Main coupling matrix (1^+ / 1^- sectors)

	$\sigma^{\#1}_{1^+\alpha\beta}$	$\sigma^{\#2}_{1^+\alpha\beta}$	$\tau^{\#1}_{1^+\alpha\beta}$	$\sigma^{\#1}_{1^-\alpha}$	$\sigma^{\#2}_{1^-\alpha}$	$\tau^{\#1}_{1^-\alpha}$	$\tau^{\#2}_{1^-\alpha}$
$\sigma^{\#1}_{1^+}\dagger^{\alpha\beta}$	0	$-\dfrac{\sqrt2}{t_1+k^2 t_1}$	$-\dfrac{i\sqrt2\,k}{t_1+k^2 t_1}$	0	0	0	0
$\sigma^{\#2}_{1^+}\dagger^{\alpha\beta}$	$-\dfrac{\sqrt2}{t_1+k^2 t_1}$	$\dfrac{-2k^2(2r_3+r_5)+t_1}{(1+k^2)^2 t_1^2}$	$\dfrac{-2ik^3(2r_3+r_5)+ik t_1}{(1+k^2)^2 t_1^2}$	0	0	0	0
$\tau^{\#1}_{1^+}\dagger^{\alpha\beta}$	$\dfrac{i\sqrt2\,k}{t_1+k^2 t_1}$	$\dfrac{i(2k^3(2r_3+r_5)-k t_1)}{(1+k^2)^2 t_1^2}$	$\dfrac{-2k^4(2r_3+r_5)+k^2 t_1}{(1+k^2)^2 t_1^2}$	0	0	0	0
$\sigma^{\#1}_{1^-}\dagger^{\alpha}$	0	0	0	$\dfrac{1}{k^2(2r_3+r_5)}$	$-\dfrac{1}{\sqrt2\,(k^2+2k^4)(2r_3+r_5)}$	0	$-\dfrac{i}{k(1+2k^2)(2r_3+r_5)}$
$\sigma^{\#2}_{1^-}\dagger^{\alpha}$	0	0	0	$-\dfrac{1}{\sqrt2\,(k^2+2k^4)(2r_3+r_5)}$	$\dfrac{6k^2(2r_3+r_5)+t_1}{2(k+2k^3)^2(2r_3+r_5)t_1}$	0	$\dfrac{i(6k^2(2r_3+r_5)+t_1)}{\sqrt2\,k(1+2k^2)^2(2r_3+r_5)t_1}$
$\tau^{\#1}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0
$\tau^{\#2}_{1^-}\dagger^{\alpha}$	0	0	0	$\dfrac{i}{k(1+2k^2)(2r_3+r_5)}$	$-\dfrac{i(6k^2(2r_3+r_5)+t_1)}{\sqrt2\,k(1+2k^2)^2(2r_3+r_5)t_1}$	0	$\dfrac{6k^2(2r_3+r_5)+t_1}{(1+2k^2)^2(2r_3+r_5)t_1}$

ω/f coupling matrix (1^+ / 1^- sectors)

	$f^{\#2}_{1^-}\dagger^{\alpha}$	$f^{\#1}_{1^-}\dagger^{\alpha}$	$\omega^{\#2}_{1^-}\dagger^{\alpha}$	$\omega^{\#1}_{1^-}\dagger^{\alpha}$	$f^{\#1}_{1^+}\dagger^{\alpha\beta}$	$\omega^{\#2}_{1^+}\dagger^{\alpha\beta}$	$\omega^{\#1}_{1^+}\dagger^{\alpha\beta}$
$\omega^{\#1}_{1^+}\dagger^{\alpha\beta}$	0	0	0	0	$\dfrac{ik t_1}{\sqrt2}$	$-\dfrac{t_1}{\sqrt2}$	$k^2(2r_3+r_5)-\dfrac{t_1}{2}$
$\omega^{\#2}_{1^+}\dagger^{\alpha\beta}$	0	0	0	0	0	0	$-\dfrac{t_1}{\sqrt2}$
$f^{\#1}_{1^+}\dagger^{\alpha\beta}$	0	0	0	0	0	0	$-\dfrac{ik t_1}{\sqrt2}$
$\omega^{\#1}_{1^-}\dagger^{\alpha}$	$-\tfrac13 ik t_1$	0	$\dfrac{t_1}{3\sqrt2}$	$k^2(2r_3+r_5)+\dfrac{t_1}{6}$	0	0	0
$\omega^{\#2}_{1^-}\dagger^{\alpha}$	$-\tfrac13 i\sqrt2\,k t_1$	0	$\dfrac{t_1}{3}$	$\dfrac{t_1}{3\sqrt2}$	0	0	0
$f^{\#1}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0
$f^{\#2}_{1^-}\dagger^{\alpha}$	$\dfrac{2k^2 t_1}{3}$	0	$\tfrac13 i\sqrt2\,k t_1$	$\dfrac{ik t_1}{3}$	0	0	0

Source constraints

Source constraints (SO(3) irreps)	#
$\tau^{\#1}_{0^-} == 0$	1
$\tau^{\#2}_{0^+} == 0$	1
$\tau^{\#2}_{1^-2\alpha} + 2ik\,\sigma^{\#1}_{1^-\alpha} == 0$	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

σ/τ 0 sector

	$\sigma^{\#1}_{0^-}\dagger$	$\tau^{\#2}_{0^+}\dagger$	$\tau^{\#1}_{0^+}\dagger$	$\sigma^{\#1}_{0^+}\dagger$
$\sigma^{\#1}_{0^+}\dagger$	0	0	0	$\dfrac{1}{6k^2 r_3}$
$\tau^{\#1}_{0^+}\dagger$	0	0	0	0
$\tau^{\#2}_{0^+}\dagger$	0	0	0	0
$\sigma^{\#1}_{0^-}\dagger$	$-\dfrac{1}{t_1}$	0	0	0

ω/f 0 sector

	$\omega^{\#1}_{0^+}$	$f^{\#1}_{0^+}$	$f^{\#2}_{0^+}$	$\omega^{\#1}_{0^-}$
$\omega^{\#1}_{0^+}\dagger$	$6k^2 r_3$	0	0	0
$f^{\#1}_{0^+}\dagger$	0	0	0	0
$f^{\#2}_{0^+}\dagger$	0	0	0	0
$\omega^{\#1}_{0^-}\dagger$	0	0	0	$-t_1$

2^+ / 2^- ω,f sector

	$\omega^{\#1}_{2^+\alpha\beta}$	$f^{\#1}_{2^+\alpha\beta}$	$\omega^{\#1}_{2^-\alpha\beta\chi}$
$\omega^{\#1}_{2^+}\dagger^{\alpha\beta}$	$\dfrac{t_1}{2}$	$-\dfrac{ik t_1}{\sqrt2}$	0
$f^{\#1}_{2^+}\dagger^{\alpha\beta}$	$\dfrac{ik t_1}{\sqrt2}$	$k^2 t_1$	0
$\omega^{\#1}_{2^-}\dagger^{\alpha\beta\chi}$	0	0	$\dfrac{t_1}{2}$

2^+ / 2^- σ,τ sector

	$\sigma^{\#1}_{2^+\alpha\beta}$	$\tau^{\#1}_{2^+\alpha\beta}$	$\sigma^{\#1}_{2^-\alpha\beta\chi}$
$\sigma^{\#1}_{2^+}\dagger^{\alpha\beta}$	$\dfrac{2}{(1+2k^2)^2 t_1}$	$-\dfrac{2i\sqrt2\,k}{(1+2k^2)^2 t_1}$	0
$\tau^{\#1}_{2^+}\dagger^{\alpha\beta}$	$\dfrac{2i\sqrt2\,k}{(1+2k^2)^2 t_1}$	$\dfrac{4k^2}{(1+2k^2)^2 t_1}$	0
$\sigma^{\#1}_{2^-}\dagger^{\alpha\beta\chi}$	0	0	$\dfrac{2}{t_1}$

Lagrangian density

$$\mathcal{L} = -\tfrac13 t_1\,\omega^{\alpha l}{}_{\kappa\alpha}\,\omega^{\kappa}{}_{\lambda}{}'{}_{\kappa\lambda} - 2r_3\,\partial_\alpha\omega^{\kappa\lambda}{}_\kappa\,\partial^l\omega_\lambda{}^\alpha{}_\alpha - r_5\,\partial_\alpha\omega_\kappa{}^{\kappa\lambda}\,\partial^l\omega_\lambda{}^\alpha{}_\alpha + 2r_3\,\partial_\alpha\omega_\theta{}^\alpha{}_\theta\,\partial_\kappa\omega^{\theta\kappa\lambda} - r_5\,\partial_\alpha\omega_\theta{}^\alpha{}_\theta\,\partial_\kappa\omega^{\theta\kappa\lambda}$$
$$ - 2r_3\,\partial_\theta\omega_\lambda{}^\alpha{}_\alpha\,\partial_\kappa\omega^{\theta\kappa\lambda} + r_5\,\partial_\theta\omega_\lambda{}^\alpha{}_\alpha\,\partial_\kappa\omega^{\theta\kappa\lambda} - 2r_3\,\partial_\alpha\omega_\kappa{}^{\theta\kappa\lambda}... + 4r_3\,\partial_\theta\omega_\lambda{}^\alpha{}_\alpha\,\partial_\kappa\omega^{\kappa\lambda\theta} + 2r_5\,\partial_\theta\omega_\lambda{}^\alpha{}_\alpha\,\partial_\kappa\omega^{\kappa\lambda\theta}$$
$$ - \tfrac12 t_1\,\partial^\kappa{}_{\kappa\theta}\partial^\kappa f_{\alpha\lambda} - \tfrac12 t_1\,\partial^{\alpha\kappa}f^l{}_{\kappa\alpha}\partial^\kappa f'{}_{\alpha\lambda} + \tfrac13 t_1\,\partial^\alpha f^l{}_{\kappa\alpha}\partial^\kappa f'{}_{\alpha\lambda} + 2t_1\,\omega^\alpha{}_{l\kappa\theta}\partial^\kappa f'{}^\theta{}_\kappa$$
$$ - \tfrac13 t_1\,\omega_{l\alpha}{}^\alpha\partial^\kappa f'{}_\kappa + \tfrac12 t_1\,\omega^\lambda{}_{l\lambda}\partial^\kappa f'{}_\kappa + \tfrac12 t_1\,\partial^{\alpha\kappa}f^l{}_\kappa\partial^\kappa f'{}^\lambda{}_{\lambda\kappa} - 4r_3\,\partial^\theta\omega_\lambda{}^{\lambda\alpha}\partial_\alpha\omega_{\alpha\beta}\,'$$
$$ - 2r_3\,\partial_\alpha\omega^{\beta\lambda}{}_\alpha\partial^\kappa f_{\lambda\kappa} + 2r_3\,\partial_\theta\omega_\lambda{}^\alpha{}_\alpha\partial^\lambda\omega^{\theta\kappa}{}_\kappa - r_5\,\partial_\theta\omega_\lambda{}^\alpha{}_\alpha\partial^\lambda\omega^{\theta\kappa}{}_\kappa$$

Added source term: $f^{\alpha\beta}\tau_{\alpha\beta} + \omega^{\alpha\beta\chi}\sigma_{\alpha\beta\chi}$

Pole / unitarity

Quadratic pole

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

Unitarity conditions

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

(No massive particles)