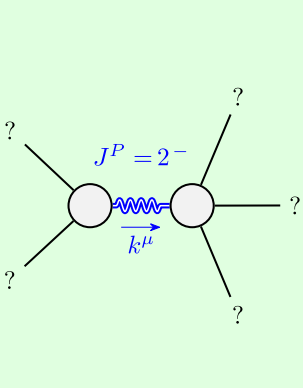


## Lagrangian density

$$\begin{aligned}
& -\frac{1}{3}t_1\omega_{\lambda'}^{\alpha\lambda}\omega_{\kappa\alpha}^{\kappa-\frac{1}{3}t_1}\omega_{\lambda'}^{\kappa\lambda}\omega_{\kappa\lambda}^{\lambda'}+\frac{2}{3}t_2\omega_{\lambda'}^{\kappa\lambda}\omega_{\kappa\lambda}^{\lambda'}+\frac{1}{3}t_1\omega_{\kappa\lambda}^{\lambda'}\omega_{\lambda'}^{\kappa\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}+2r_1\partial_{\lambda'}\omega_{\kappa}^{\kappa\lambda}\partial'\omega_{\lambda}^{\alpha}- \\
& \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}+\frac{2}{3}r_1\partial_{\theta}\omega_{\alpha\beta}^{\kappa}\partial_{\kappa}\omega^{\theta\alpha\beta}+ \\
& 2r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\theta}^{\theta\kappa\lambda}-2r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\alpha}^{\theta\kappa\lambda}+2r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega^{\kappa\lambda\theta}- \\
& 4r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega_{\alpha}^{\kappa\lambda\theta}-\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}\frac{1}{3}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}+t_1\omega_{\kappa\alpha}^{\alpha}\partial^{\kappa}f_{\lambda'}^{\lambda}+ \\
& t_1\omega_{\kappa\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\lambda}+2t_1\partial^{\alpha}f_{\kappa\alpha}\partial^{\kappa}f_{\lambda'}^{\lambda}-t_1\partial_{\kappa}f_{\lambda}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\lambda}+\frac{1}{3}t_1\omega_{\lambda\theta\kappa}\partial^{\kappa}f^{\lambda\theta}+ \\
& \frac{1}{3}\frac{1}{3}t_2\omega_{\lambda\theta\kappa}\partial^{\kappa}f^{\lambda\theta}+\frac{4}{3}t_1\omega_{\lambda\kappa\theta}\partial^{\kappa}f^{\lambda\theta}-\frac{2}{3}t_2\omega_{\lambda\kappa\theta}\partial^{\kappa}f^{\lambda\theta}-\frac{1}{3}t_1\omega_{\theta\lambda\kappa}\partial^{\kappa}f^{\lambda\theta}- \\
& \frac{1}{3}\frac{1}{3}t_2\omega_{\theta\lambda\kappa}\partial^{\kappa}f^{\lambda\theta}+\frac{2}{3}t_1\omega_{\theta\kappa\lambda}\partial^{\kappa}f^{\lambda\theta}+\frac{2}{3}t_2\omega_{\theta\kappa\lambda}\partial^{\kappa}f^{\lambda\theta}-t_1\omega_{\lambda'\alpha}^{\alpha}\partial^{\kappa}f_{\lambda'}^{\lambda}- \\
& t_1\omega_{\lambda'}^{\lambda}\partial^{\kappa}f_{\lambda'}^{\lambda}+\frac{1}{3}t_1\partial^{\alpha}f_{\lambda}^{\kappa}\partial^{\kappa}f_{\lambda\alpha}^{\lambda}-\frac{1}{6}t_2\partial^{\alpha}f_{\lambda}^{\kappa}\partial^{\kappa}f_{\lambda\alpha}^{\lambda}+\frac{1}{3}t_1\partial_{\kappa}f_{\lambda}^{\lambda}\partial^{\kappa}f_{\theta}^{\theta}- \\
& \frac{1}{6}\frac{1}{3}t_2\partial_{\kappa}f_{\theta}^{\lambda}\partial^{\kappa}f_{\lambda}^{\theta}+\frac{2}{3}t_1\partial_{\kappa}f_{\theta}^{\lambda}\partial^{\kappa}f_{\lambda}^{\theta}+\frac{1}{6}t_2\partial_{\kappa}f_{\theta}^{\lambda}\partial^{\kappa}f_{\lambda}^{\theta}-t_1\partial^{\alpha}f_{\lambda'}^{\lambda}\partial^{\kappa}f_{\alpha}^{\lambda\kappa}+ \\
& \frac{2}{3}\frac{1}{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{8}{3}r_1\partial^{\beta}\omega_{\lambda'}^{\lambda\alpha}\partial_{\lambda}\omega_{\alpha\beta}^{\lambda'}-2r_1\partial_{\alpha}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\theta}^{\theta\kappa}+2r_1\partial_{\theta}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega_{\alpha}^{\theta\kappa}
\end{aligned}$$



Massive particle

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)

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

$\omega_1^{\#1} + \alpha\beta$	$\omega_1^{\#2} + \alpha\beta$	$f_1^{\#1} + \alpha\beta$	$\omega_1^{\#1} - \alpha$	$\omega_1^{\#2} - \alpha$	$f_1^{\#1} - \alpha$	$f_1^{\#2} - \alpha$
$\frac{1}{6}(t_1 + 4t_2)$	$-\frac{t_1 - 2t_2}{3\sqrt{2}}$	$-\frac{i k(t_1 - 2t_2)}{3\sqrt{2}}$	0	0	0	0
$\omega_1^{\#2} + \alpha\beta$	$-\frac{t_1 - 2t_2}{3\sqrt{2}}$	$\frac{1}{3} i k(t_1 + t_2)$	0	0	0	0
$f_1^{\#1} + \alpha\beta$	$-\frac{1}{3} i k(t_1 + t_2)$	$\frac{1}{3} k^2(t_1 + t_2)$	0	0	0	0
$\omega_1^{\#1} + \alpha$	0	0	$-k^2 r_1 - \frac{t_1}{2}$	$\frac{t_1}{\sqrt{2}}$	0	$i k t_1$
$\omega_1^{\#2} + \alpha$	0	0	$\frac{t_1}{\sqrt{2}}$	0	0	0
$f_1^{\#1} + \alpha$	0	0	0	0	0	0
$f_1^{\#2} + \alpha$	0	0	$-i k t_1$	0	0	0

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

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

	$\omega_{2^+}^{\#1} \alpha\beta$	$f_{2^+}^{\#1} \alpha\beta$	$\omega_{2^-}^{\#1} \alpha\beta\chi$
$\omega_{2^+}^{\#1} \dagger \alpha\beta$	$\frac{t_1}{2}$	$-\frac{ikt_1}{\sqrt{2}}$	0
$f_{2^+}^{\#1} \dagger \alpha\beta$	$\frac{ikt_1}{\sqrt{2}}$	$k^2 t_1$	0
$\omega_{2^-}^{\#1} \dagger \alpha\beta\chi$	0	0	$k^2 r_1 + \frac{t_1}{2}$

	$\omega_0^{\#1}$	$f_0^{\#1}$	$f_0^{\#2}$	$\omega_0^{\#1}$
$\omega_0^{\#1} \uparrow$	$-t_1$	$i \sqrt{2} k t_1$	0	0
$f_0^{\#1} \uparrow$	$-i \sqrt{2} k t_1$	$-2 k^2 t_1$	0	0
$f_0^{\#2} \uparrow$	0	0	0	0
$\omega_0^{\#1} \uparrow$	0	0	0	$t_2$

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

## Unitarity conditions

---

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