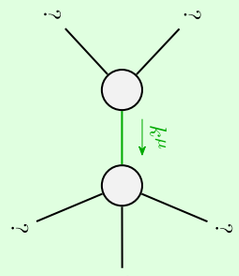
Unitarity conditions

$r_5 < -2\,r_3 \;\&\&\; t_1 < 0 \,||\, t_1 > 0$



Quadratic pole	
Pole residue:	$-\frac{1}{(2r_3+r_5)t_1^2} > 0$
Polarisations:	2

(No massive particles)

	$\sigma_{1^+}^{\#1}{}_{\alpha\beta}$	$\sigma_{1^+}^{\#2}{}_{\alpha\beta}$	$\tau_{1^+}^{\#1}{}_{\alpha\beta}$	$\sigma_{1^-}^{\#1}{}_{\alpha}$	$\sigma_{1^-}^{\#2}{}_{\alpha}$	$\tau_{1^-}^{\#1}{}_{\alpha}$	$\tau_{1^-}^{\#2}{}_{\alpha}$
$\sigma_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	0	$-\frac{\sqrt{2}}{t_1+k^2 t_1}$	$-\frac{i\sqrt{2}\,k}{t_1+k^2 t_1}$	0	0	0	0
$\sigma_{1^+}^{\#2}{}^{\dagger\alpha\beta}$	$-\frac{\sqrt{2}}{t_1+k^2 t_1}$	$\frac{-2k^2(2r_3+r_5)+t_1}{(1+k^2)^2 t_1^2}$	$\frac{-2ik^3(2r_3+r_5)+ikt_1}{(1+k^2)^2 t_1^2}$	0	0	0	0
$\tau_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	$\frac{i\sqrt{2}\,k}{t_1+k^2 t_1}$	$\frac{i(2k^3(2r_3+r_5)-kt_1)}{(1+k^2)^2 t_1^2}$	$\frac{-2k^4(2r_3+r_5)+k^2 t_1}{(1+k^2)^2 t_1^2}$	0	0	0	0
$\sigma_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	$\frac{1}{k^2(2r_3+r_5)}$	$-\frac{1}{\sqrt{2}\,(k^2+2k^4)(2r_3+r_5)}$	0	$-\frac{i}{k(1+2k^2)(2r_3+r_5)}$
$\sigma_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	$-\frac{1}{\sqrt{2}\,(k^2+2k^4)(2r_3+r_5)}$	$\frac{6k^2(2r_3+r_5)+t_1}{2(k+2k^3)^2(2r_3+r_5)t_1}$	0	$\frac{i(6k^2(2r_3+r_5)+t_1)}{\sqrt{2}\,k(1+2k^2)^2(2r_3+r_5)t_1}$
$\tau_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$\tau_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	$\frac{i}{k(1+2k^2)(2r_3+r_5)}$	$-\frac{i(6k^2(2r_3+r_5)+t_1)}{\sqrt{2}\,k(1+2k^2)^2(2r_3+r_5)t_1}$	0	$\frac{6k^2(2r_3+r_5)+t_1}{(1+2k^2)^2(2r_3+r_5)t_1}$

	$\omega_{1^+}^{\#1}{}_{\alpha\beta}$	$\omega_{1^+}^{\#2}{}_{\alpha\beta}$	$f_{1^+}^{\#1}{}_{\alpha\beta}$	$\omega_{1^-}^{\#1}{}_{\alpha}$	$\omega_{1^-}^{\#2}{}_{\alpha}$	$f_{1^-}^{\#1}{}_{\alpha}$	$f_{1^-}^{\#2}{}_{\alpha}$
$\omega_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	$k^2(2r_3+r_5)-\frac{t_1}{2}$	$-\frac{t_1}{\sqrt{2}}$	$-\frac{ikt_1}{\sqrt{2}}$	0	0	0	0
$\omega_{1^+}^{\#2}{}^{\dagger\alpha\beta}$	$-\frac{t_1}{\sqrt{2}}$	0	0	0	0	0	0
$f_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	$\frac{ikt_1}{\sqrt{2}}$	0	0	0	0	0	0
$\omega_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	$k^2(2r_3+r_5)+\frac{t_1}{6}$	$\frac{t_1}{3\sqrt{2}}$	0	$\frac{ikt_1}{3}$
$\omega_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	$\frac{t_1}{3\sqrt{2}}$	$\frac{t_1}{3}$	0	$\frac{1}{3}i\sqrt{2}\,kt_1$
$f_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$f_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	$-\frac{1}{3}ikt_1$	$-\frac{1}{3}i\sqrt{2}\,kt_1$	0	$\frac{2k^2t_1}{3}$

Source constraints

SO(3) irreps	#
$\tau_{0^+}^{\#2} == 0$	1
$\tau_{0^+}^{\#1} == 0$	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

Lagrangian density

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\begin{aligned}
&-\tfrac{1}{3}t_1\,\omega_{\iota}{}^{\alpha\iota}\,\omega_{\kappa\alpha}{}^{\kappa} - t_1\,\omega_{\iota}{}^{\kappa\lambda}\,\omega_{\kappa\lambda}{}^{\iota} + f^{\alpha\beta}\,\tau_{\alpha\beta} + \omega^{\alpha\beta\chi}\,\sigma_{\alpha\beta\chi} - 2r_3\,\partial_\iota\omega^{\kappa\lambda}{}_{\kappa}\partial^\iota\omega_{\lambda}{}^{\alpha}{}_{\alpha} - \\
&r_5\,\partial_\iota\omega^{\kappa\lambda}{}_{\kappa}\partial^\iota\omega_{\lambda}{}^{\alpha}{}_{\alpha} + 2r_3\,\partial_\alpha\omega_{\lambda}{}^{\alpha}{}_{\theta}\partial_\kappa\omega^{\theta\kappa\lambda} - r_5\,\partial_\alpha\omega_{\lambda}{}^{\alpha}{}_{\theta}\partial_\kappa\omega^{\theta\kappa\lambda} - 2r_3\,\partial_\theta\omega_{\lambda}{}^{\alpha}{}_{\alpha}\partial_\kappa\omega^{\theta\kappa\lambda} + \\
&r_5\,\partial_\theta\omega_{\lambda}{}^{\alpha}{}_{\alpha}\partial_\kappa\omega^{\theta\kappa\lambda} - 2r_3\,\partial_\alpha\omega_{\lambda}{}^{\alpha}{}_{\theta}\partial_\kappa\omega^{\kappa\lambda\theta} - r_5\,\partial_\alpha\omega_{\lambda}{}^{\alpha}{}_{\theta}\partial_\kappa\omega^{\kappa\lambda\theta} + 4r_3\,\partial_\theta\omega_{\lambda}{}^{\alpha}{}_{\alpha}\partial_\kappa\omega^{\kappa\lambda\theta} + \\
&2r_5\,\partial_\theta\omega_{\lambda}{}^{\alpha}{}_{\alpha}\partial_\kappa\omega^{\kappa\lambda\theta} - \tfrac{1}{2}t_1\,\partial^\alpha f_{\theta\kappa}\partial^\kappa f_{\alpha}{}^{\theta} - \tfrac{1}{2}t_1\,\partial^\alpha f_{\kappa\theta}\partial^\kappa f_{\alpha}{}^{\theta} - \tfrac{1}{2}t_1\,\partial^\alpha f^{\lambda}{}_{\kappa}\partial^\kappa f_{\alpha\lambda} + \\
&\tfrac{1}{3}t_1\,\omega_{\kappa\alpha}{}^{\alpha}\,\partial^\kappa f^\iota{}_{\iota} + \tfrac{1}{3}t_1\,\omega_{\kappa\lambda}{}^{\lambda}\,\partial^\kappa f^\iota{}_{\iota} + \tfrac{2}{3}t_1\,\partial^\alpha f_{\kappa\alpha}\partial^\kappa f^\iota{}_{\iota} - \tfrac{1}{3}t_1\,\partial_\kappa f^{\lambda}{}_{\lambda}\partial^\kappa f^\iota{}_{\iota} + \\
&2t_1\,\omega_{\iota\kappa\theta}\,\partial^\kappa f^{\iota\theta} - \tfrac{1}{3}t_1\,\omega_{\iota\alpha}{}^{\alpha}\,\partial^\kappa f^\iota{}_{\kappa} - \tfrac{1}{3}t_1\,\omega_{\iota\lambda}{}^{\lambda}\,\partial^\kappa f^\iota{}_{\kappa} + \tfrac{1}{2}t_1\,\partial^\alpha f^{\lambda}{}_{\kappa}\partial^\kappa f_{\lambda\alpha} + \\
&\tfrac{1}{2}t_1\,\partial_\kappa f_{\theta}{}^{\lambda}\partial^\kappa f_{\lambda}{}^{\theta} + \tfrac{1}{2}t_1\,\partial_\kappa f^{\lambda}{}_{\theta}\partial^\kappa f_{\lambda}{}^{\theta} - \tfrac{1}{3}t_1\,\partial^\alpha f^{\lambda}{}_{\alpha}\partial^\kappa f_{\lambda\kappa} - 4r_3\,\partial^\beta\omega_{\iota}{}^{\lambda\alpha}\partial_\lambda\omega_{\alpha\beta}{}^{\iota} - \\
&2r_3\,\partial_\alpha\omega_{\lambda}{}^{\alpha}{}_{\theta}\partial^\lambda\omega^{\theta\kappa}{}_{\kappa} + r_5\,\partial_\alpha\omega_{\lambda}{}^{\alpha}{}_{\theta}\partial^\lambda\omega^{\theta\kappa}{}_{\kappa} + 2r_3\,\partial_\theta\omega_{\lambda}{}^{\alpha}{}_{\alpha}\partial^\lambda\omega^{\theta\kappa}{}_{\kappa} - r_5\,\partial_\theta\omega_{\lambda}{}^{\alpha}{}_{\alpha}\partial^\lambda\omega^{\theta\kappa}{}_{\kappa}
\end{aligned}
$$

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

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

	$\omega_{0^+}^{\#1}$	$f_{0^+}^{\#1}$	$f_{0^+}^{\#2}$	$\omega_{0^-}^{\#1}$
$\omega_{0^+}^{\#1}{}^{\dagger}$	$6k^2 r_3$	0	0	0
$f_{0^+}^{\#1}{}^{\dagger}$	0	0	0	0
$f_{0^+}^{\#2}{}^{\dagger}$	0	0	0	0
$\omega_{0^-}^{\#1}{}^{\dagger}$	0	0	0	$-t_1$

	$\sigma_{0^+}^{\#1}$	$\tau_{0^+}^{\#1}$	$\tau_{0^+}^{\#2}$	$\sigma_{0^-}^{\#1}$
$\sigma_{0^+}^{\#1}{}^{\dagger}$	$\frac{1}{6k^2 r_3}$	0	0	0
$\tau_{0^+}^{\#1}{}^{\dagger}$	0	0	0	0
$\tau_{0^+}^{\#2}{}^{\dagger}$	0	0	0	0
$\sigma_{0^-}^{\#1}{}^{\dagger}$	0	0	0	$-\frac{1}{t_1}$