Tables

$J=1$ sector

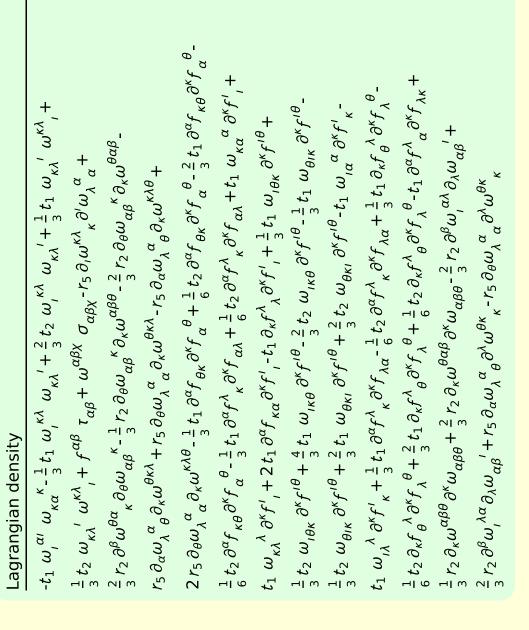|	$\sigma^{\#1}_{1^+}\dagger^{\alpha\beta}$	$\sigma^{\#2}_{1^+}\dagger^{\alpha\beta}$	$\tau^{\#1}_{1^+}\dagger^{\alpha\beta}$	$\sigma^{\#1}_{1^-}\dagger^{\alpha}$	$\sigma^{\#2}_{1^-}\dagger^{\alpha}$	$\tau^{\#1}_{1^-}\dagger^{\alpha}$	$\tau^{\#2}_{1^-}\dagger^{\alpha}$
$\tau^{\#2}_{1^-}{}_{\alpha}$	0	0	0	$\frac{2ik}{t_1+2k^2 t_1}$	$-\frac{i\sqrt{2}k(2k^2 r_5+t_1)}{(t_1+2k^2 t_1)^2}$	0	$-\frac{4k^4 r_5+2k^2 t_1}{(t_1+2k^2 t_1)^2}$
$\tau^{\#1}_{1^-}{}_{\alpha}$	0	0	0	0	0	0	0
$\sigma^{\#2}_{1^-}{}_{\alpha}$	0	0	0	$\frac{\sqrt{2}}{t_1+2k^2 t_1}$	$-\frac{2k^2 r_5+t_1}{(t_1+2k^2 t_1)^2}$	0	$\frac{i\sqrt{2}k(2k^2 r_5+t_1)}{(t_1+2k^2 t_1)^2}$
$\sigma^{\#1}_{1^-}{}_{\alpha}$	0	0	0	$\frac{\sqrt{2}}{t_1+2k^2 t_1}$	0	0	$-\frac{2ik}{t_1+2k^2 t_1}$
$\tau^{\#1}_{1^+}{}_{\alpha\beta}$	$\frac{i\sqrt{2}k(t_1-2t_2)}{(1+k^2)^2(3t_1 t_2+2k^2 r_5(t_1+t_2))}$	$\frac{ik(6k^2 r_5+t_1+4t_2)}{(1+k^2)^2(3t_1 t_2+2k^2 r_5(t_1+t_2))}$	$\frac{k^2(6k^2 r_5+t_1+4t_2)}{(1+k^2)^2(3t_1 t_2+2k^2 r_5(t_1+t_2))}$	0	0	0	0
$\sigma^{\#2}_{1^+}{}_{\alpha\beta}$	$\frac{\sqrt{2}(t_1-2t_2)}{(1+k^2)(3t_1 t_2+2k^2 r_5(t_1+t_2))}$	$\frac{6k^2 r_5+t_1+4t_2}{(1+k^2)^2(3t_1 t_2+2k^2 r_5(t_1+t_2))}$	$-\frac{ik(6k^2 r_5+t_1+4t_2)}{(1+k^2)^2(3t_1 t_2+2k^2 r_5(t_1+t_2))}$	0	0	0	0
$\sigma^{\#1}_{1^+}{}_{\alpha\beta}$	$\frac{2(t_1+t_2)}{3t_1 t_2+2k^2 r_5(t_1+t_2)}$	$\frac{\sqrt{2}(t_1-2t_2)}{(1+k^2)(3t_1 t_2+2k^2 r_5(t_1+t_2))}$	$-\frac{i\sqrt{2}k(t_1-2t_2)}{(1+k^2)(3t_1 t_2+2k^2 r_5(t_1+t_2))}$	0	0	0	0

	$\omega^{\#1}_{1^+\alpha\beta}$	$\omega^{\#2}_{1^+\alpha\beta}$	$f^{\#1}_{1^+\alpha\beta}$	$\omega^{\#1}_{1^-\alpha}$	$\omega^{\#2}_{1^-\alpha}$	$f^{\#1}_{1^-\alpha}$	$f^{\#2}_{1^-\alpha}$
$\omega^{\#1}_{1^+}\dagger^{\alpha\beta}$	$\frac{1}{6}(6k^2 r_5+t_1+4t_2)$	$-\frac{t_1-2t_2}{3\sqrt{2}}$	$-\frac{ik(t_1-2t_2)}{3\sqrt{2}}$	0	0	0	0
$\omega^{\#2}_{1^+}\dagger^{\alpha\beta}$	$-\frac{t_1-2t_2}{3\sqrt{2}}$	$\frac{t_1+t_2}{3}$	$\frac{1}{3}ik(t_1+t_2)$	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	$k^2 r_5-\frac{t_1}{2}$	$\frac{t_1}{\sqrt{2}}$	0	ikt_1
$\omega^{\#2}_{1^-}\dagger^{\alpha}$	0	0	0	$\frac{t_1}{\sqrt{2}}$	0	0	0
$f^{\#1}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0
$f^{\#2}_{1^-}\dagger^{\alpha}$	0	0	0	$-ikt_1$	0	0	0

$J=0$ sector

	$\omega^{\#1}_{0^+}$	$f^{\#1}_{0^+}$	$f^{\#2}_{0^+}$	$\omega^{\#1}_{0^-}$
$\omega^{\#1}_{0^+}\dagger$	$-t_1$	$i\sqrt{2}kt_1$	0	0
$f^{\#1}_{0^+}\dagger$	$-i\sqrt{2}kt_1$	$-2k^2 t_1$	0	0
$f^{\#2}_{0^+}\dagger$	0	0	0	0
$\omega^{\#1}_{0^-}\dagger$	0	0	0	$k^2 r_2+t_2$

	$\sigma^{\#1}_{0^+}$	$\tau^{\#1}_{0^+}$	$\tau^{\#2}_{0^+}$	$\sigma^{\#1}_{0^-}$
$\sigma^{\#1}_{0^+}\dagger$	$-\frac{1}{(1+2k^2)^2 t_1}$	$\frac{i\sqrt{2}k}{(1+2k^2)^2 t_1}$	0	0
$\tau^{\#1}_{0^+}\dagger$	$-\frac{i\sqrt{2}k}{(1+2k^2)^2 t_1}$	$-\frac{2k^2}{(1+2k^2)^2 t_1}$	0	0
$\tau^{\#2}_{0^+}\dagger$	0	0	0	0
$\sigma^{\#1}_{0^-}\dagger$	0	0	0	$\frac{1}{k^2 r_2+t_2}$

$J=2$ sector

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

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

Source constraints

SO(3) irreps	#
$\tau^{\#2}_{0^+} == 0$	1
$\tau^{\#1}_{0^+} - 2ik\sigma^{\#1}_{0^+} == 0$	1
$f^{\#2}_{1^-}{}^{\alpha} + 2ik\sigma^{\#1}_{1^-}{}^{\alpha} == 0$	3
$\tau^{\#1}_{1^-}{}^{\alpha} == 0$	3
$\tau^{\#1}_{1^+}{}^{\alpha\beta} + ik\sigma^{\#2}_{1^+}{}^{\alpha\beta} == 0$	3
$\tau^{\#1}_{2^+}{}^{\alpha\beta} - 2ik\sigma^{\#1}_{2^+}{}^{\alpha\beta} == 0$	5
Total #:	16

Lagrangian density

$$
\begin{aligned}
\mathcal{L} = \; & -t_1\,\omega_i{}^{\alpha I}\,\omega_{\kappa\alpha}{}^{\kappa} - \tfrac{1}{3}t_1\,\omega_i{}^{\kappa\lambda}\,\omega_{\kappa\lambda}{}^{I} + \tfrac{2}{3}t_2\,\omega_i{}^{\kappa\lambda}\,\omega_{\kappa\lambda}{}^{I} + \tfrac{1}{3}t_1\,\omega_{\kappa\lambda}{}^{I}\,\omega^{\kappa\lambda}{}_{i} \\
& + \tfrac{1}{3}t_2\,\omega_i{}^{\kappa\lambda}\,\omega_{\kappa\lambda}{}^{I} + f^{\alpha\beta}\tau_{\alpha\beta} + \omega^{\alpha\beta\chi}\sigma_{\alpha\beta\chi} - r_5\,\partial_i\omega^{\kappa\lambda}{}_{\kappa}\,\partial^i\omega_{\lambda}{}^{\alpha}{}_{\alpha} \\
& + \tfrac{2}{3}t_2\,\partial_\theta\omega^{\theta\alpha}{}_{\alpha}\,\partial_\kappa\omega^{\alpha\beta\theta}{}_{\kappa} - \tfrac{1}{3}t_2\,\partial_\theta\omega_{\alpha\beta}{}^{\kappa}\,\partial_\kappa\omega^{\alpha\beta\theta}{}_{\alpha\beta} \\
& + r_5\,\partial_\alpha\omega_\lambda{}^{\alpha}{}_\theta\,\partial_\kappa\omega^{\theta\kappa\lambda} - r_5\,\partial_\theta\omega_\lambda{}^{\alpha}{}_{\alpha}\,\partial_\kappa\omega^{\theta\kappa\lambda} \\
& + 2r_5\,\partial_\theta\omega_\lambda{}^{\alpha}{}_{\alpha}\,\partial_\kappa\omega^{\kappa\lambda\theta} - \tfrac{1}{3}t_1\,\partial_\theta f_{\theta\kappa}\,\partial^\kappa f_{\alpha}{}^{\theta} + \tfrac{1}{6}t_2\,\partial_\theta\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_\theta\partial^\kappa f_{\kappa\theta}\,\partial^\kappa f_{\alpha\lambda} + \tfrac{1}{6}t_2\,\partial^\alpha f_{\kappa\lambda}\,\partial^\kappa f_{\alpha\lambda} + \tfrac{1}{3}t_1\,\omega_{I\theta\kappa}\,\partial^\kappa f^{I\theta} \\
& + t_1\,\omega_{I}{}^{\lambda}\,\partial^\kappa f^{I}{}_{I} - t_1\,\partial_\theta f_{\kappa\lambda}\,\partial^\kappa f^{I}{}_{\lambda} - t_1\,\partial_\theta f^{I\theta}\,\partial^\kappa f^{I\theta} + \tfrac{1}{3}t_1\,\omega_{I\theta\kappa}\,\partial^\kappa f^{I\theta} \\
& - \tfrac{1}{3}t_2\,\omega_{I\theta}{}^{\kappa}\,\partial^\kappa f^{I\theta} + \tfrac{4}{3}t_1\,\omega_{I\kappa\theta}\,\partial^\kappa f^{I\theta} - \tfrac{2}{3}t_2\,\omega_{I\kappa\theta}\,\partial^\kappa f^{I\theta} - \tfrac{1}{3}t_1\,\omega_{I\alpha}{}^{\alpha}\,\partial^\kappa f^{I}{}_{\kappa} \\
& + \tfrac{2}{3}t_1\,\omega_{I\theta\kappa}\,\partial^\kappa f^{I\theta} + \tfrac{1}{3}t_2\,\omega_{\theta\kappa I}\,\partial^\kappa f^{I\theta} - \tfrac{1}{6}t_2\,\partial_\kappa f^{\alpha\lambda}\,\partial^\kappa f_{\lambda\alpha} - \tfrac{1}{6}t_2\,\partial_\kappa f^{\alpha\lambda}\,\partial^\kappa f_{\lambda\kappa} \\
& + t_1\,\omega_{\kappa\lambda}{}^{\lambda}\,\partial^\kappa f^{I}{}_{I} - \tfrac{1}{3}t_1\,\partial^{\alpha} f_{\kappa\theta}\,\partial^\kappa f_{\lambda} + \tfrac{2}{3}t_1\,\partial_\kappa f^{\alpha\lambda}\,\partial^\kappa f_{\lambda\kappa} - t_1\,\partial^{\alpha} f_{\kappa\lambda}\,\partial^\kappa f_{\lambda\kappa} \\
& + \tfrac{1}{6}t_2\,\partial_\kappa\omega^{\alpha\beta\theta}\,\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_2\,\partial^\beta\omega_I{}^{\lambda\alpha}\,\partial\omega_{\lambda\alpha}{}^{I} + r_5\,\partial_\alpha\omega_\lambda{}^{\alpha}\,\partial^\lambda\omega^{\theta\kappa}{}_{\kappa} - r_5\,\partial_\theta\omega_\lambda{}^{\alpha}\,\partial^\lambda\omega^{\theta\kappa}{}_{\kappa}
\end{aligned}
$$

Massive particle

$J^P = 1^+$, k^μ

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

Massive particle

$J^P = 0^-$, k^μ

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

Unitarity conditions

$$r_2 < 0 \;\&\&\; r_5 > 0 \;\&\&\; t_1 < 0 \;\&\&\; t_2 > -t_1$$

(No massless particles)