

Lagrangian density

$$\begin{aligned} & \frac{2}{3} t_3 \omega_{, \alpha'} \omega_{\kappa \alpha}^{\kappa} - r_5 \partial_{, \alpha'} \omega_{\kappa}^{\kappa \lambda} \partial_{, \alpha} \omega_{\lambda}^{\alpha} - \frac{2}{3} r_1 \partial^{\beta} \omega_{\kappa}^{\theta \alpha} \partial_{\theta \omega}^{\alpha \beta} - \\ & \frac{2}{3} r_1 \partial_{\theta \omega}^{\alpha \beta} \partial_{\kappa} \omega^{\alpha \beta \theta} + \frac{2}{3} r_1 \partial_{\theta \omega}^{\alpha \beta} \partial_{\kappa} \omega^{\theta \alpha \beta} - r_5 \partial_{\alpha} \omega_{\lambda}^{\alpha} \partial_{\theta} \omega^{\theta \kappa \lambda} + \\ & r_5 \partial_{\theta \omega}^{\alpha} \partial_{\kappa} \omega^{\theta \kappa \lambda} - r_5 \partial_{\alpha} \omega_{\lambda}^{\alpha} \partial_{\theta} \omega^{\kappa \lambda \theta} + 2 r_5 \partial_{\theta \omega}^{\alpha} \partial_{\kappa} \omega^{\kappa \lambda \theta} - \\ & \frac{2}{3} t_3 \omega_{\kappa \alpha}^{\alpha} \partial^{\kappa} f'_{, \alpha} - \frac{2}{3} t_3 \omega_{\kappa \lambda}^{\lambda} \partial^{\kappa} f'_{, \alpha} - \frac{4}{3} t_3 \partial^{\alpha} f_{\kappa \alpha} \partial^{\kappa} f'_{, \alpha} + \frac{2}{3} t_3 \partial_{\kappa} f^{\lambda}_{, \alpha} \partial^{\kappa} f'_{, \alpha} + \\ & \frac{2}{3} t_3 \omega_{\alpha}^{\alpha} \partial^{\kappa} f'_{, \kappa} + \frac{2}{3} t_3 \omega_{\lambda}^{\lambda} \partial^{\kappa} f'_{, \kappa} + \frac{2}{3} t_3 \partial^{\alpha} f^{\lambda}_{, \alpha} \partial^{\kappa} f_{\lambda \kappa} + \\ & \frac{2}{3} r_1 \partial_{\kappa} \omega^{\alpha \beta \theta} \partial^{\kappa} \omega_{\alpha \beta \theta} - \frac{2}{3} r_1 \partial_{\kappa} \omega^{\theta \alpha \beta} \partial^{\kappa} \omega_{\alpha \beta \theta} + \frac{2}{3} r_1 \partial^{\beta} \omega_{, \alpha}^{\alpha \lambda} \partial_{\lambda} \omega_{\alpha \beta}^{\alpha} - \\ & \frac{8}{3} r_1 \partial^{\beta} \omega_{, \alpha}^{\lambda \alpha} \partial_{\lambda} \omega_{\alpha \beta}^{\alpha} + r_5 \partial_{\alpha} \omega_{\lambda}^{\alpha} \partial_{\theta} \omega^{\lambda \theta \kappa} - r_5 \partial_{\theta \omega}^{\alpha} \partial_{\lambda} \omega^{\alpha} \partial^{\lambda} \omega^{\theta \kappa}_{, \kappa} \end{aligned}$$

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

Source constraints

SO(3) irreps	#
$\sigma_0^{\#1} == 0$	1
$\tau_0^{\#2} == 0$	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
$\tau_{1+}^{\#1\alpha\beta} == 0$	3
$\sigma_{1+}^{\#2\alpha\beta} == 0$	3
$\tau_{2+}^{\#1\alpha\beta} == 0$	5
$\sigma_{2+}^{\#1\alpha\beta} == 0$	5
Total #:	25

(No massive particles)

Unitarity conditions

$$r_1 < 0 \&\& (r_5 < -r_1 \parallel r_5 > -2r_1) \parallel r_1 > 0 \&\& -2r_1 < r_5 < -r_1$$

$\sigma_0^{\#1} +$	$\tau_0^{\#1}$	$\tau_0^{\#2}$	$\sigma_0^{\#1}$
$\frac{1}{(1+2k^2)^2 t_3}$	$-\frac{i\sqrt{2}k}{(1+2k^2)^2 t_3}$	0	0
$\frac{i\sqrt{2}k}{(1+2k^2)^2 t_3}$	$\frac{2k^2}{(1+2k^2)^2 t_3}$	0	0
0	0	0	0

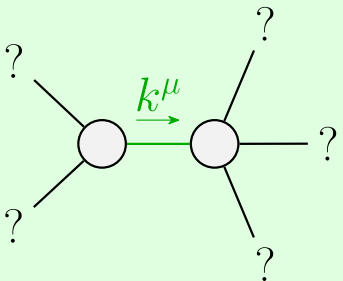
$\sigma_{2+}^{\#1} + \alpha\beta$	0	0	0
$\tau_{2+}^{\#1} + \alpha\beta$	0	0	0
$\sigma_{2-}^{\#1} + \alpha\beta\chi$	0	0	$\frac{1}{k^2 r_1}$

	$\omega_{2^+}^{\#1} \alpha \beta$	$f_{2^+}^{\#1} \alpha \beta$	$\omega_{2^-}^{\#1} \alpha \beta \chi$
$\omega_{2^+}^{\#1} \dagger \alpha \beta$	0	0	0
$f_{2^+}^{\#1} \dagger \alpha \beta$	0	0	0
$\omega_{2^-}^{\#1} \dagger \alpha \beta \chi$	0	0	$k^2 r_1$

	$\omega_{1+}^{\#1} + \alpha\beta$	$\omega_{1+}^{\#2} + \alpha\beta$	$f_{1+}^{\#1} + \alpha\beta$	$\omega_{1-}^{\#1} - \alpha$	$\omega_{1-}^{\#2} - \alpha$	$f_{1-}^{\#1} - \alpha$	$f_{1-}^{\#2} - \alpha$
$\omega_{1+}^{\#1} + \alpha\beta$	$k^2(2r_1 + r_5)$	0	0	0	0	0	0
$\omega_{1+}^{\#2} + \alpha\beta$	0	0	0	0	0	0	0
$f_{1+}^{\#1} + \alpha\beta$	0	0	0	0	0	0	0
$\omega_{1-}^{\#1} - \alpha$	0	0	0	$k^2(r_1 + r_5) + \frac{2t_3}{3}$	$-\frac{\sqrt{2}t_3}{3}$	0	$-\frac{2}{3}\tilde{v}kt_3$
$\omega_{1-}^{\#2} - \alpha$	0	0	0	$-\frac{\sqrt{2}t_3}{3}$	$\frac{t_3}{3}$	0	$\frac{1}{3}\tilde{v}\sqrt{2}kt_3$
$f_{1-}^{\#1} - \alpha$	0	0	0	0	0	0	0
$f_{1-}^{\#2} - \alpha$	0	0	0	$\frac{2\tilde{v}kt_3}{3}$	$-\frac{1}{3}\tilde{v}\sqrt{2}kt_3$	0	$\frac{2k^2t_3}{3}$

	$\omega_{0+}^{\#1}$	$f_{0+}^{\#1}$	$f_{0+}^{\#2}$	$\omega_{0-}^{\#1}$
$\omega_{0+}^{\#1} \dagger$	t_3	$-i \sqrt{2} k t_3$	0	0
$f_{0+}^{\#1} \dagger$	$i \sqrt{2} k t_3$	$2 k^2 t_3$	0	0
$f_{0+}^{\#2} \dagger$	0	0	0	0
$\omega_{0-}^{\#1} \dagger$	0	0	0	0

	$\sigma_{1+}^{\#1} \alpha \beta$	$\sigma_{1+}^{\#2} \alpha \beta$	$\tau_{1+}^{\#1} \alpha \beta$	$\sigma_{1-}^{\#1} \alpha$	$\sigma_{1-}^{\#2} \alpha$	$\tau_{1-}^{\#1} \alpha$	$\tau_{1-}^{\#2} \alpha$
$\sigma_{1+}^{\#1} + \alpha \beta$	$\frac{1}{\kappa^2 (2r_1 + r_5)}$	0	0	0	0	0	0
$\sigma_{1+}^{\#2} + \alpha \beta$	0	0	0	0	0	0	0
$\tau_{1+}^{\#1} + \alpha \beta$	0	0	0	0	0	0	0
$\sigma_{1-}^{\#1} + \alpha$	0	0	0	$\frac{1}{\kappa^2 (r_1 + r_5)}$	$\frac{\sqrt{2}}{\kappa^2 (1 + 2\kappa^2) (r_1 + r_5)}$	0	$\frac{2i}{\kappa (1 + 2\kappa^2) (r_1 + r_5)}$
$\sigma_{1-}^{\#2} + \alpha$	0	0	0	$\frac{\sqrt{2}}{\kappa^2 (1 + 2\kappa^2) (r_1 + r_5)}$	$\frac{3\kappa^2 (r_1 + r_5) + 2t_3}{(k + 2\kappa^3)^2 (r_1 + r_5) t_3}$	0	$\frac{i\sqrt{2} (3\kappa^2 (r_1 + r_5) + 2t_3)}{\kappa (1 + 2\kappa^2)^2 (r_1 + r_5) t_3}$
$\tau_{1-}^{\#1} + \alpha$	0	0	0	0	0	0	0
$\tau_{1-}^{\#2} + \alpha$	0	0	0	$-\frac{2i}{\kappa (1 + 2\kappa^2) (r_1 + r_5)}$	$-\frac{i\sqrt{2} (3\kappa^2 (r_1 + r_5) + 2t_3)}{\kappa (1 + 2\kappa^2)^2 (r_1 + r_5) t_3}$	0	$\frac{6\kappa^2 (r_1 + r_5) + 4t_3}{(1 + 2\kappa^2)^2 (r_1 + r_5) t_3}$



Quadratic pole

Pole residue:	$-\frac{1}{r_1(r_1+r_5)(2r_1+r_5)p^2} > 0$
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Polarisations:	2
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