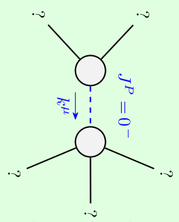
Unitarity conditions

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



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

(No massless particles)

Lagrangian density

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

	$\sigma_{1^+}^{\#1}{}_{\alpha\beta}$	$\sigma_{1^+}^{\#2}{}_{\alpha\beta}$	$\tau_{1^+}^{\#1}{}_{\alpha\beta}$	$\sigma_{1^-}^{\#1}{}_{\alpha}$	$\sigma_{1^-}^{\#2}{}_{\alpha}$	$\tau_{1^-}^{\#1}{}_{\alpha}$	$\tau_{1^-}^{\#2}{}_{\alpha}$
$\sigma_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	$\frac{2(t_1+t_2)}{3 t_1 t_2}$	$\frac{\sqrt{2}(t_1-2t_2)}{3(1+k^2) t_1 t_2}$	$\frac{i\sqrt{2}\,k(t_1-2t_2)}{3(1+k^2) t_1 t_2}$	0	0	0	0
$\sigma_{1^+}^{\#2}{}^{\dagger\alpha\beta}$	$\frac{\sqrt{2}(t_1-2t_2)}{3(1+k^2) t_1 t_2}$	$\frac{t_1+4t_2}{3(1+k^2)^2 t_1 t_2}$	$\frac{i k(t_1+4t_2)}{3(1+k^2)^2 t_1 t_2}$	0	0	0	0
$\tau_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	$-\frac{i\sqrt{2}\,k(t_1-2t_2)}{3(1+k^2) t_1 t_2}$	$-\frac{i k(t_1+4t_2)}{3(1+k^2)^2 t_1 t_2}$	$\frac{k^2(t_1+4t_2)}{3(1+k^2)^2 t_1 t_2}$	0	0	0	0
$\sigma_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	$\frac{6}{(3+4k^2)^2 t_1}$	$\frac{6\sqrt{2}}{(3+4k^2)^2 t_1}$	0	$\frac{12 i k}{(3+4k^2)^2 t_1}$
$\sigma_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	$\frac{6\sqrt{2}}{(3+4k^2)^2 t_1}$	$\frac{12}{(3+4k^2)^2 t_1}$	0	$\frac{12 i\sqrt{2}\,k}{(3+4k^2)^2 t_1}$
$\tau_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$\tau_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	$-\frac{12 i k}{(3+4k^2)^2 t_1}$	$-\frac{12 i\sqrt{2}\,k}{(3+4k^2)^2 t_1}$	0	$\frac{24 k^2}{(3+4k^2)^2 t_1}$

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

Source constraints

SO(3) irreps	#
$\tau_{0^+}^{\#2} == 0$	1
$\tau_{0^+}^{\#1} == 0$	1
$\sigma_{0^+}^{\#1} == 0$	1
$\tau_{1^-}^{\#2\,\alpha} + 2 i k\, \sigma_{1^-}^{\#1\,\alpha} == 0$	3
$\tau_{1^-}^{\#1\,\alpha} == 0$	3
$\sigma_{1^-}^{\#1\,\alpha} == \sigma_{1^-}^{\#2\,\alpha}$	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 #:	20

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

	$\sigma_{0^+}^{\#1}{}_{}$	$\tau_{0^+}^{\#1}{}_{}$	$\tau_{0^+}^{\#2}{}_{}$	$\sigma_{0^-}^{\#1}{}_{}$
$\sigma_{0^+}^{\#1}{}^{\dagger}$	0	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	$\frac{1}{k^2 r_2 + t_2}$

	$\omega_{0^+}^{\#1}{}_{}$	$f_{0^+}^{\#1}{}_{}$	$f_{0^+}^{\#2}{}_{}$	$\omega_{0^-}^{\#1}{}_{}$
$\omega_{0^+}^{\#1}{}^{\dagger}$	0	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	$k^2 r_2 + t_2$

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