

Wave operator and propagator

$\sigma_1^{\#1} \vdash^{\alpha\beta}$	0	$-\frac{\sqrt{2}}{t_1+k^2t_1}$	$-\frac{i\sqrt{2}k}{t_1+k^2t_1}$	0	0	0
$\sigma_1^{\#2} \vdash^{\alpha\beta}$	$-\frac{\sqrt{2}}{t_1+k^2t_1}$	$\frac{-2k^2(2r_1+r_5)+t_1}{(1+k^2)^2t_1^2}$	$\frac{-2ik^3(2r_1+r_5)+ikt_1}{(1+k^2)^2t_1^2}$	0	0	0
$\tau_1^{\#1} \vdash^{\alpha\beta}$	$\frac{i\sqrt{2}k}{t_1+k^2t_1}$	$\frac{i(2k^3(2r_1+r_5)-kt_1)}{(1+k^2)^2t_1^2}$	$\frac{-2k^4(2r_1+r_5)+k^2t_1}{(1+k^2)^2t_1^2}$	0	0	0
$\sigma_1^{\#1} \vdash^{\alpha}$	0	0	0	$\frac{1}{k^2(r_1+r_5)}$	$-\frac{1}{\sqrt{2}(k^2+2k^4)(r_1+r_5)}$	$-\frac{i}{k(1+2k^2)(r_1+r_5)}$
$\sigma_1^{\#2} \vdash^{\alpha}$	0	0	0	$-\frac{1}{\sqrt{2}(k^2+2k^4)(r_1+r_5)}$	$\frac{6k^2(r_1+r_5)+t_1}{2(k+2k^3)^2(r_1+r_5)t_1}$	$\frac{i(6k^2(r_1+r_5)+t_1)}{\sqrt{2}k(1+2k^2)^2(r_1+r_5)t_1}$
$\tau_1^{\#1} \vdash^{\alpha}$	0	0	0	0	0	0
$\tau_1^{\#2} \vdash^{\alpha}$	0	0	0	$\frac{i}{k(1+2k^2)(r_1+r_5)}$	$-\frac{i(6k^2(r_1+r_5)+t_1)}{\sqrt{2}k(1+2k^2)^2(r_1+r_5)t_1}$	$\frac{6k^2(r_1+r_5)+t_1}{(1+2k^2)^2(r_1+r_5)t_1}$

	$\sigma_{2^+}^{\#1} \alpha\beta$	$\tau_{2^+}^{\#1} \alpha\beta$	$\sigma_{2^+}^{\#1} \alpha\beta\chi$
$\sigma_{2^+}^{\#1} \dagger \alpha\beta$	$\frac{2}{(1+2k^2)^2 t_1}$	$-\frac{2i\sqrt{2}k}{(1+2k^2)^2 t_1}$	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	$\frac{2}{2k^2 r_1 + t_1}$

$\omega_2^{\#1} \dagger \alpha\beta$	$\omega_2^{\#1} f_2^{\#1} \dagger \alpha\beta$	$\omega_2^{\#1} \omega_2^{\#1} \alpha\beta X$
$\omega_2^{\#1} \dagger \alpha\beta$	$-\frac{i k t_1}{\sqrt{2}}$	0
$f_2^{\#1} \dagger \alpha\beta$	$k^2 t_1$	0
$\omega_2^{\#1} \dagger \alpha\beta X$	0	$k^2 r_1 + \frac{t_1}{2}$

$\sigma_0^{\#1} \tau_0^{\#1}$	0	0	0	$-\frac{1}{t_1}$
$\sigma_0^{\#1} \tau_0^{\#2}$	0	0	0	0
$\tau_0^{\#1}$	0	0	0	0
$\tau_0^{\#2}$	0	0	0	0
$\sigma_0^{\#1}$	0	0	0	0

	$\omega_1^{\#1} + \alpha\beta$	$\omega_1^{\#2} + \alpha\beta$	$f_1^{\#1} + \alpha\beta$	$\omega_1^{\#1} - \alpha$	$\omega_1^{\#2} - \alpha$	$f_1^{\#1} - \alpha$	$f_1^{\#2} - \alpha$
$\omega_1^{\#1} + \alpha\beta$	$k^2(2r_1 + r_5) - \frac{t_1}{2}$	$-\frac{t_1}{\sqrt{2}}$	$\frac{ikt_1}{\sqrt{2}}$	0	0	0	0
$\omega_1^{\#2} + \alpha\beta$		0	0	0	0	0	0
$f_1^{\#1} + \alpha\beta$	$\frac{ikt_1}{\sqrt{2}}$	0	0	0	0	0	0
$\omega_1^{\#1} + \alpha$	0	0	0	$k^2(r_1 + r_5) + \frac{t_1}{6}$	$\frac{t_1}{3\sqrt{2}}$	0	$\frac{ikt_1}{3}$
$\omega_1^{\#2} + \alpha$	0	0	0	$\frac{t_1}{3\sqrt{2}}$	$\frac{t_1}{3}$	0	$\frac{1}{3}i\sqrt{2}kt_1$
$f_1^{\#1} + \alpha$	0	0	0	0	0	0	0
$f_1^{\#2} + \alpha$	0	0	0	$-\frac{1}{3}ikt_1$	$-\frac{1}{3}i\sqrt{2}kt_1$	0	$\frac{2k^2t_1}{3}$

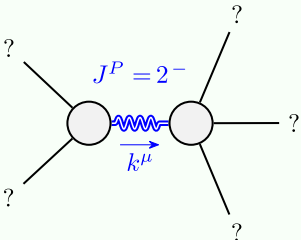
Quadratic (free) action

$$\begin{aligned} S = & \iiint \left(\left(\frac{1}{6} (2t_1 \omega_{\alpha}^{\alpha i} \omega_{\theta}^{\theta} + 6 f^{\alpha \beta} \tau_{\alpha \beta} + 6 \omega^{\alpha \beta \chi} \sigma_{\alpha \beta \chi} - 4t_1 \omega_{\alpha}^{\theta} \omega_{\theta}^{\alpha} \partial_{\theta} f^{\alpha i} + 4t_1 \omega_{\theta}^{\alpha} \partial' f^{\alpha} - \right. \right. \\ & \left. \partial' f^{\alpha} - 2t_1 \partial_{\theta} f^{\theta} \partial' f^{\alpha} - 2t_1 \partial_{\theta} f^{\alpha i} \partial_{\theta} f^{\theta} + 4t_1 \partial' f^{\alpha} \partial_{\alpha} f^{\theta} - 6t_1 \partial_{\alpha} f_{\theta} \partial^{\theta} f^{\alpha i} - \right. \\ & \left. 3t_1 \partial_{\alpha} f_{\theta i} \partial^{\theta} f^{\alpha i} + 3t_1 \partial_{\theta} f_{\alpha} \partial^{\theta} f^{\alpha i} + 3t_1 \partial_{\theta} f_{\alpha i} \partial^{\theta} f^{\alpha i} + \right. \\ & \left. 6t_1 \omega_{\alpha \theta i} (\omega^{\alpha i \theta} + 2 \partial^{\theta} f^{\alpha i}) - 8r_1 \partial_{\beta} \omega_{\alpha \theta} \partial^{\theta} \omega^{\alpha \beta i} + 4r_1 \partial_{\beta} \omega_{\alpha \theta i} \partial^{\theta} \omega^{\alpha \beta i} - 16r_1 \right. \\ & \left. \partial_{\beta} \omega_{\theta \alpha} \partial^{\theta} \omega^{\alpha \beta i} - 4r_1 \partial_{\theta} \omega_{\alpha \beta \theta} \partial^{\theta} \omega^{\alpha \beta i} + 4r_1 \partial_{\theta} \omega_{\alpha \beta i} \partial^{\theta} \omega^{\alpha \beta i} + 4r_1 \partial_{\theta} \omega_{\alpha i \theta} \partial^{\theta} \omega^{\alpha \beta i} + \right. \\ & \left. 6r_5 \partial_{\theta} \omega_{\theta}^{\kappa} \partial^{\theta} \omega_{\kappa}^{\alpha i} - 6r_5 \partial_{\theta} \omega_{\kappa}^{\alpha} \partial^{\theta} \omega_{\alpha}^{\kappa} - 6r_5 \partial_{\alpha} \omega_{\kappa}^{\alpha i \theta} \partial^{\theta} \omega_{\theta}^{\kappa} - 6r_5 \partial_{\alpha} \omega^{\alpha i \theta} \partial_{\kappa} \omega_{\theta}^{\kappa} + 12r_5 \partial^{\theta} \omega_{\alpha}^{\alpha i} \right. \\ & \left. \partial_{\kappa} \omega_{\theta}^{\kappa} + 6r_5 \partial_{\alpha} \omega^{\alpha i \theta} \partial_{\kappa} \omega_{\theta}^{\kappa} - 12r_5 \partial^{\theta} \omega_{\alpha}^{\alpha i} \partial_{\kappa} \omega_{\theta}^{\kappa} \right)) [t, x, y, z] dz dy dx dt \end{aligned}$$

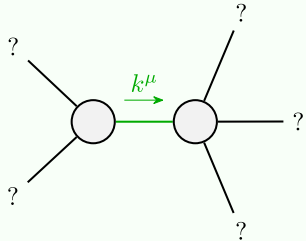
$\omega_0^{\#1} \uparrow$	0	0	0	$-t_1$
$f_0^{\#2} \uparrow$	0	0	0	0
$f_0^{\#1} \uparrow$	0	0	0	0
$\omega_0^{\#1} \uparrow$	0	0	0	0

Source constraints/gauge generators	SO(3) irreps	Multiplicities
	$\sigma_{0+}^{\#1} = 0$	1
	$\tau_{0+}^{\#1} = 0$	1
	$\tau_{0+}^{\#2} = 0$	1
	$\tau_{1-}^{\#2\alpha} + 2\,i\,k\,\sigma_{1-}^{\#2\alpha} = 0$	3
	$\tau_{1-}^{\#1\alpha} = 0$	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 constraints:	17

Massive and massless spectra



Massive particle	
Pole residue:	$-\frac{1}{r_1} > 0$
Polarisations:	5
Square mass:	$-\frac{t_1}{2r_1} > 0$
Spin:	2
Parity:	Odd



Quadratic pole	
Pole residue:	$-\frac{1}{(r_1+r_5)t_1^2} > 0$
Polarisations:	2

Unitarity conditions

$$r_1 < 0 \ \&\& \ r_5 < -r_1 \ \&\& \ t_1 > 0$$