta\theta}\partial^{\kappa}\omega_{\alpha\beta\theta}+ \\ &\frac{1}{3}r_2\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_2\partial_{\kappa}\omega^{\theta\alpha\beta}\partial^{\kappa}\omega_{\alpha\beta\theta}+ \\ &\frac{2}{3}r_1\partial^{\beta}\omega_{\prime}^{\alpha\lambda}\partial_{\lambda}\omega_{\alpha\beta}^{\prime}-\frac{2}{3}r_2\partial^{\beta}\omega_{\prime}^{\alpha\lambda}\partial_{\lambda}\omega_{\alpha\beta}^{\prime}-\frac{8}{3}r_1\partial^{\beta}\omega_{\lambda}^{\lambda\alpha}\partial_{\lambda}\omega_{\alpha\beta}^{\prime}+ \\ &\frac{2}{3}r_2\partial^{\beta}\omega_{\lambda}^{\lambda\alpha}\partial_{\lambda}\omega_{\alpha\beta}^{\prime}-2r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\theta}^{\theta}\omega_{\lambda}^{\theta\kappa}+2r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\alpha}^{\theta\kappa} \end{aligned}$$

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

$\sigma_{1+}^{\#1} \dagger^{\alpha\beta}$	$\sigma_{1+}^{\#2} \dagger^{\alpha\beta}$	$\tau_{1+}^{\#1} \dagger^{\alpha\beta}$	$\sigma_{1-}^{\#1} \dagger^{\alpha}$	$\sigma_{1-}^{\#2} \dagger^{\alpha}$	$\tau_{1-}^{\#1} \dagger^{\alpha}$	$\tau_{1-}^{\#2} \dagger^{\alpha}$
$\frac{6}{(3+k^2)^2}t_2$	$\frac{3\sqrt{2}}{(3+k^2)^2}t_2$	$\frac{3i\sqrt{2}k}{(3+k^2)^2}t_2$	0	0	0	0
$\frac{3\sqrt{2}}{(3+k^2)^2}t_2$	$\frac{3}{(3+k^2)^2}t_2$	$\frac{3ik}{(3+k^2)^2}t_2$	0	0	0	0
$-\frac{3i\sqrt{2}k}{(3+k^2)^2}t_2$	$-\frac{3ik}{(3+k^2)^2}t_2$	$\frac{3k^2}{(3+k^2)^2}t_2$	0	0	0	0
0	0	0	$-\frac{1}{k^2}r_1$	$-\frac{\sqrt{2}}{k^2r_1+2k^3}r_1$	0	$-\frac{2i}{kr_1+2k^3}r_1$
0	0	0	$-\frac{\sqrt{2}}{k^2r_1+2k^4}r_1$	$\frac{3k^2r_1-2t_3}{(k+2k^3)^2r_1t_3}$	0	$\frac{i\sqrt{2}(3k^2r_1-2t_3)}{k(1+2k^2)^2r_1t_3}$
0	0	0	0	0	0	0
0	0	0	$\frac{2i}{kr_1+2k^3}r_1$	$-\frac{i\sqrt{2}(3k^2r_1-2t_3)}{k(1+2k^2)^2r_1t_3}$	0	$\frac{6k^2r_1-4t_3}{(1+2k^2)^2r_1t_3}$

$\omega_{1+}^{\#1} \dagger^{\alpha\beta}$	$\omega_{1+}^{\#2} \dagger^{\alpha\beta}$	$f_{1+}^{\#1} \dagger^{\alpha\beta}$	$\omega_{1-}^{\#1} \dagger^{\alpha}$	$\omega_{1-}^{\#2} \dagger^{\alpha}$	$f_{1-}^{\#1} \dagger^{\alpha}$	$f_{1-}^{\#2} \dagger^{\alpha}$
$\frac{2t_2}{3}$	$\frac{\sqrt{2}t_2}{3}$	$\frac{1}{3}i\sqrt{2}kt_2$	0	0	0	0
$\frac{\sqrt{2}t_2}{3}$	$\frac{t_2}{3}$	$\frac{ikt_2}{3}$	0	0	0	0
$-\frac{1}{3}i\sqrt{2}kt_2$	$-\frac{1}{3}ikt_2$	$\frac{k^2t_2}{3}$	0	0	0	0
0	0	0	$-k^2r_1+\frac{2t_3}{3}$	$-\frac{\sqrt{2}t_3}{3}$	0	$-\frac{2}{3}i\frac{kt_3}{3}$
0	0	0	$-\frac{\sqrt{2}t_3}{3}$	$\frac{t_3}{3}$	0	$\frac{1}{3}i\sqrt{2}kt_3$
0	0	0	0	0	0	0
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
$\tau_{0+}^{\#1} - 2ik\sigma_{0+}^{\#1} == 0$	1
$\tau_{1-}^{\#2\alpha} + 2ik\sigma_{1-}^{\#2\alpha} == 0$	3
$\tau_{1-}^{\#1\alpha} == 0$	3
$\tau_{1+}^{\#1\alpha\beta} + ik\sigma_{1+}^{\#1\alpha\beta} == 0$	3
$\sigma_{1+}^{\#1\alpha\beta} == \sigma_{1+}^{\#2\alpha\beta}$	3
$\tau_{2+}^{\#1\alpha\beta} == 0$	5
$\sigma_{2+}^{\#1\alpha\beta} == 0$	5
Total #:	24

$\omega_0^{\#1} \dagger$	$f_{0+}^{\#1} \dagger$	$f_{0+}^{\#2} \dagger$	$\omega_0^{\#1-} \dagger$
$t_3$	$-i\sqrt{2}kt_3$	0	0
$i\sqrt{2}kt_3$	$2k^2t_3$	0	0
0	0	0	0
0	0	0	$k^2r_2+t_2$

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

$\sigma_{0+}^{\#1} \dagger$	$\sigma_{0+}^{\#1}$	$\tau_{0+}^{\#1} \dagger$	$\tau_{0+}^{\#2} \dagger$	$\tau_{0+}^{\#1}$	$\sigma_{0-}^{\#1}$
$\frac{1}{(1+2k^2)^2}t_3$	$-\frac{i\sqrt{2}k}{(1+2k^2)^2}t_3$	0	0	0	0
$\frac{i\sqrt{2}k}{(1+2k^2)^2}t_3$	$\frac{2k^2}{(1+2k^2)^2}t_3$	0	0	0	0
0	0	0	0	0	0
0	0	0	$\frac{1}{k^2r_2+t_2}$		

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