



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

Massive particle

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

(No massless particles)

Lagrangian density

$$\begin{aligned} &-\frac{1}{3}t_1\omega_{\lambda'}^{\alpha\prime}\omega_{\kappa\alpha}^{\kappa}+\frac{2}{3}t_3\omega_{\lambda'}^{\alpha\prime}\omega_{\kappa\alpha}^{\kappa}-t_1\omega_{\lambda'}^{\kappa\lambda}\omega_{\kappa\lambda}^{\prime}+f^{\alpha\beta}\tau_{\alpha\beta}+\\ &\omega^{\alpha\beta\chi}\sigma_{\alpha\beta\chi}+r_1\partial_{\lambda}\omega_{\kappa}^{\kappa\lambda}\partial^{\prime}\omega_{\lambda}^{\alpha}{}_{\alpha}{}^{\kappa}-\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}\partial_{\kappa}\omega^{\alpha\beta\theta}+\\ &\frac{2}{3}r_1\partial_{\theta}\omega_{\alpha\beta}^{\kappa}\partial_{\kappa}\omega_{\lambda}^{\alpha}\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\theta}\omega_{\lambda}^{\theta\kappa\lambda}-r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\alpha}^{\theta\kappa\lambda}+r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\theta}\omega_{\lambda}^{\kappa\lambda\theta}-\\ &2r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\alpha}\omega_{\lambda}^{\kappa\lambda\theta}-\frac{1}{2}t_1\partial^{\alpha}f_{\theta\kappa}\partial^{\kappa}f_{\alpha}^{\theta}-\frac{1}{2}t_1\partial^{\alpha}f_{\kappa\theta}\partial^{\kappa}f_{\alpha}^{\theta}-\frac{1}{2}t_1\partial^{\alpha}f_{\kappa}^{\lambda}\partial^{\kappa}f_{\alpha\lambda}+\\ &\frac{1}{3}t_1\omega_{\kappa\alpha}^{\alpha}\partial^{\kappa}f_{\lambda'}^{\prime}-\frac{2}{3}t_3\omega_{\kappa\alpha}^{\alpha}\partial^{\kappa}f_{\lambda'}^{\prime}+\frac{1}{3}t_1\omega_{\kappa\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\prime}-\frac{2}{3}t_3\omega_{\kappa\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\prime}+\\ &\frac{2}{3}t_1\partial^{\alpha}f_{\kappa\alpha}\partial^{\kappa}f_{\lambda'}^{\prime}-\frac{4}{3}t_3\partial^{\alpha}f_{\kappa\alpha}\partial^{\kappa}f_{\lambda'}^{\prime}-\frac{1}{3}t_1\partial_{\kappa}f_{\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\prime}+\frac{2}{3}t_3\partial_{\kappa}f_{\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\prime}+\\ &2t_1\omega_{\lambda\kappa\theta}\partial^{\kappa}f^{\lambda\theta}-\frac{1}{3}t_1\omega_{\lambda\alpha}\partial^{\kappa}f_{\lambda'}^{\prime}+\frac{2}{3}t_3\omega_{\lambda\alpha}\partial^{\kappa}f_{\lambda'}^{\prime}-\frac{1}{3}t_1\omega_{\lambda\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\prime}+\\ &\frac{2}{3}t_3\omega_{\lambda\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\prime}+\frac{1}{2}t_1\partial^{\alpha}f_{\kappa}^{\lambda}\partial^{\kappa}f_{\lambda\alpha}^{\lambda}+\frac{1}{2}t_1\partial_{\kappa}f_{\theta}^{\lambda}\partial^{\kappa}f_{\lambda}^{\theta}+\frac{1}{2}t_1\partial_{\kappa}f_{\theta}^{\lambda}\partial^{\kappa}f_{\lambda}^{\theta}-\\ &\frac{1}{3}t_1\partial^{\alpha}f_{\alpha}^{\lambda}\partial^{\kappa}f_{\lambda\kappa}^{\lambda}+\frac{2}{3}t_3\partial^{\alpha}f_{\alpha}^{\lambda}\partial^{\kappa}f_{\lambda\kappa}^{\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_{\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}-r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\theta}^{\theta\kappa}+r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\kappa}^{\theta\kappa} \end{aligned}$$

$\omega_{1+}^{\#1}+\alpha\beta$	$\omega_{1+}^{\#2}+\alpha\beta$	$f_{1+}^{\#1}+\alpha\beta$	$\omega_{1-}^{\#1}-\alpha$	$\omega_{1-}^{\#2}-\alpha$	$f_{1-}^{\#1}-\alpha$	$f_{1-}^{\#2}-\alpha$
$\omega_{1+}^{\#1}+\alpha\beta$	$k^2r_1-\frac{t_1}{2}$	$-\frac{ikt_1}{\sqrt{2}}$	0	0	0	0
$\omega_{1+}^{\#2}+\alpha\beta$	$-\frac{t_1}{\sqrt{2}}$	0	0	0	0	0
$f_{1+}^{\#1}+\alpha\beta$	$\frac{i\,k\,t_1}{\sqrt{2}}$	0	0	0	0	0
$\omega_{1-}^{\#1}+\alpha$	0	0	$\frac{1}{6}(t_1+4t_3)$	$\frac{t_1-2t_3}{3\sqrt{2}}$	0	$\frac{1}{3}i\,k\,(t_1-2t_3)$
$\omega_{1-}^{\#2}+\alpha$	0	0	$\frac{t_1-2t_3}{3\sqrt{2}}$	$\frac{t_1+t_3}{3}$	0	$\frac{1}{3}i\sqrt{2}\,k\,(t_1+t_3)$
$f_{1-}^{\#1}+\alpha$	0	0	0	0	0	0
$f_{1-}^{\#2}+\alpha$	0	0	$-\frac{1}{3}i\,k\,(t_1-2t_3)$	$-\frac{1}{3}i\sqrt{2}\,k\,(t_1+t_3)$	0	$\frac{2}{3}k^2\,(t_1+t_3)$

	$\sigma_{0+}^{\#1}$	$\tau_{0+}^{\#1}$	$\tau_{0+}^{\#2}$	$\sigma_{0-}^{\#1}$
$\sigma_{0+}^{\#1}+$	$\frac{1}{(1+2k^2)^2t_3}$	$-\frac{i\sqrt{2}\,k}{(1+2k^2)^2t_3}$	0	0
$\tau_{0+}^{\#1}+$	$\frac{i\sqrt{2}\,k}{(1+2k^2)^2t_3}$	$\frac{2k^2}{(1+2k^2)^2t_3}$	0	0
$\tau_{0+}^{\#2}+$	0	0	0	0
$\sigma_{0-}^{\#1}+$	0	0	0	$-\frac{1}{t_1}$

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

	$\omega_{0+}^{\#1}$	$f_{0+}^{\#1}$	$f_{0+}^{\#2}$	$\omega_{0-}^{\#1}$
$\omega_{0+}^{\#1}+$	t_3	$-i\sqrt{2}\,k\,t_3$	0	0
$f_{0+}^{\#1}+$	$i\sqrt{2}\,k\,t_3$	$2k^2t_3$	0	0
$f_{0+}^{\#2}+$	0	0	0	0
$\omega_{0-}^{\#1}+$	0	0	0	$-t_1$

	$\omega_{2+}^{\#1}+\alpha\beta$	$f_{2+}^{\#1}+\alpha\beta$	$\omega_{2-}^{\#1}-\alpha\beta\chi$
$\omega_{2+}^{\#1}+\alpha\beta$	$\frac{t_1}{2}$	$-\frac{i\,k\,t_1}{\sqrt{2}}$	0
$f_{2+}^{\#1}+\alpha\beta$	$\frac{i\,k\,t_1}{\sqrt{2}}$	k^2t_1	0
$\omega_{2-}^{\#1}+\alpha\beta\chi$	0	0	$k^2r_1+\frac{t_1}{2}$

Source constraints

SO(3) irreps	#
$\tau_{0+}^{\#2}==0$	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
$\tau_{1+}^{\#1\alpha\beta}+i\,k\,\sigma_{1+}^{\#2\alpha\beta}==0$	3
$\tau_{2+}^{\#1\alpha\beta}-2i\,k\,\sigma_{2+}^{\#1\alpha\beta}==0$	5
Total #:	16