



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

Lagrangian density

$$\begin{aligned}
 &-\frac{1}{3}t_1\omega_{\kappa\alpha'}^{\alpha'}\omega_{\kappa\alpha}^{\kappa}+\frac{2}{3}t_3\omega_{\kappa\alpha'}^{\alpha'}\omega_{\kappa\alpha}^{\kappa}-\frac{1}{3}t_1\omega_{\kappa\lambda}^{\kappa\lambda}\omega_{\kappa\lambda}^{\lambda}+\frac{2}{3}t_2\omega_{\kappa\lambda}^{\kappa\lambda}\omega_{\kappa\lambda}^{\lambda}+ \\
 &\frac{1}{3}t_1\omega_{\kappa\lambda}^{\lambda}\omega_{\kappa\lambda}^{\kappa\lambda}+\frac{1}{3}t_2\omega_{\kappa\lambda}^{\lambda}\omega_{\kappa\lambda}^{\kappa\lambda}+\frac{2}{3}r_2\partial^\theta\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{1}{3}t_1\partial^\alpha f_{\theta\kappa}\partial^\kappa f_{\alpha}^{\theta}+ \\
 &\frac{1}{6}t_2\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}{6}t_2\partial^\alpha f_{\kappa\theta}\partial^\kappa f_{\alpha}^{\theta}-\frac{1}{3}t_1\partial^\alpha f_{\lambda}^{\kappa}\partial^\kappa f_{\alpha\lambda}^{\lambda}+ \\
 &\frac{1}{6}t_2\partial^\alpha f_{\lambda}^{\kappa}\partial^\kappa f_{\alpha\lambda}^{\lambda}+\frac{1}{3}t_1\omega_{\kappa\alpha}^{\alpha}\partial^\kappa f_{\kappa}^{\lambda}-\frac{2}{3}t_3\omega_{\kappa\alpha}^{\alpha}\partial^\kappa f_{\kappa}^{\lambda}+\frac{1}{3}t_1\omega_{\kappa\lambda}^{\lambda}\partial^\kappa f_{\kappa}^{\lambda}- \\
 &\frac{2}{3}t_3\omega_{\kappa\lambda}^{\lambda}\partial^\kappa f_{\kappa}^{\lambda}+\frac{2}{3}t_1\partial^\alpha f_{\kappa\alpha}\partial^\kappa f_{\lambda}^{\lambda}-\frac{4}{3}t_3\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}+ \\
 &\frac{2}{3}t_3\partial_\kappa f_{\lambda}^{\lambda}\partial^\kappa f_{\lambda}^{\lambda}+\frac{1}{3}t_1\omega_{\theta\kappa}\partial^\kappa f_{\theta}^{\lambda}+\frac{1}{3}t_2\omega_{\theta\kappa}\partial^\kappa f_{\theta}^{\lambda}+\frac{4}{3}t_1\omega_{\theta\kappa}\partial^\kappa f_{\theta}^{\lambda}- \\
 &\frac{2}{3}t_2\omega_{\theta\kappa}\partial^\kappa f_{\theta}^{\lambda}-\frac{1}{3}t_1\omega_{\theta\kappa}\partial^\kappa f_{\theta}^{\lambda}-\frac{1}{3}t_2\omega_{\theta\kappa}\partial^\kappa f_{\theta}^{\lambda}+\frac{2}{3}t_1\omega_{\theta\kappa}\partial^\kappa f_{\theta}^{\lambda}+ \\
 &\frac{2}{3}t_2\omega_{\theta\kappa}\partial^\kappa f_{\theta}^{\lambda}-\frac{1}{3}t_1\omega_{\kappa\alpha}^{\alpha}\partial^\kappa f_{\kappa}^{\lambda}+\frac{2}{3}t_3\omega_{\kappa\alpha}^{\alpha}\partial^\kappa f_{\kappa}^{\lambda}-\frac{1}{3}t_1\omega_{\kappa\lambda}^{\lambda}\partial^\kappa f_{\kappa}^{\lambda}+ \\
 &\frac{2}{3}t_3\omega_{\kappa\lambda}^{\lambda}\partial^\kappa f_{\kappa}^{\lambda}+\frac{1}{3}t_1\partial^\alpha f_{\lambda}^{\kappa}\partial^\kappa f_{\lambda}^{\lambda}-\frac{1}{6}t_2\partial^\alpha f_{\lambda}^{\kappa}\partial^\kappa f_{\lambda}^{\lambda}+\frac{1}{3}t_1\partial_\kappa f_{\theta}^{\lambda}\partial^\kappa f_{\theta}^{\lambda}- \\
 &\frac{1}{6}t_2\partial_\kappa f_{\theta}^{\lambda}\partial^\kappa f_{\theta}^{\lambda}+\frac{2}{3}t_1\partial_\kappa f_{\theta}^{\lambda}\partial^\kappa f_{\theta}^{\lambda}+\frac{1}{6}t_2\partial_\kappa f_{\theta}^{\lambda}\partial^\kappa f_{\theta}^{\lambda}- \\
 &\frac{1}{3}t_1\partial^\alpha f_{\lambda\kappa}\partial^\kappa f_{\alpha}^{\lambda}+\frac{2}{3}t_3\partial^\alpha f_{\lambda\kappa}\partial^\kappa f_{\alpha}^{\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^\theta\omega_{\alpha\beta}^{\lambda}\partial_\lambda\omega_{\alpha\beta}^{\lambda}+\frac{2}{3}r_2\partial^\theta\omega_{\alpha\beta}^{\lambda\alpha}\partial_\lambda\omega_{\alpha\beta}^{\lambda}
 \end{aligned}$$

Added source term: $f^{\alpha\beta}\tau_{\alpha\beta}+\omega^{\alpha\beta\chi}\sigma_{\alpha\beta\chi}$

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

Source constraints	#
$\tau_{0+}^{\#2}==0$	1
$\tau_{0+}^{\#1}-2ik\sigma_{0+}^{\#1}==0$	1
$\tau_{1-}^{\#2\alpha}+2ik\sigma_{1-}^{\#2\alpha}==0$	3
$\tau_{1-}^{\#1\alpha}==0$	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 #:	16

	$\omega_{0+}^{\#1}$	$f_{0+}^{\#1}$	$f_{0+}^{\#2}$	$\omega_{0+}^{\#1}$
$\omega_{0+}^{\#1}+$	t_3	$-i\sqrt{2}kt_3$	0	0
$f_{0+}^{\#1}+$	$i\sqrt{2}kt_3$	$2k^2t_3$	0	0
$f_{0+}^{\#2}+$	0	0	0	0
$\omega_{0+}^{\#1}+$	0	0	0	$k^2r_2+t_2$

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

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

	$\omega_{1+}^{\#1}\alpha\beta$	$\omega_{1+}^{\#2}\alpha\beta$	$f_{1+}^{\#1}\alpha\beta$	$\omega_{1-}^{\#1}\alpha$	$\omega_{1-}^{\#2}\alpha$	$f_{1-}^{\#1}\alpha$	$f_{1-}^{\#2}\alpha$
$\omega_{1+}^{\#1}+\alpha\beta$	$\frac{1}{6}(t_1+4t_2)$	$-\frac{t_1-2t_2}{3\sqrt{2}}$	$-\frac{ik(t_1-2t_2)}{3\sqrt{2}}$	0	0	0	0
$\omega_{1+}^{\#2}+\alpha\beta$	$-\frac{t_1-2t_2}{3\sqrt{2}}$	$\frac{t_1+t_2}{3}$	$\frac{1}{3}ik(t_1+t_2)$	0	0	0	0
$f_{1+}^{\#1}+\alpha\beta$	$\frac{ik(t_1-2t_2)}{3\sqrt{2}}$	$-\frac{1}{3}ik(t_1+t_2)$	$\frac{1}{3}k^2(t_1+t_2)$	0	0	0	0
$\omega_{1-}^{\#1}+\alpha$	0	0	0	$\frac{1}{6}(t_1+4t_3)$	$\frac{t_1-2t_3}{3\sqrt{2}}$	0	$\frac{1}{3}ik(t_1-2t_3)$
$\omega_{1-}^{\#2}+\alpha$	0	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	0
$f_{1-}^{\#2}+\alpha$	0	0	0	$-\frac{1}{3}ik(t_1-2t_3)$	$-\frac{1}{3}i\sqrt{2}k(t_1+t_3)$	0	$\frac{2}{3}k^2(t_1+t_3)$

	$\sigma_{1+}^{\#1}\alpha\beta$	$\sigma_{1+}^{\#2}\alpha\beta$	$\tau_{1+}^{\#1}\alpha\beta$	$\sigma_{1-}^{\#1}\alpha$	$\sigma_{1-}^{\#2}\alpha$	$\tau_{1-}^{\#1}\alpha$	$\tau_{1-}^{\#2}\alpha$
$\sigma_{1+}^{\#1}+\alpha\beta$	$\frac{2(t_1+t_2)}{3t_1t_2}$	$\frac{\sqrt{2}(t_1-2t_2)}{3(1+k^2)t_1t_2}$	$\frac{i\sqrt{2}k(t_1-2t_2)}{3(1+k^2)t_1t_2}$	0	0	0	0
$\sigma_{1+}^{\#2}+\alpha\beta$	$\frac{\sqrt{2}(t_1-2t_2)}{3(1+k^2)t_1t_2}$	$\frac{t_1+4t_2}{3(1+k^2)^2t_1t_2}$	$\frac{ik(t_1+4t_2)}{3(1+k^2)^2t_1t_2}$	0	0	0	0
$\tau_{1+}^{\#1}+\alpha\beta$	$-\frac{i\sqrt{2}k(t_1-2t_2)}{3(1+k^2)t_1t_2}$	$-\frac{ik(t_1+4t_2)}{3(1+k^2)^2t_1t_2}$	$-\frac{k^2(t_1+4t_2)}{3(1+k^2)^2t_1t_2}$	$-\frac{\sqrt{2}(t_1-2t_2)}{3(1+2k^2)t_1t_3}$	$-\frac{\sqrt{2}(t_1-2t_3)}{3(1+2k^2)t_1t_3}$	$-\frac{2ik t_1-4ikt_3}{3t_1t_3+6k^2t_1t_3}$	$-\frac{i\sqrt{2}k(t_1+4t_3)}{3(1+2k^2)^2t_1t_3}$
$\sigma_{1-}^{\#1}+\alpha$	0	0	0	0	0	0	0
$\sigma_{1-}^{\#2}+\alpha$	0	0	0	$-\frac{\sqrt{2}(t_1-2t_3)}{3(1+2k^2)t_1t_3}$	$-\frac{t_1+4t_3}{3(1+2k^2)^2t_1t_3}$	$\frac{i\sqrt{2}k(t_1+4t_3)}{3(1+2k^2)^2t_1t_3}$	$\frac{2k^2(t_1+4t_3)}{3(1+2k^2)^2t_1t_3}$
$\tau_{1-}^{\#1}+\alpha$	0	0	0	0	0	0	0
$\tau_{1-}^{\#2}+\alpha$	0	0	0	$-\frac{2ik(t_1-2t_3)}{3t_1t_3+6k^2t_1t_3}$	$-\frac{i\sqrt{2}k(t_1+4t_3)}{3(1+2k^2)^2t_1t_3}$	$\frac{2k^2(t_1+4t_3)}{3(1+2k^2)^2t_1t_3}$	$\frac{2k^2(t_1+4t_3)}{3(1+2k^2)^2t_1t_3}$

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

Unitarity conditions

(No massless particles)