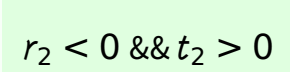


Wave operator and propagator

$$\begin{aligned} \text{Quadratic (free) action} \\ S = & \iiint \left(\frac{1}{6} (-4t_3 \omega_{\alpha}^{\alpha\iota} \omega_{\iota\kappa}^{\kappa} + 6f_{\kappa}^{\alpha\beta} \tau_{\alpha\beta} + 6\omega^{\alpha\beta\chi} \sigma_{\alpha\beta\chi} + 8t_3 \omega_{\alpha\kappa}^{\kappa} \partial_{\iota} f^{\alpha\iota} - \right. \\ & 8t_3 \omega_{\iota\kappa}^{\kappa} \partial_{\iota} f_{\kappa}^{\alpha} + 4t_3 \partial_{\iota} f_{\kappa}^{\kappa} \partial_{\iota} f_{\alpha}^{\alpha} + 4t_2 \omega_{\iota\theta\alpha} \partial^{\theta} f^{\alpha\iota} + \\ & 2t_2 \partial_{\alpha} f_{\iota\theta} \partial^{\theta} f^{\alpha\iota} - t_2 \partial_{\alpha} f_{\theta\iota} \partial^{\theta} f^{\alpha\iota} - t_2 \partial_{\iota} f_{\alpha\theta} \partial^{\theta} f^{\alpha\iota} + \\ & t_2 \partial_{\theta} f_{\alpha\iota} \partial^{\theta} f^{\alpha\iota} - t_2 \partial_{\theta} f_{\iota\alpha} \partial^{\theta} f^{\alpha\iota} - 4t_2 \omega_{\alpha\theta\iota} (\omega^{\alpha\iota\theta} + \partial^{\theta} f^{\alpha\iota}) + \\ & 2t_2 \omega_{\alpha\iota\theta} (\omega^{\alpha\iota\theta} + 2\partial^{\theta} f^{\alpha\iota}) + 8r_2 \partial_{\beta} \omega_{\alpha\iota\theta} \partial^{\theta} \omega^{\alpha\beta\iota} - \\ & 4r_2 \partial_{\beta} \omega_{\alpha\theta\iota} \partial^{\theta} \omega^{\alpha\beta\iota} + 4r_2 \partial_{\beta} \omega_{\iota\theta\alpha} \partial^{\theta} \omega^{\alpha\beta\iota} - \\ & 2r_2 \partial_{\iota} \omega_{\alpha\theta\beta} \partial^{\theta} \omega^{\alpha\beta\iota} + 2r_2 \partial_{\theta} \omega_{\alpha\beta\iota} \partial^{\theta} \omega^{\alpha\beta\iota} - 4r_2 \partial_{\beta} \omega_{\alpha\iota\theta} \\ & \quad \partial^{\theta} \omega^{\alpha\beta\iota} + 6r_5 \partial_{\iota} \omega_{\kappa}^{\kappa} \partial^{\theta} \omega_{\kappa}^{\alpha\iota} - 6r_5 \partial_{\theta} \omega_{\iota\kappa}^{\kappa} \partial^{\theta} \omega_{\alpha}^{\alpha\iota} + \\ & 4t_3 \partial_{\iota} f_{\kappa}^{\alpha\iota} \partial_{\kappa}^{\kappa} - 8t_3 \partial_{\iota} f_{\kappa}^{\alpha} \partial_{\kappa}^{\kappa} - 6r_5 \partial_{\alpha} \omega^{\alpha\iota\theta} \partial_{\kappa} \omega_{\iota\theta}^{\kappa} + \\ & 12r_5 \partial^{\theta} \omega_{\alpha}^{\alpha\iota} \partial_{\kappa} \omega_{\iota\theta}^{\kappa} + 6r_5 \partial_{\alpha} \omega^{\alpha\iota\theta} \partial_{\kappa} \omega_{\theta\iota}^{\kappa} - \\ & \left. 12r_5 \partial^{\theta} \omega_{\alpha}^{\alpha\iota} \partial_{\kappa} \omega_{\theta}^{\kappa} \right) [t, x, y, z] dz dy dx dt \end{aligned}$$

Unitarity conditions



	$\sigma_0^{\#1} \dagger$	$\tau_0^{\#1} \dagger$	$\tau_0^{\#2} \dagger$	$\sigma_0^{\#1} \dagger$	$\omega_0^{\#1} \dagger$	$f_0^{\#1} \dagger$	$f_0^{\#2} \dagger$	$\omega_0^{\#1} \dagger$
	$\frac{1}{(1+2k^2)^2 t_3}$	$\frac{i\sqrt{2}k}{(1+2k^2)^2 t_3}$	0	0	0	$-i\sqrt{2}kt_3$	0	t_3
	$\frac{i\sqrt{2}k}{(1+2k^2)^2 t_3}$	$\frac{2k^2}{(1+2k^2)^2 t_3}$	0	0	0	$2k^2 t_3$	0	$i\sqrt{2}kt_3$
	0	0	0	0	0	0	0	0
	0	0	0	0	$\frac{1}{k^2 r_2 + t_2}$	0	$k^2 r_2 + t_2$	0
	$\sigma_2^{\#1} \dagger + \alpha\beta$	$\tau_2^{\#1} \dagger + \alpha\beta$	$\sigma_2^{\#1} \dagger + \alpha\beta\chi$	$\sigma_2^{\#1} \dagger + \alpha\beta$	$\tau_2^{\#1} \dagger + \alpha\beta$	$\sigma_2^{\#1} \dagger + \alpha\beta\chi$	$\sigma_2^{\#1} \dagger + \alpha\beta$	$\tau_2^{\#1} \dagger + \alpha\beta\chi$
	$\omega_2^{\#1} \dagger + \alpha\beta$	$f_2^{\#1} \dagger + \alpha\beta$	$\omega_2^{\#1} \dagger + \alpha\beta\chi$	$\omega_2^{\#1} \dagger + \alpha\beta$	$f_2^{\#1} \dagger + \alpha\beta$	$\omega_2^{\#1} \dagger + \alpha\beta\chi$	$\omega_2^{\#1} \dagger + \alpha\beta$	$f_2^{\#1} \dagger + \alpha\beta\chi$
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
	$\omega_{1^+}^{\#1} \alpha\beta$	$\omega_{1^+}^{\#2} \alpha\beta$	$f_{1^+}^{\#1} \alpha\beta$	$\omega_{1^-}^{\#1} \alpha$	$\omega_{1^-}^{\#2} \alpha$	$f_{1^-}^{\#1} \alpha$	$f_{1^-}^{\#2} \alpha$	$f_{1^-}^{\#2} \alpha$
$\tau_1^{\#1} \dagger + \alpha\beta$	$k^2 r_5 + \frac{2t_2}{3}$	$\frac{\sqrt{2}t_2}{3}$	$\frac{1}{3}i\sqrt{2}kt_2$	0	0	0	0	0
$\tau_1^{\#2} \dagger + \alpha\beta$	$\frac{\sqrt{2}t_2}{3}$	$\frac{t_2}{3}$	$\frac{ikt_2}{3}$	0	0	0	0	0
$\tau_1^{\#1} \dagger + \alpha\beta$	$-\frac{1}{3}i\sqrt{2}kt_2$	$-\frac{1}{3}ikt_2$	$\frac{k^2 t_2}{3}$	0	0	0	0	0
$\tau_1^{\#1} \dagger + \alpha$	0	0	0	$k^2 r_5 + \frac{2t_3}{3}$	$-\frac{\sqrt{2}t_3}{3}$	0	$-\frac{2}{3}ikt_3$	$\frac{1}{3}i\sqrt{2}kt_3$
$\tau_1^{\#2} \dagger + \alpha$	0	0	0	$-\frac{\sqrt{2}t_3}{3}$	$\frac{t_3}{3}$	0	0	0
$\tau_1^{\#1} \dagger + \alpha$	0	0	0	0	0	0	0	0
$\tau_1^{\#2} \dagger + \alpha$	0	0	0	$\frac{2ikt_3}{3}$	$-\frac{1}{3}i\sqrt{2}kt_3$	0	$\frac{2k^2 t_3}{3}$	$\frac{2k^2 t_3}{3}$