



Massive particle

Pole residue:	$-\frac{1}{r_1} > 0$
Polarisations:	5
Square mass:	$-\frac{t_1}{2r_1} > 0$
Spin:	2
Parity:	Odd

$$r_1 < 0 \&\& t_1 > 0$$

Unitarity conditions

(No massless particles)

Lagrangian density

$$-t_1\omega_{\prime}^{\alpha\prime}\omega_{\kappa\alpha}^{\kappa}-\frac{1}{3}t_1\omega_{\prime}^{\kappa\lambda}\omega_{\kappa\lambda}^{\prime}+\frac{1}{3}t_1\omega_{\kappa\lambda}^{\prime}\omega_{\prime}^{\kappa\lambda}+f^{\alpha\beta}\tau_{\alpha\beta}+\omega^{\alpha\beta\chi}\sigma_{\alpha\beta\chi}+$$

$$2r_1\partial_{\prime}\omega_{\kappa}^{\kappa\lambda}\partial_{\prime}\omega_{\lambda}^{\alpha}-\frac{2}{3}r_1\partial^{\beta}\omega_{\kappa}^{\theta\alpha}\partial_{\theta}\omega_{\alpha\beta}^{\kappa}-\frac{2}{3}r_1\partial_{\theta}\omega_{\alpha\beta}^{\kappa}-\frac{2}{3}r_1\partial_{\theta}\omega_{\alpha\beta}^{\theta\kappa\lambda}+2r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\theta}^{\theta\kappa\lambda}-2r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega^{\theta\kappa\lambda}+$$

$$2r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega^{\kappa\lambda\theta}-4r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\alpha}\omega_{\lambda}^{\kappa\lambda\theta}-\frac{1}{3}t_1\partial^{\alpha}f_{\theta\kappa}\partial^{\kappa}f_{\alpha}^{\theta}-\frac{2}{3}t_1\partial^{\alpha}f_{\kappa\theta}\partial^{\kappa}f_{\alpha}^{\theta}-\frac{1}{3}t_1\partial_{\alpha}f_{\kappa}^{\theta}\partial^{\alpha}f_{\lambda}^{\kappa}+\frac{1}{3}t_1\omega_{\kappa\alpha}\partial^{\kappa}f_{\alpha\lambda}^{\prime}+\frac{1}{3}t_1\omega_{\kappa\alpha}\partial^{\kappa}f_{\prime}^{\alpha}+\frac{1}{3}t_1\omega_{\theta\kappa\prime}\partial^{\kappa}f_{\prime}^{\theta}-t_1\omega_{\prime\alpha}\partial^{\kappa}f_{\kappa}^{\alpha}-t_1\omega_{\prime\lambda}^{\lambda}\partial^{\kappa}f_{\kappa}^{\prime}+$$

$$\frac{1}{3}t_1\partial_{\alpha}f_{\kappa}^{\alpha}f_{\lambda\alpha}^{\kappa}+\frac{1}{3}t_1\partial_{\kappa}f_{\theta}^{\lambda}\partial^{\kappa}f_{\lambda}^{\theta}+\frac{2}{3}t_1\partial_{\kappa}f_{\theta}^{\lambda}\partial^{\kappa}f_{\lambda}^{\theta}-t_1\partial^{\alpha}f_{\alpha}^{\lambda}\partial^{\kappa}f_{\lambda\kappa}^{\kappa}+\frac{2}{3}r_1\partial_{\kappa}\omega^{\alpha\beta\theta}\partial^{\kappa}\omega_{\alpha\beta\theta}-\frac{2}{3}r_1\partial_{\kappa}\omega^{\theta\alpha\beta}\partial^{\kappa}\omega_{\alpha\beta\theta}+\frac{2}{3}r_1\partial^{\beta}\omega_{\lambda}^{\alpha\lambda}\partial_{\lambda}\omega_{\alpha\beta}^{\prime}-\frac{8}{3}r_1\partial^{\beta}\omega_{\lambda}^{\lambda\alpha}\partial_{\lambda}\omega_{\alpha\beta}^{\prime}-2r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\theta}^{\theta\kappa}+2r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\theta}^{\theta\kappa}$$

$\sigma_{1+}^{\#1}+\alpha\beta$	$\sigma_{1+}^{\#2}+\alpha\beta$	$\tau_{1+}^{\#1}+\alpha\beta$	$\sigma_{1-}^{\#1}\alpha$	$\sigma_{1-}^{\#2}\alpha$	$\tau_{1-}^{\#1}\alpha$	$\tau_{1-}^{\#2}\alpha$
$\frac{6}{(3+2k^2)^2t_1}$	$-\frac{6\sqrt{2}}{(3+2k^2)^2t_1}$	$-\frac{6i\sqrt{2}k}{(3+2k^2)^2t_1}$	0	0	0	0
$-\frac{6\sqrt{2}}{(3+2k^2)^2t_1}$	$\frac{12}{(3+2k^2)^2t_1}$	$\frac{12ik}{(3+2k^2)^2t_1}$	0	0	0	0
$\frac{6i\sqrt{2}k}{(3+2k^2)^2t_1}$	$-\frac{12ik}{(3+2k^2)^2t_1}$	$\frac{12k^2}{(3+2k^2)^2t_1}$	0	0	0	0
0	0	0	0	$\frac{\sqrt{2}}{t_1+2k^2t_1}$	0	$\frac{2ik}{t_1+2k^2t_1}$
0	0	0	$\frac{\sqrt{2}}{t_1+2k^2t_1}$	$\frac{2k^2r_1+t_1}{(t_1+2k^2t_1)^2}$	0	$\frac{i\sqrt{2}k(2k^2r_1+t_1)}{(t_1+2k^2t_1)^2}$
0	0	0	0	0	0	0
0	0	0	$-\frac{2ik}{t_1+2k^2t_1}$	$-\frac{i\sqrt{2}k(2k^2r_1+t_1)}{(t_1+2k^2t_1)^2}$	0	$\frac{2k^2(2k^2r_1+t_1)}{(t_1+2k^2t_1)^2}$

$\omega_{1+}^{\#1}+\alpha\beta$	$\omega_{1+}^{\#2}+\alpha\beta$	$f_{1+}^{\#1}+\alpha\beta$	$\omega_{1-}^{\#1}\alpha$	$\omega_{1-}^{\#2}\alpha$	$f_{1-}^{\#1}\alpha$	$f_{1-}^{\#2}\alpha$
$\frac{t_1}{6}$	$-\frac{t_1}{3\sqrt{2}}$	$-\frac{ikt_1}{3\sqrt{2}}$	0	0	0	0
$-\frac{t_1}{3\sqrt{2}}$	$\frac{t_1}{3}$	$\frac{ikt_1}{3}$	0	0	0	0
$\frac{ikt_1}{3\sqrt{2}}$	$-\frac{1}{3}\bar{ik}t_1$	$\frac{k^2t_1}{3}$	0	0	0	0
0	0	0	$-k^2r_1-\frac{t_1}{2}$	$\frac{t_1}{\sqrt{2}}$	0	$\bar{ik}t_1$
0	0	0	$\frac{t_1}{\sqrt{2}}$	0	0	0
0	0	0	0	0	0	0
0	0	0	$-\bar{ik}t_1$	0	0	0

Source constraints	#
SO(3) irreps	
$\sigma_{0-}^{\#1}==0$	1
$\tau_{0+}^{\#2}==0$	1
$\tau_{0+}^{\#1}-2\bar{ik}\sigma_{0+}^{\#1}==0$	1
$\tau_{1-}^{\#2\alpha}+2\bar{ik}\sigma_{1-}^{\#2\alpha}==0$	3
$\tau_{1-}^{\#1\alpha}==0$	3
$\tau_{1+}^{\#1\alpha\beta}-2\bar{ik}\sigma_{1+}^{\#1\alpha\beta}==0$	3
$2\sigma_{1+}^{\#1\alpha\beta}+\sigma_{1+}^{\#2\alpha\beta}==0$	3
$\tau_{2+}^{\#1\alpha\beta}-2\bar{ik}\sigma_{2+}^{\#1\alpha\beta}==0$	5
Total #:	20

	$\sigma_{0+}^{\#1}$	$\tau_{0+}^{\#1}$	$\tau_{0+}^{\#2}$	$\sigma_{0-}^{\#1}$
$\sigma_{0+}^{\#1}+$	$-\frac{1}{(1+2k^2)^2t_1}$	$\frac{i\sqrt{2}k}{(1+2k^2)^2t_1}$	0	0
$\tau_{0+}^{\#1}+$	$-\frac{i\sqrt{2}k}{(1+2k^2)^2t_1}$	$-\frac{2k^2}{(1+2k^2)^2t_1}$	0	0
$\tau_{0+}^{\#2}+$	0	0	0	0
$\sigma_{0-}^{\#1}+$	0	0	0	0

	$\sigma_{2+}^{\#1}+\alpha\beta$	$\tau_{2+}^{\#1}+\alpha\beta$	$\sigma_{2-}^{\#1}\alpha\beta\chi$
$\sigma_{2+}^{\#1}+\alpha\beta$	$\frac{2}{(1+2k^2)^2t_1}$	$-\frac{2i\sqrt{2}k}{(1+2k^2)^2t_1}$	0
$\tau_{2+}^{\#1}+\alpha\beta$	$\frac{2i\sqrt{2}k}{(1+2k^2)^2t_1}$	$\frac{4k^2}{(1+2k^2)^2t_1}$	0
$\sigma_{2-}^{\#1}+\alpha\beta\chi$	0	0	$\frac{2}{2k^2r_1+t_1}$

$\omega_{0+}^{\#1}+$	$f_{0+}^{\#1}$	$f_{0+}^{\#2}$	$\omega_{0-}^{\#1}$
$\omega_{0+}^{\#1}+$	$-t_1$	$i\sqrt{2}kt_1$	0
$f_{0+}^{\#1}+$	$-i\sqrt{2}kt_1$	$-2k^2t_1$	0
$f_{0+}^{\#2}+$	0	0	0
$\omega_{0-}^{\#1}+$	0	0	0

$\omega_2^{\#1} + \alpha\beta$	$f_2^{\#1} \alpha\beta$	$\omega_2^{\#1} \alpha\beta\chi$	
$\omega_2^{\#1} + \alpha\beta$	$\frac{t_1}{2}$	$-\frac{ikt_1}{\sqrt{2}}$	0
$f_2^{\#1} + \alpha\beta$	$\frac{ikt_1}{\sqrt{2}}$	$k^2 t_1$	0
$\omega_2^{\#1} + \alpha\beta\chi$	0	0	$k^2 r_1 + \frac{t_1}{2}$