



Massive particle	
Pole residue:	$\frac{-3t_1t_2(t_1+t_2)+3r_5(t_1^2+2t_2^2)}{r_5(t_1+t_2)(-3t_1t_2+2r_5(t_1+t_2))} > 0$
Polarisations:	3
Square mass:	$-\frac{3t_1t_2}{2r_5t_1+2r_5t_2} > 0$
Spin:	1
Parity:	Even

Unitarity conditions

$r_5 > 0 \ \&\& \ (t_1 < 0 \ \&\& \ (t_2 < 0 \ || \ t_2 > -t_1)) \ || \ (t_1 > 0 \ \&\& \ -t_1 < t_2 < 0)$

Lagrangian density

$$\begin{aligned}
 & -t_1 \, \omega_{\, ' }^{\, a\prime} \, \omega_{\kappa\alpha}^{\, \kappa} - \tfrac{1}{3} t_1 \, \omega_{\, ' }^{\, \kappa\lambda} \, \omega_{\kappa\lambda}^{\, ' } + \tfrac{2}{3} t_2 \, \omega_{\, ' }^{\, \kappa\lambda} \, \omega_{\kappa\lambda}^{\, ' } + \tfrac{1}{3} t_1 \, \omega_{\kappa\lambda}^{\, ' } \, \omega^{\kappa\lambda}_{\, ' } + \\
 & \tfrac{1}{3} t_2 \, \omega_{\kappa\lambda}^{\, ' } \, \omega^{\kappa\lambda}_{\, ' } - r_5 \, \partial_{\prime} \omega_{\kappa}^{\kappa\lambda} \, \partial^{\prime} \omega_{\lambda\alpha}^{\alpha} - r_5 \, \partial_{\alpha} \omega_{\lambda}^{\alpha} \, \partial_{\theta} \omega^{\theta\kappa\lambda} + \\
 & r_5 \, \partial_{\theta} \omega_{\lambda\alpha}^{\alpha} \, \partial_{\kappa} \omega^{\theta\kappa\lambda} - r_5 \, \partial_{\alpha} \omega_{\lambda\theta}^{\alpha} \, \partial_{\kappa} \omega^{\kappa\lambda\theta} + 2 \, r_5 \, \partial_{\theta} \omega_{\lambda\alpha}^{\alpha} \, \partial_{\kappa} \omega^{\kappa\lambda\theta} - \\
 & \tfrac{1}{3} t_1 \, \partial^{\alpha} f_{\theta\kappa} \, \partial^{\kappa} f_{\alpha}^{\theta} + \tfrac{1}{6} t_2 \, \partial^{\alpha} f_{\theta\kappa} \, \partial^{\kappa} f_{\alpha}^{\theta} - \tfrac{2}{3} t_1 \, \partial^{\alpha} f_{\kappa\theta} \, \partial^{\kappa} f_{\alpha}^{\theta} - \\
 & \tfrac{1}{6} t_2 \, \partial^{\alpha} f_{\kappa\theta} \, \partial^{\kappa} f_{\alpha}^{\theta} - \tfrac{1}{3} t_1 \, \partial^{\alpha} f_{\kappa}^{\lambda} \, \partial^{\kappa} f_{\alpha\lambda} + \tfrac{1}{6} t_2 \, \partial^{\alpha} f_{\kappa}^{\lambda} \, \partial^{\kappa} f_{\alpha\lambda} + \\
 & t_1 \, \omega_{\kappa\alpha}^{\alpha} \, \partial^{\kappa} f_{\prime}^{\prime} + t_1 \, \omega_{\kappa\lambda}^{\lambda} \, \partial^{\kappa} f_{\prime}^{\prime} + 2 \, t_1 \, \partial^{\alpha} f_{\kappa\alpha} \, \partial^{\kappa} f_{\prime}^{\prime} - t_1 \, \partial_{\kappa} f_{\lambda}^{\lambda} \, \partial^{\kappa} f_{\prime}^{\prime} + \\
 & \tfrac{1}{3} t_1 \, \omega_{\prime\theta\kappa} \, \partial^{\kappa} f^{\prime\theta} + \tfrac{1}{3} t_2 \, \omega_{\prime\theta\kappa} \, \partial^{\kappa} f^{\prime\theta} + \tfrac{4}{3} t_1 \, \omega_{\prime\kappa\theta} \, \partial^{\kappa} f^{\prime\theta} - \\
 & \tfrac{2}{3} t_2 \, \omega_{\prime\kappa\theta} \, \partial^{\kappa} f^{\prime\theta} - \tfrac{1}{3} t_1 \, \omega_{\theta\prime\kappa} \, \partial^{\kappa} f^{\prime\theta} - \tfrac{1}{3} t_2 \, \omega_{\theta\prime\kappa} \, \partial^{\kappa} f^{\prime\theta} + \\
 & \tfrac{2}{3} t_1 \, \omega_{\theta\kappa\prime} \, \partial^{\kappa} f^{\prime\theta} + \tfrac{2}{3} t_2 \, \omega_{\theta\kappa\prime} \, \partial^{\kappa} f^{\prime\theta} - t_1 \, \omega_{\prime\alpha}^{\alpha} \, \partial^{\kappa} f_{\kappa}^{\prime} - t_1 \, \omega_{\prime\lambda}^{\lambda} \, \partial^{\kappa} f_{\kappa}^{\prime} + \\
 & \tfrac{1}{3} t_1 \, \partial^{\alpha} f_{\kappa}^{\lambda} \, \partial^{\kappa} f_{\lambda\alpha} - \tfrac{1}{6} t_2 \, \partial^{\alpha} f_{\kappa}^{\lambda} \, \partial^{\kappa} f_{\lambda\alpha} + \tfrac{1}{3} t_1 \, \partial_{\kappa} f_{\theta}^{\lambda} \, \partial^{\kappa} f_{\lambda}^{\theta} - \\
 & \tfrac{1}{6} t_2 \, \partial_{\kappa} f_{\theta}^{\lambda} \, \partial^{\kappa} f_{\lambda}^{\theta} + \tfrac{2}{3} t_1 \, \partial_{\kappa} f_{\theta}^{\lambda} \, \partial^{\kappa} f_{\lambda}^{\theta} + \tfrac{1}{6} t_2 \, \partial_{\kappa} f_{\theta}^{\lambda} \, \partial^{\kappa} f_{\lambda}^{\theta} - \\
 & t_1 \, \partial^{\alpha} f_{\alpha}^{\lambda} \, \partial^{\kappa} f_{\lambda\kappa} + r_5 \, \partial_{\alpha} \omega_{\lambda\theta}^{\alpha} \, \partial^{\lambda} \omega^{\theta\kappa}_{\kappa} - r_5 \, \partial_{\theta} \omega_{\lambda\alpha}^{\alpha} \, \partial^{\lambda} \omega^{\theta\kappa}_{\kappa}
 \end{aligned}$$

Added source term:

$f^{\alpha\beta} \, \tau_{\alpha\beta} + \omega^{\alpha\beta\chi} \, \sigma_{\alpha\beta\chi}$

$\sigma_0^{\#1} \dagger$	$\tau_0^{\#1} \dagger$	$\tau_0^{\#2} \dagger$	$\sigma_0^{\#1-}$
$-\frac{1}{(1+2k^2)^2} t_1$	$\frac{i\sqrt{2}k}{(1+2k^2)^2} t_1$	0	0
$-\frac{i\sqrt{2}k}{(1+2k^2)^2} t_1$	$-\frac{2k^2}{(1+2k^2)^2} t_1$	0	0
0	0	0	0
0	0	0	$\frac{1}{t_2}$

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

$\omega_{2+}^{\#1} \dagger$	$f_{2+}^{\#1} \dagger$	$\omega_{2-}^{\#1} \dagger$	$\alpha\beta\chi$
$\frac{t_1}{2}$	$-\frac{ikt_1}{\sqrt{2}}$	0	0
$\frac{ikt_1}{\sqrt{2}}$	$k^2 t_1$	0	0
0	0	0	$\frac{t_1}{2}$

$\sigma_{1+}^{\#1} \dagger$	$\sigma_{1+}^{\#2} \dagger$	$\tau_{1+}^{\#1} \dagger$	$\sigma_{1-}^{\#2} \dagger$	$\tau_{1-}^{\#1} \dagger$	$\tau_{1-}^{\#2} \dagger$
$\frac{2(t_1+t_2)}{3t_1t_2+2k^2r_5(t_1+t_2)}$	$\frac{\sqrt{2}(t_1-2t_2)}{(1+k^2)(3t_1t_2+2k^2r_5(t_1+t_2))}$	$\frac{i\sqrt{2}k(t_1-2t_2)}{(1+k^2)(3t_1t_2+2k^2r_5(t_1+t_2))}$	0	0	0
$\frac{\sqrt{2}(t_1-2t_2)}{(1+k^2)(3t_1t_2+2k^2r_5(t_1+t_2))}$	$\frac{6k^2r_5+t_1+4t_2}{(1+k^2)^2(3t_1t_2+2k^2r_5(t_1+t_2))}$	$\frac{ik(6k^2r_5+t_1+4t_2)}{(1+k^2)^2(3t_1t_2+2k^2r_5(t_1+t_2))}$	0	0	0
$-\frac{i\sqrt{2}k(t_1-2t_2)}{(1+k^2)(3t_1t_2+2k^2r_5(t_1+t_2))}$	$-\frac{ik(6k^2r_5+t_1+4t_2)}{(1+k^2)^2(3t_1t_2+2k^2r_5(t_1+t_2))}$	$\frac{k^2(6k^2r_5+t_1+4t_2)}{(1+k^2)^2(3t_1t_2+2k^2r_5(t_1+t_2))}$	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	$\frac{-2k^2r_5+t_1}{(t_1+2k^2t_1)^2}$	0	$-\frac{i\sqrt{2}k(2k^2r_5-t_1)}{(t_1+2k^2t_1)^2}$
0	0	0	0	0	0
0	0	0	$-\frac{2ik}{t_1+2k^2t_1}$	$\frac{i\sqrt{2}k(2k^2r_5-t_1)}{(t_1+2k^2t_1)^2}$	$\frac{-4k^4r_5+2k^2t_1}{(t_1+2k^2t_1)^2}$

$\omega_{1+}^{\#1} \dagger$	$\omega_{1+}^{\#2} \dagger$	$f_{1+}^{\#1} \dagger$	$\omega_{1-}^{\#2} \dagger$	$f_{1-}^{\#1} \dagger$	$f_{1-}^{\#2} \dagger$
$\frac{1}{6}(6k^2r_5+t_1+4t_2)$	$-\frac{t_1-2t_2}{3\sqrt{2}}$	$-\frac{ik(t_1-2t_2)}{3\sqrt{2}}$	0	0	0
$-\frac{t_1-2t_2}{3\sqrt{2}}$	$\frac{t_1+t_2}{3}$	$\frac{1}{3}i k(t_1+t_2)$	0	0	0
$\frac{ik(t_1-2t_2)}{3\sqrt{2}}$	$-\frac{1}{3}i k(t_1+t_2)$	$\frac{1}{3}k^2(t_1+t_2)$	0	0	0
0	0	0	$k^2r_5-\frac{t_1}{2}$	$\frac{t_1}{\sqrt{2}}$	$i k t_1$
0	0	0	$\frac{t_1}{\sqrt{2}}$	0	0
0	0	0	0	0	0
0	0	0	$-i k t_1$	0	0

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

$\omega_{0+}^{\#1} \dagger$	$f_{0+}^{\#1} \dagger$	$f_{0+}^{\#2} \dagger$	$\omega_{0-}^{\#1} \dagger$
$-t_1$	$i\sqrt{2}kt_1$	0	0
$-i\sqrt{2}kt_1$	$-2k^2t_1$	0	0
0	0	0	0
0	0	0	t_2

(No massless particles)