


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

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

$\omega_1^{\#1} + \alpha\beta$	$k^2 r_1 - \frac{t_1}{2}$	$-\frac{t_1}{\sqrt{2}}$	$-\frac{i k t_1}{\sqrt{2}}$	0	$\omega_{1-}^{\#2}$	$f_{1-}^{\#1}$	$f_{1-}^{\#2}$
$\omega_1^{\#2} + \alpha\beta$	$-\frac{t_1}{\sqrt{2}}$	0	0	0	0	0	0
$f_1^{\#1} + \alpha\beta$	$\frac{i k t_1}{\sqrt{2}}$	0	0	0	0	0	0
$\omega_1^{\#1} + \alpha$	0	0	0	$\frac{t_1}{6}$	$\frac{t_1}{3\sqrt{2}}$	0	$\frac{i k t_1}{3}$
$\omega_1^{\#2} + \alpha$	0	0	0	$\frac{t_1}{3\sqrt{2}}$	$\frac{t_1}{3}$	0	$\frac{1}{3} i \sqrt{2} k t_1$
$f_1^{\#1} + \alpha$	0	0	0	0	0	0	0
$f_1^{\#2} + \alpha$	0	0	0	$-\frac{1}{3} i k t_1$	$-\frac{1}{3} i \sqrt{2} k t_1$	0	$\frac{2 k^2 t_1}{3}$

Source constraints	
SO(3) irreps	#
$\sigma_0^{\#1} == 0$	1
$\tau_0^{\#1} == 0$	1
$\tau_0^{\#2} == 0$	1
$\tau_1^{\#2\alpha} + 2ik\sigma_1^{\#1\alpha} == 0$	3
$\tau_1^{\#1\alpha} == 0$	3
$\sigma_1^{\#1\alpha} == \sigma_1^{\#2\alpha}$	3
$\tau_1^{\#1\alpha\beta} + ik\sigma_1^{\#2\alpha\beta} == 0$	3
$\tau_2^{\#1\alpha\beta} - 2ik\sigma_2^{\#1\alpha\beta} == 0$	5
Total #:	20

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

$\omega_0^{\#1} \uparrow$	0	0	0	$-\tau_1$
$f_0^{\#1} \uparrow$	0	0	0	0
$f_0^{\#2} \uparrow$	0	0	0	0
$\omega_0^{\#1} \downarrow$	0	0	0	0

$\sigma_0^{\#1} +$	0	0	0	$-\frac{1}{t_1}$
$\tau_0^{\#1} +$	0	0	0	0
$\tau_0^{\#2} +$	0	0	0	0
$\sigma_0^{\#1} +$	0	0	0	0

$\sigma_2^{\#1} + \alpha\beta$	$\frac{2}{(1+2k^2)^2 t_1}$	$-\frac{2i\sqrt{2}k}{(1+2k^2)^2 t_1}$	$\sigma_2^{\#1} - \alpha\beta\chi$
$\tau_2^{\#1} + \alpha\beta$	$\frac{2i\sqrt{2}k}{(1+2k^2)^2 t_1}$	$\frac{4k^2}{(1+2k^2)^2 t_1}$	$\tau_2^{\#1} + \alpha\beta$
$\sigma_2^{\#1} + \alpha\beta\chi$	$0$	$0$	$\frac{2}{2k^2 t_1 + t_1}$