Lagrangian density

$$
\begin{aligned}
&-t_1\,\omega_{\iota}^{\alpha\prime}\,\omega_{\kappa\alpha}^{\ \ \kappa}-\tfrac{1}{3}t_1\,\omega_{\iota}^{\kappa\lambda}\,\omega_{\kappa\lambda}^{\ \ \prime}+\tfrac{2}{3}t_2\,\omega_{\iota}^{\kappa\lambda}\,\omega_{\kappa\lambda}^{\ \ \prime}+\\
&\tfrac{1}{3}t_1\,\omega_{\kappa\lambda}^{\ \ \prime}\,\omega^{\kappa\lambda}{}_{\prime}+\tfrac{1}{3}t_2\,\omega_{\kappa\lambda}^{\ \ \prime}\,\omega^{\kappa\lambda}{}_{\prime}+f^{\alpha\beta}\,\tau_{\alpha\beta}+\omega^{\alpha\beta\chi}\,\sigma_{\alpha\beta\chi}+\\
&2\,r_1\,\partial_{\iota}\omega^{\kappa\lambda}\,\partial^{\prime}\omega_{\lambda\ \alpha}^{\ \ \alpha}-\tfrac{2}{3}r_1\,\partial^{\beta}\omega^{\theta\alpha}{}_{\kappa}\,\partial_{\theta}\omega_{\alpha\beta}^{\ \ \kappa}+\tfrac{2}{3}r_2\,\partial^{\beta}\omega^{\theta\alpha}{}_{\kappa}\,\partial_{\theta}\omega_{\alpha\beta}^{\ \ \kappa}-\\
&\tfrac{2}{3}r_1\,\partial_{\theta}\omega_{\alpha\beta}^{\ \ \kappa}\,\partial_{\kappa}\omega^{\alpha\beta\theta}-\tfrac{1}{3}r_2\,\partial_{\theta}\omega_{\alpha\beta}^{\ \ \kappa}\,\partial_{\kappa}\omega^{\alpha\beta\theta}+\tfrac{2}{3}r_1\,\partial_{\theta}\omega_{\alpha\beta}^{\ \ \kappa}\,\partial_{\kappa}\omega^{\theta\alpha\beta}-\\
&\tfrac{2}{3}r_2\,\partial_{\theta}\omega_{\alpha\beta}^{\ \ \kappa}\,\partial_{\kappa}\omega^{\theta\alpha\beta}+2\,r_1\,\partial_{\alpha}\omega_{\lambda\ \theta}^{\ \ \alpha}\,\partial_{\kappa}\omega^{\theta\kappa\lambda}-2\,r_1\,\partial_{\theta}\omega_{\lambda\ \alpha}^{\ \ \alpha}\,\partial_{\kappa}\omega^{\theta\kappa\lambda}+\\
&2\,r_1\,\partial_{\alpha}\omega_{\lambda\ \theta}^{\ \ \alpha}\,\partial_{\theta}\omega^{\kappa\lambda\theta}-4\,r_1\,\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_{\lambda\alpha}+\\
&\tfrac{1}{6}t_2\,\partial^{\alpha}f_{\ \kappa}^{\lambda}\,\partial^{\kappa}f_{\lambda\alpha}+t_1\,\omega_{\kappa\alpha}^{\ \ \alpha}\,\partial^{\kappa}f_{\iota}^{\ \prime\theta}+t_1\,\omega_{\kappa\lambda}^{\ \ \lambda}\,\partial^{\kappa}f_{\iota}^{\ \prime}+2\,t_1\,\partial^{\alpha}f_{\kappa\alpha}\,\partial^{\kappa}f_{\iota}^{\ \prime}-\\
&t_1\,\partial_{\kappa}f_{\ \lambda}^{\lambda}\,\partial^{\kappa}f_{\iota}^{\ \prime}+\tfrac{1}{3}t_1\,\omega_{\iota\theta\kappa}\,\partial^{\kappa}f^{\prime\theta}+\tfrac{1}{3}t_2\,\omega_{\iota\theta\kappa}\,\partial^{\kappa}f^{\prime\theta}+\tfrac{4}{3}t_1\,\omega_{\iota\kappa\theta}\,\partial^{\kappa}f^{\prime\theta}-\\
&\tfrac{2}{3}t_2\,\omega_{\iota\kappa\theta}\,\partial^{\kappa}f^{\prime\theta}-\tfrac{1}{3}t_1\,\omega_{\theta\iota\kappa}\,\partial^{\kappa}f^{\prime\theta}-\tfrac{1}{3}t_2\,\omega_{\theta\iota\kappa}\,\partial^{\kappa}f^{\prime\theta}+\tfrac{2}{3}t_1\,\omega_{\theta\kappa\iota}\,\partial^{\kappa}f^{\prime\theta}+\\
&\tfrac{2}{3}t_2\,\omega_{\theta\kappa\iota}\,\partial^{\kappa}f^{\prime\theta}-t_1\,\omega_{\iota\alpha}^{\ \ \alpha}\,\partial^{\kappa}f_{\ \kappa}^{\prime}-t_1\,\omega_{\iota\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^{\alpha}f_{\ \kappa}^{\lambda}\,\partial^{\kappa}f_{\lambda}^{\ \theta}-t_1\,\partial^{\alpha}f_{\lambda}^{\ \theta}\,\partial^{\kappa}f_{\ \alpha}^{\lambda}\,\partial^{\kappa}f_{\lambda\kappa}+\tfrac{2}{3}r_1\,\partial_{\kappa}\omega^{\alpha\beta\theta}\,\partial^{\kappa}\omega_{\alpha\beta\theta}+\\
&\tfrac{1}{3}r_2\,\partial_{\kappa}\omega^{\alpha\beta\theta}\,\partial^{\kappa}\omega_{\alpha\beta\theta}-\tfrac{2}{3}r_1\,\partial_{\kappa}\omega^{\theta\alpha\beta}\,\partial^{\kappa}\omega_{\alpha\beta\theta}+\tfrac{2}{3}r_2\,\partial_{\kappa}\omega^{\theta\alpha\beta}\,\partial^{\kappa}\omega_{\alpha\beta\theta}+\\
&\tfrac{2}{3}r_1\,\partial^{\beta}\omega_{\iota}^{\ \alpha\lambda}\,\partial_{\lambda}\omega_{\alpha\beta}^{\ \ \prime}-\tfrac{2}{3}r_2\,\partial^{\beta}\omega_{\iota}^{\ \alpha\lambda}\,\partial_{\lambda}\omega_{\alpha\beta}^{\ \ \prime}-\tfrac{8}{3}r_1\,\partial^{\beta}\omega_{\iota}^{\ \lambda\alpha}\,\partial_{\lambda}\omega_{\alpha\beta}^{\ \ \prime}+\\
&\tfrac{2}{3}r_2\,\partial^{\beta}\omega_{\iota}^{\ \lambda\alpha}\,\partial_{\lambda}\omega_{\alpha\beta}^{\ \ \prime}-2\,r_1\,\partial_{\alpha}\omega_{\lambda\ \theta}^{\ \ \alpha}\,\partial^{\lambda}\omega^{\theta\kappa}{}_{\kappa}+2\,r_1\,\partial_{\theta}\omega_{\lambda\ \alpha}^{\ \ \alpha}\,\partial^{\lambda}\omega^{\theta\kappa}{}_{\kappa}
\end{aligned}
$$

| | $\sigma_{1^+}^{\#1}{}^{\alpha\beta}$ | $\sigma_{1^+}^{\#2}{}^{\alpha\beta}$ | $\tau_{1^+}^{\#1}{}^{\alpha\beta}$ | $\sigma_{1^-}^{\#1}{}^{\alpha}$ | $\sigma_{1^-}^{\#2}{}^{\alpha}$ | $\tau_{1^-}^{\#1}{}^{\alpha}$ | $\tau_{1^-}^{\#2}{}^{\alpha}$ |
|---|---|---|---|---|---|---|---|
| $\sigma_{1^+}^{\#1}{}^{\dagger\,\alpha\beta}$ | $\frac{2(t_1+t_2)}{3t_1t_2}$ | $\frac{\sqrt{2}(t_1-2t_2)}{3(1+k^2)t_1t_2}$ | $-\frac{i\sqrt{2}k(t_1-2t_2)}{3(1+k^2)t_1t_2}$ | 0 | 0 | 0 | 0 |
| $\sigma_{1^+}^{\#2}{}^{\dagger\,\alpha\beta}$ | $\frac{\sqrt{2}(t_1-2t_2)}{3(1+k^2)t_1t_2}$ | $\frac{t_1+4t_2}{3(1+k^2)t_1t_2}$ | $-\frac{ik(t_1+4t_2)}{3(1+k^2)t_1t_2}$ | 0 | 0 | 0 | 0 |
| $\tau_{1^+}^{\#1}{}^{\dagger\,\alpha\beta}$ | $-\frac{i\sqrt{2}k(t_1-2t_2)}{3(1+k^2)t_1t_2}$ | $-\frac{ik(t_1+4t_2)}{3(1+k^2)t_1t_2}$ | $\frac{k^2(t_1+4t_2)}{3(1+k^2)t_1t_2}$ | 0 | 0 | 0 | 0 |
| $\sigma_{1^-}^{\#1}{}^{\dagger\,\alpha}$ | 0 | 0 | 0 | 0 | $\frac{\sqrt{2}}{t_1+2k^2t_1}$ | 0 | $\frac{2ik}{t_1+2k^2t_1}$ |
| $\sigma_{1^-}^{\#2}{}^{\dagger\,\alpha}$ | 0 | 0 | 0 | $\frac{\sqrt{2}}{t_1+2k^2t_1}$ | $\frac{2k^2r_1+t_1}{(t_1+2k^2t_1)^2}$ | 0 | $\frac{i\sqrt{2}k(2k^2r_1+t_1)}{(t_1+2k^2t_1)^2}$ |
| $\tau_{1^-}^{\#1}{}^{\dagger\,\alpha}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $\tau_{1^-}^{\#2}{}^{\dagger\,\alpha}$ | 0 | 0 | 0 | $-\frac{2ik}{t_1+2k^2t_1}$ | $-\frac{i\sqrt{2}k(2k^2r_1+t_1)}{(t_1+2k^2t_1)^2}$ | 0 | $\frac{2k^2(2k^2r_1+t_1)}{(t_1+2k^2t_1)^2}$ |

| | $\omega_{1^+}^{\#1}{}^{\alpha\beta}$ | $\omega_{1^+}^{\#2}{}^{\alpha\beta}$ | $f_{1^+}^{\#1}{}^{\alpha\beta}$ | $\omega_{1^-}^{\#1}{}^{\alpha}$ | $\omega_{1^-}^{\#2}{}^{\alpha}$ | $f_{1^-}^{\#1}{}^{\alpha}$ | $f_{1^-}^{\#2}{}^{\alpha}$ |
|---|---|---|---|---|---|---|---|
| $\omega_{1^+}^{\#1}{}^{\dagger\,\alpha\beta}$ | $\frac{1}{6}(t_1+4t_2)$ | $-\frac{t_1-2t_2}{3\sqrt{2}}$ | $-\frac{ik(t_1-2t_2)}{3\sqrt{2}}$ | 0 | 0 | 0 | 0 |
| $\omega_{1^+}^{\#2}{}^{\dagger\,\alpha\beta}$ | $-\frac{t_1-2t_2}{3\sqrt{2}}$ | $\frac{t_1+t_2}{3}$ | $\frac{1}{3}ik(t_1+t_2)$ | 0 | 0 | 0 | 0 |
| $f_{1^+}^{\#1}{}^{\dagger\,\alpha\beta}$ | $\frac{ik(t_1-2t_2)}{3\sqrt{2}}$ | $-\frac{1}{3}ik(t_1+t_2)$ | $\frac{1}{3}k^2(t_1+t_2)$ | 0 | 0 | 0 | 0 |
| $\omega_{1^-}^{\#1}{}^{\dagger\,\alpha}$ | 0 | 0 | 0 | $-k^2r_1-\frac{t_1}{2}$ | $\frac{t_1}{\sqrt{2}}$ | 0 | $-ikt_1$ |
| $\omega_{1^-}^{\#2}{}^{\dagger\,\alpha}$ | 0 | 0 | 0 | $\frac{t_1}{\sqrt{2}}$ | 0 | 0 | 0 |
| $f_{1^-}^{\#1}{}^{\dagger\,\alpha}$ | 0 | 0 | 0 | 0 | 0 | 0 | $ikt_1$ |
| $f_{1^-}^{\#2}{}^{\dagger\,\alpha}$ | 0 | 0 | 0 | $ikt_1$ | 0 | $-ikt_1$ | 0 |

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

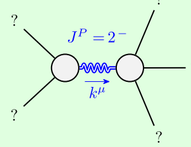
| | $\sigma_{2^+}^{\#1}{}^{\alpha\beta}$ | $\tau_{2^+}^{\#1}{}^{\alpha\beta}$ | $\sigma_{2^-}^{\#1}{}^{\alpha\beta\chi}$ |
|---|---|---|---|
| $\sigma_{2^+}^{\#1}{}^{\dagger\,\alpha\beta}$ | $\frac{2}{(1+2k^2)^2t_1}$ | $-\frac{2i\sqrt{2}k}{(1+2k^2)^2t_1}$ | 0 |
| $\tau_{2^+}^{\#1}{}^{\dagger\,\alpha\beta}$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

| | $\sigma_{0^+}^{\#1}$ | $\tau_{0^+}^{\#1}$ | $\tau_{0^+}^{\#2}$ | $\sigma_{0^-}^{\#1}$ |
|---|---|---|---|---|
| $\sigma_{0^+}^{\#1}{}^{\dagger}$ | $-\frac{1}{(1+2k^2)^2t_1}$ | $\frac{i\sqrt{2}k}{(1+2k^2)^2t_1}$ | 0 | 0 |
| $\tau_{0^+}^{\#1}{}^{\dagger}$ | $-\frac{i\sqrt{2}k}{(1+2k^2)^2t_1}$ | $-\frac{2k^2}{(1+2k^2)^2t_1}$ | 0 | 0 |
| $\tau_{0^+}^{\#2}{}^{\dagger}$ | 0 | 0 | 0 | 0 |
| $\sigma_{0^-}^{\#1}{}^{\dagger}$ | 0 | 0 | 0 | $\frac{1}{k^2r_2+t_2}$ |

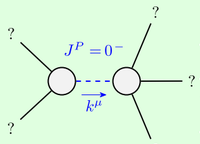
| | $\omega_{0^+}^{\#1}$ | $f_{0^+}^{\#1}$ | $f_{0^+}^{\#2}$ | $\omega_{0^-}^{\#1}$ |
|---|---|---|---|---|
| $\omega_{0^+}^{\#1}{}^{\dagger}$ | $-t_1$ | $i\sqrt{2}kt_1$ | 0 | 0 |
| $f_{0^+}^{\#1}{}^{\dagger}$ | $-i\sqrt{2}kt_1$ | $-2k^2t_1$ | 0 | 0 |
| $f_{0^+}^{\#2}{}^{\dagger}$ | 0 | 0 | 0 | $k^2r_2+t_2$ |
| $\omega_{0^-}^{\#1}{}^{\dagger}$ | 0 | 0 | 0 | 0 |

Source constraints

| SO(3) irreps | # |
|---|---|
| $\tau_{0^+}^{\#2}==0$ | 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 |




| Massive particle | |
|---|---|
| Pole residue: | $-\frac{1}{r_1}>0$ |
| Polarisations: | 5 |
| Square mass: | $-\frac{t_1}{2r_1}>0$ |
| Spin: | 2 |
| Parity: | Odd |




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

Unitarity conditions

$r_1<0\ \&\&\ r_2<0\ \&\&\ t_1>0\ \&\&\ t_2>0$

(No massless particles)