

# Wave operator and propagator

$\sigma_1^{\#1} \dagger \alpha \beta$	$\frac{6}{(3+k^2)^2 t_2}$	$\frac{3 \sqrt{2}}{(3+k^2)^2 t_2}$	$\frac{3 i \sqrt{2} k}{(3+k^2)^2 t_2}$	0	0	0	0
$\sigma_1^{\#2} \dagger \alpha \beta$	$\frac{3 \sqrt{2}}{(3+k^2)^2 t_2}$	$\frac{3}{(3+k^2)^2 t_2}$	$\frac{3 i k}{(3+k^2)^2 t_2}$	0	0	0	0
$\tau_1^{\#1} \dagger \alpha \beta$	$-\frac{3 i \sqrt{2} k}{(3+k^2)^2 t_2}$	$-\frac{3 i k}{(3+k^2)^2 t_2}$	$\frac{3 k^2}{(3+k^2)^2 t_2}$	0	0	0	0
$\sigma_I^{\#1} \dagger \alpha$	0	0	0	$\frac{6}{(3+2 k^2)^2 t_3}$	$-\frac{3 \sqrt{2}}{(3+2 k^2)^2 t_3}$	0	$-\frac{6 i k}{(3+2 k^2)^2 t_3}$
$\sigma_I^{\#2} \dagger \alpha$	0	0	0	$-\frac{3 \sqrt{2}}{(3+2 k^2)^2 t_3}$	$\frac{3}{(3+2 k^2)^2 t_3}$	0	$\frac{3 i \sqrt{2} k}{(3+2 k^2)^2 t_3}$
$\tau_I^{\#1} \dagger \alpha$	0	0	0	0	0	0	0
$\tau_I^{\#2} \dagger \alpha$	0	0	0	$\frac{6 i k}{(3+2 k^2)^2 t_3}$	$-\frac{3 i \sqrt{2} k}{(3+2 k^2)^2 t_3}$	0	$\frac{6 k^2}{(3+2 k^2)^2 t_3}$

$$S = - \iiint [ (\frac{1}{6} (-4 t_3 \omega_{\alpha}^{\kappa} \omega'_{\kappa} + 6 f^{\alpha\beta} \tau_{\alpha\beta} + 6 \omega^{\alpha\beta\chi} \sigma_{\alpha\beta\chi} - 8 t_3 \omega_{\kappa}^{\kappa} \partial f_{\alpha}^{\kappa} + 4 t_3 \partial f_{\kappa}^{\kappa} \partial f_{\alpha}^{\kappa} + 4 t_2 \omega_{\theta\alpha} \partial^{\theta} f^{\alpha\iota} + 2 t_2 \partial_{\alpha f'} \partial^{\theta} f^{\alpha\iota} - t_2 \partial_{\alpha f'} \partial^{\theta} f^{\alpha\iota} - t_2 \partial_{\alpha f'} \partial^{\theta} f^{\alpha\iota} + t_2 \partial_{\theta f'} \partial^{\theta} f^{\alpha\iota} - t_2 \partial_{\theta f'} \partial^{\theta} f^{\alpha\iota} - 4 t_2 \omega_{\alpha\theta\iota} (\omega^{\alpha\iota\theta} + \partial^{\theta} f^{\alpha\iota}) + 2 t_2 \omega_{\alpha\iota\theta} (\omega^{\alpha\iota\theta} + 2 \partial^{\theta} f^{\alpha\iota}) + 8 r_2 \partial_{\beta\omega} \partial^{\theta} \omega^{\alpha\beta\iota} - 4 r_2 \partial_{\beta\omega} \partial^{\theta} \omega_{\alpha\theta\iota} \partial^{\theta} \omega^{\alpha\beta\iota} - 2 r_2 \partial_{\beta\omega} \partial^{\theta} \omega^{\alpha\beta\iota} - 2 r_2 \partial_{\beta\omega} \partial^{\theta} \omega_{\alpha\theta\iota} \partial^{\theta} \omega^{\alpha\beta\iota} + 4 r_2 \partial_{\beta\omega} \partial^{\theta} \omega_{\alpha\theta\iota} \partial^{\theta} \omega^{\alpha\beta\iota} - 4 r_2 \partial_{\beta\omega} \partial^{\theta} \omega_{\alpha\theta\iota} \partial^{\theta} \omega^{\alpha\beta\iota} + 4 t_3 \partial f_{\alpha}^{\kappa} \partial f_{\kappa}^{\alpha} - 8 t_3 \partial f_{\alpha}^{\kappa} \partial f_{\kappa}^{\alpha}) ] [t, x, y, z] dz dy dx dt$$

	$\omega_0^{+1}$	$f_0^{+1}$	$f_0^{+2}$	$\omega_0^{+1}$
$\omega_0^{+1} \dagger$	$t_3$	$-i \sqrt{2} k t_3$	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	$k^2 r_2 + t_2$
	$\sigma_0^{+1}$	$\tau_0^{+1}$	$\tau_0^{+2}$	$\sigma_0^{-1}$
$\sigma_0^{+1} \dagger$	$\frac{1}{(1+2k^2)^2 t_3}$	$-\frac{i \sqrt{2} k}{(1+2k^2)^2 t_3}$	0	0
$\tau_0^{+1} \dagger$	$\frac{i \sqrt{2} k}{(1+2k^2)^2 t_3}$	$\frac{2 k^2}{(1+2k^2)^2 t_3}$	0	0
$\tau_0^{+2} \dagger$	0	0	0	0
$\sigma_0^{-1} \dagger$	0	0	0	$\frac{1}{k^2 r_2 + t_2}$

# Massive and massless spectra



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