



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

(No massless particles)

Unitarity conditions

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

$\sigma_{1+}^{\#1} \dagger^{\alpha\beta}$	$\sigma_{1+}^{\#2}$	$\tau_{1+}^{\#1} \dagger^{\alpha\beta}$	$\sigma_{1-}^{\#1} \alpha$	$\sigma_{1-}^{\#2} \alpha$	$\tau_{1-}^{\#1} \alpha$	$\tau_{1-}^{\#2} \alpha$
$\sigma_{1+}^{\#1} \dagger^{\alpha\beta}$	$\frac{6}{(3+k^2)^2 t_2}$	$\frac{3 i \sqrt{2} k}{(3+k^2)^2 t_2}$	0	0	0	0
$\sigma_{1+}^{\#2} \dagger^{\alpha\beta}$	$\frac{3 \sqrt{2}}{(3+k^2)^2 t_2}$	$\frac{3 i k}{(3+k^2)^2 t_2}$	0	0	0	0
$\tau_{1+}^{\#1} \dagger^{\alpha\beta}$	$-\frac{3 i \sqrt{2} k}{(3+k^2)^2 t_2}$	$-\frac{3 i k}{(3+k^2)^2 t_2}$	0	0	0	0
$\sigma_{1-}^{\#1} \dagger^{\alpha}$	0	0	$-\frac{2}{3 k^2 r_3}$	$-\frac{2 \sqrt{2}}{3 k^2 r_3+6 k^3 r_3}$	0	$-\frac{4 i}{3 k r_3+6 k^3 r_3}$
$\sigma_{1-}^{\#2} \dagger^{\alpha}$	0	0	0	$-\frac{9 k^2 r_3-4 t_3}{3 (k+2 k^2)^2 r_3 t_3}$	0	$\frac{i \sqrt{2} (9 k^2 r_3-4 t_3)}{3 k (1+2 k^2)^2 r_3 t_3}$
$\tau_{1-}^{\#1} \dagger^{\alpha}$	0	0	0	0	0	0
$\tau_{1-}^{\#2} \dagger^{\alpha}$	0	0	$\frac{4 i}{3 k r_3+6 k^3 r_3}$	$-\frac{i \sqrt{2} (9 k^2 r_3-4 t_3)}{3 k (1+2 k^2)^2 r_3 t_3}$	0	$\frac{2 (9 k^2 r_3-4 t_3)}{3 (1+2 k^2)^2 r_3 t_3}$

Lagrangian density

$$\begin{aligned} &\frac{2}{3} t_3 \omega_{\lambda'}^{\alpha'} \omega_{\kappa\alpha}^{\kappa} + \frac{2}{3} t_2 \omega_{\kappa\lambda}^{\kappa\lambda} \omega_{\lambda'}^{\lambda'} + \frac{1}{3} t_2 \omega_{\kappa\lambda}^{\lambda'} \omega_{\lambda'}^{\kappa\lambda} + f^{\alpha\beta} \tau_{\alpha\beta} + \omega^{\alpha\beta\chi} \sigma_{\alpha\beta\chi} + \\ &\frac{3}{2} r_3 \partial_{\lambda} \omega_{\kappa}^{\kappa\lambda} \partial' \omega_{\lambda \alpha}^{\alpha} + \frac{2}{3} r_2 \partial^{\beta} \omega_{\kappa}^{\theta\alpha} \partial_{\theta} \omega_{\alpha\beta}^{\kappa} - \frac{1}{3} r_2 \partial_{\theta} \omega_{\alpha\beta}^{\kappa} \partial_{\kappa} \omega^{\alpha\beta\theta} - \\ &\frac{2}{3} r_2 \partial_{\theta} \omega_{\alpha\beta}^{\kappa} \partial_{\kappa} \omega^{\theta\alpha\beta} + \frac{5}{2} r_3 \partial_{\alpha} \omega_{\lambda}^{\alpha} \partial_{\theta} \omega_{\lambda}^{\theta\kappa\lambda} - \frac{5}{2} r_3 \partial_{\theta} \omega_{\lambda}^{\alpha} \partial_{\alpha} \omega_{\lambda}^{\theta\kappa\lambda} + \\ &\frac{3}{2} r_3 \partial_{\alpha} \omega_{\lambda}^{\alpha} \partial_{\theta} \omega_{\lambda}^{\kappa\lambda\theta} - 3 r_3 \partial_{\theta} \omega_{\lambda}^{\alpha} \partial_{\kappa} \omega_{\alpha}^{\kappa\lambda\theta} + \frac{1}{6} t_2 \partial^{\alpha} f_{\theta\kappa} \partial^{\kappa} f_{\alpha}^{\theta} - \\ &\frac{1}{6} t_2 \partial^{\alpha} f_{\kappa\theta} \partial^{\kappa} f_{\alpha}^{\theta} + \frac{1}{6} t_2 \partial^{\alpha} f_{\lambda}^{\lambda} \partial^{\kappa} f_{\alpha\lambda}^{\kappa} - \frac{2}{3} t_3 \omega_{\kappa\alpha}^{\alpha} \partial^{\kappa} f_{\lambda'}^{\lambda'} - \frac{2}{3} t_3 \omega_{\kappa\lambda}^{\lambda} \partial^{\kappa} f_{\lambda'}^{\lambda} - \\ &\frac{4}{3} t_3 \partial^{\alpha} f_{\kappa\alpha} \partial^{\kappa} f_{\lambda'}^{\lambda'} + \frac{2}{3} t_3 \partial_{\kappa} f_{\lambda}^{\lambda} \partial^{\kappa} f_{\lambda'}^{\lambda'} + \frac{1}{3} t_2 \omega_{\theta\kappa} \partial^{\kappa} f_{\lambda'}^{\theta} - \frac{2}{3} t_2 \omega_{\lambda\kappa} \partial^{\kappa} f_{\lambda'}^{\theta} - \\ &\frac{1}{3} t_2 \omega_{\theta\lambda\kappa} \partial^{\kappa} f_{\lambda'}^{\theta} + \frac{2}{3} t_2 \omega_{\theta\kappa\lambda} \partial^{\kappa} f_{\lambda'}^{\theta} + \frac{2}{3} t_3 \omega_{\lambda\alpha}^{\alpha} \partial^{\kappa} f_{\lambda'}^{\lambda'} + \frac{2}{3} t_3 \omega_{\lambda\lambda}^{\lambda} \partial^{\kappa} f_{\lambda'}^{\lambda} - \\ &\frac{1}{6} t_2 \partial^{\alpha} f_{\lambda}^{\lambda} \partial^{\kappa} f_{\lambda\alpha}^{\kappa} - \frac{1}{6} t_2 \partial_{\kappa} f_{\theta}^{\lambda} \partial^{\kappa} f_{\lambda}^{\theta} + \frac{1}{6} t_2 \partial_{\kappa} f_{\lambda}^{\theta} \partial^{\kappa} f_{\theta}^{\lambda} + \frac{2}{3} t_3 \partial^{\alpha} f_{\lambda}^{\lambda} \partial^{\kappa} f_{\alpha}^{\lambda} \partial^{\kappa} f_{\lambda\kappa}^{\lambda} + \\ &\frac{1}{3} r_2 \partial_{\kappa} \omega^{\alpha\beta\theta} \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_2 \partial^{\beta} \omega_{\lambda'}^{\alpha\lambda} \partial_{\lambda} \omega_{\alpha\beta}^{\beta} + \\ &\frac{2}{3} r_2 \partial^{\beta} \omega_{\lambda'}^{\lambda\alpha} \partial_{\lambda} \omega_{\alpha\beta}^{\beta} - 4 r_3 \partial^{\beta} \omega_{\lambda'}^{\lambda\alpha} \partial_{\lambda} \omega_{\alpha\beta}^{\beta} - \frac{5}{2} r_3 \partial_{\alpha} \omega_{\lambda}^{\alpha} \partial^{\lambda} \omega_{\kappa}^{\theta\kappa} + \frac{5}{2} r_3 \partial_{\theta} \omega_{\lambda}^{\alpha} \partial^{\lambda} \omega_{\kappa}^{\theta\kappa} \end{aligned}$$

$\omega_{1+}^{\#1} \dagger^{\alpha\beta}$	$\omega_{1+}^{\#2}$	$f_{1+}^{\#1} \dagger^{\alpha\beta}$	$\omega_{1-}^{\#1} \alpha$	$\omega_{1-}^{\#2} \alpha$	$f_{1-}^{\#1} \alpha$	$f_{1-}^{\#2} \alpha$
$\omega_{1+}^{\#1} \dagger^{\alpha\beta}$	$\frac{2 t_2}{3}$	$\frac{\sqrt{2} t_2}{3}$	$\frac{1}{3} i \sqrt{2} k t_2$	0	0	0
$\omega_{1+}^{\#2} \dagger^{\alpha\beta}$	$\frac{\sqrt{2} t_2}{3}$	$\frac{t_2}{3}$	$\frac{i k t_2}{3}$	0	0	0
$f_{1+}^{\#1} \dagger^{\alpha\beta}$	$-\frac{1}{3} i \sqrt{2} k t_2$	$-\frac{1}{3} i k t_2$	$\frac{k^2 t_2}{3}$	0	0	0
$\omega_{1-}^{\#1} \dagger^{\alpha}$	0	0	0	$\frac{1}{6} (-9 k^2 r_3+4 t_3)$	0	$-\frac{2}{3} i k t_3$
$\omega_{1-}^{\#2} \dagger^{\alpha}$	0	0	0	$-\frac{\sqrt{2} t_3}{3}$	0	$\frac{1}{3} i \sqrt{2} k t_3$
$f_{1-}^{\#1} \dagger^{\alpha}$	0	0	0	0	0	0
$f_{1-}^{\#2} \dagger^{\alpha}$	0	0	$\frac{2 i k t_3}{3}$	$-\frac{1}{3} i \sqrt{2} k t_3$	0	$\frac{2 k^2 t_3}{3}$

Source constraints

SO(3) irreps	#
$\tau_{0+}^{\#2} == 0$	1
$\tau_{0+}^{\#1} - 2 i k \sigma_{0+}^{\#1} == 0$	1
$\tau_{1-}^{\#2\alpha} + 2 i k \sigma_{1-}^{\#2\alpha} == 0$	3
$\tau_{1-}^{\#1\alpha} == 0$	3
$\tau_{1+}^{\#1\alpha\beta} + i k \sigma_{1+}^{\#1\alpha\beta} == 0$	3
$\sigma_{1+}^{\#1\alpha\beta} == \sigma_{1+}^{\#2\alpha\beta}$	3
$\sigma_{2+}^{\#1\alpha\beta\chi} == 0$	5
$\tau_{2+}^{\#1\alpha\beta} == 0$	5
Total #:	24

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

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

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

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