Particle spectrograph

Wave operator and propagator

$\tau_{1}^{\#2}{}_{\alpha}$	0	0	0	$-\frac{6ik}{(3+2k^2)^2t_3}$	$\frac{3i\sqrt{2}k}{(3+2k^2)^2t_3}$	0	$\frac{6k^2}{(3+2k^2)^2t_3}$
$\tau_{1}^{\#1}{}_{\alpha}$	0	0	0	0	0	0	0
$\sigma_{1^{-}\alpha}^{\#2}$	0	0	0	$-\frac{3\sqrt{2}}{(3+2k^2)^2t_3}$	$\frac{3}{(3+2k^2)^2t_3}$	0	$-\frac{3i\sqrt{2}k}{(3+2k^2)^2t_3}$
$\sigma_{1^{-}\alpha}^{\#1}$	0	0	0	$\frac{6}{(3+2k^2)^2t_3}$	$-\frac{3\sqrt{2}}{(3+2k^2)^2t_3}$	0	$\frac{6ik}{(3+2k^2)^2t_3}$
$\tau_{1}^{\#1}_{\alpha\beta}$	$-\frac{2i\sqrt{2}}{3kr_3+3k^3r_3}$	$\frac{i(9k^2r_3+4t_2)}{3k(1+k^2)^2r_3t_2}$	$\frac{9k^2r_3+4t_2}{3(1+k^2)^2r_3t_2}$	0	0		0
$\sigma_{1}^{\#2}$	$-\frac{2\sqrt{2}}{3k^2r_3+3k^4r_3}$	$\frac{9k^2r_3+4t_2}{3(k+k^3)^2r_3t_2}$	$-\frac{i(9k^2r_3+4t_2)}{3k(1+k^2)^2r_3t_2}$	0	0	0	0
$\sigma_{1}^{\#1}_{\alpha\beta}$	$\frac{2}{3k^2r_3}$	$-\frac{2\sqrt{2}}{3k^2r_3+3k^4r_3}$	$\frac{2i\sqrt{2}}{3kr_3+3k^3r_3}$	$ \begin{array}{c c} \hline 2i\sqrt{2} \\ \hline 3k_3 + 3k^3 r_3 \\ \hline 0 \\ \hline 0 \end{array} $		0	
	$\frac{#1}{1} + \alpha \beta$	$_{1}^{\#2}$ $+^{\alpha\beta}$	$_{1}^{\#1}+^{\alpha\beta}$	$\sigma_{1}^{\#_{1}} +^{\alpha}$	$\sigma_{1}^{\#2} +^{\alpha}$	$\tau_{1}^{\#_{1}} +^{\alpha}$	$\tau_1^{\#2} +^{\alpha}$

Quadrai	Quadratic (free) action							
$S_{F} ==$ $\iiint \left(\frac{1}{6}\right)$	$ \int_{\mathbb{F}} = \int_{\mathbb{F}} \left\{ \left\{ 4t_3\; \omega_{\kappa \alpha}^{\;\; \alpha'}\; \omega_{\kappa \alpha}^{\;\; \kappa'} + 4t_2\; \omega_{\kappa \lambda}^{\;\; \kappa'}\; \omega_{\kappa \lambda}^{\;\; \kappa'} + 2t_2\; \omega_{\kappa \lambda}^{\;\; \kappa'}\; \omega^{\kappa \lambda}_{\;\; \kappa'} + 6\; f^{\alpha\beta}\; \tau_{\alpha\beta} + 6\; \omega^{\alpha\beta\chi} \right\} $	$4t_2\omega_{,}^{{\scriptscriptstyle K}\lambda}$	$\omega_{\kappa\lambda}^{\prime} + 2t_2$	$\omega_{_{K\lambda}}^{'}$	$^{\kappa\lambda}_{\prime} + 6 f^{\alpha\beta} \tau$	α_{eta} + 6	$\omega^{lphaeta\chi}$	
$\sigma_{\alpha\beta\chi}$ +	$\sigma_{\alpha\beta\chi} + 4 r_2 \partial^\beta \omega^{\theta\alpha}_{\alpha\beta} \partial_\theta \omega_{\alpha\beta}^{ } - 2 r_2 \partial_\theta \omega_{\alpha\beta}^{ } \partial_\kappa \omega^{\alpha\beta\theta} - 4 r_2 \partial_\theta \omega_{\alpha\beta}^{ } \partial_\kappa \omega^{\theta\alpha\beta} +$	$_{3}^{\kappa}$ - 2 r_{2} ∂_{ϵ}	$\omega_{lphaeta}^{} \partial_{\kappa} \omega^{lphaeta}$	9-4 r ₂ 0	$^{ert}_{ert}\omega_{lphaeta}^{}\partial_{\kappa}\omega^{arthetalpha}$	+ +		
$6 r_3 \partial_{\alpha} u$	$6 r_3 \partial_\alpha \omega_\lambda^{\ \alpha}_{\ \ \theta} \partial_\kappa \omega^{\theta \kappa \lambda} - 6 r_3 \partial_\theta \omega_\lambda^{\ \alpha}_{\ \ \alpha} \partial_\kappa \omega^{\theta \kappa \lambda}_{\ \ \kappa} + t_2 \partial^\alpha f_{\theta \kappa}^{\ \ \theta} \partial^\kappa f_\alpha^{\ \ \theta} - t_2 \partial^\alpha f_{\kappa \theta}^{\ \ \theta} \partial^\kappa f_\alpha^{\ \ \theta} +$	$\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\rho}$	$_{\kappa}\omega^{ heta\kappa\lambda}+t_{2}\partial^{lpha}$	$f_{\theta_K} \partial^{\kappa} f$	$_{\alpha}^{\ \ \ \ \ \ \ } -t_{2}\partial^{\alpha}f_{\kappa\theta}\hat{c}$	$f_{\alpha}^{k} = \frac{\theta}{\alpha}$	_	
$t_2 \partial^{\alpha} f^{\lambda}$	$t_2 \partial^\alpha f^\lambda_{\ \kappa} \partial^\kappa f_{\alpha\lambda} - 4 t_3 \omega_{\kappa\alpha}^{\ \alpha} \partial^\kappa f'_{\ \prime} - 4 t_3 \omega_{\kappa\lambda}^{\ \lambda} \partial^\kappa f'_{\ \prime} - 8 t_3 \partial^\alpha f_{\kappa\alpha} \partial^\kappa f'_{\ \prime} +$	$\partial^{\kappa} f'_{} - 4 \iota$	$f_3 \omega_{\kappa\lambda}^{\ \lambda} \partial^{\kappa} f'_{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $	-8t30c	$^{\prime}f_{\kappa\alpha}\partial^{\kappa}f^{\prime}$ +			
$4t_3\partial_{\kappa}f$	$4t_3 \partial_\kappa f^\lambda_{\ \lambda} \partial^\kappa f^{\prime}_{\ \prime} + 2t_2 \ \omega_{\prime\theta\kappa} \partial^\kappa f^{\prime\theta} - 4t_2 \ \omega_{\prime\kappa\theta} \partial^\kappa f^{\prime\theta} - 2t_2 \ \omega_{\theta\prime\kappa} \partial^\kappa f^{\prime\theta} +$	$_{K} \partial^{K} f^{I} \theta_{-} \iota$	$4t_2\omega_{_{IK} heta}\partial^{\kappa}f$	$^{1\theta}$ -2 t_2	$\omega_{\theta\prime\kappa} \partial^{\kappa} f^{\prime\theta} +$			
$4t_2 \omega_{\theta}$	$4t_2\ \omega_{\theta\kappa_l}\ \partial^\kappa f^{l\theta} + 4t_3\ \omega_{l\alpha}^{\ \alpha}\ \partial^\kappa f^{l}_{\ \kappa} + 4t_3\ \omega_{l\lambda}^{\ \lambda}\ \partial^\kappa f^{l}_{\ \kappa} - t_2\ \partial^\alpha f^{\lambda}_{\ \kappa}\ \partial^\kappa f_{\lambda\alpha} -$	$\alpha \partial^{\kappa} f'_{\kappa} +$	$-4t_3\omega_{_{I\!A}}^{\lambda}\partial^{\kappa}$	f' _K -t2 6	$\partial^{\alpha} f^{\lambda}_{\ \ \ } \partial^{\kappa} f_{\lambda \alpha}^{-}$			
$t_2 \partial_{\kappa} f_{\theta}^{ \lambda}$	$t_2 \partial_{\kappa} f_{\beta}^{\lambda} \partial^{\kappa} f_{\lambda}^{\theta} + t_2 \partial_{\kappa} f^{\lambda}_{\theta} \partial^{\kappa} f_{\lambda}^{\theta} + d t_3 \partial^{\alpha} f^{\lambda}_{\alpha} \partial^{\kappa} f_{\lambda\kappa} + 2 r_2 \partial_{\kappa} \omega^{\alpha\beta\theta} \partial^{\kappa} \omega_{\alpha\beta\theta} + d^{\alpha\beta} \partial^{\kappa} \omega_{\alpha\beta\theta} \partial^{\kappa} \omega_{\alpha\beta\phi} \partial^{\kappa$	$^{1/2}f_{\lambda}^{\theta}+4$	$t_3 \partial^{\alpha} f^{\lambda}_{\alpha} \partial^{\kappa} f$	$\lambda_{K} + 2 r_{z}$	$_2\partial_\kappa\omega^{lphaeta heta}\partial^\kappa\omega$	$\alpha \beta \theta$ +		
$4 r_2 \partial_{\kappa} \alpha$	$4r_2\partial_\kappa\omega^{\theta\alpha\beta}\partial^\kappa\omega_{\alpha\beta\theta} - 4r_2\partial^\beta\omega_{\alpha}^{\alpha\lambda}\partial_\lambda\omega_{\alpha\beta}^{} + 4r_2\partial^\beta\omega_{\lambda}^{\lambda\alpha}\partial_\lambda\omega_{\alpha\beta}^{} - 24r_3\partial^\beta\omega_{\lambda}^{\lambda\alpha}$	$\partial^{eta}\omega_{a}^{a\lambda}\partial_{\lambda}$	$\omega_{\alpha\beta}^{}$ ' + 4 r_2 δ	$^{\beta}\omega^{\prime}_{\alpha}$	$_{\lambda}\omega_{lphaeta}^{\ \ \prime}$ -24 r_{3}	$\partial^{eta}\omega^{\lambda c}$	X	
$\partial_{\lambda} {\omega_{lphaeta}}'$.	$\partial_\lambda \omega_{\alpha\beta}^{\prime} - 6 r_3 \partial_\alpha \omega_\lambda^{\alpha}_{\theta} \partial^\lambda \omega^{\theta\kappa}_{\kappa} + 6 r_3 \partial_\theta \omega_\lambda^{\alpha}_{\alpha} \partial^\lambda \omega^{\theta\kappa}_{\kappa}))[t, x, y, z] dz dy dx dt$	$_{\kappa}^{1} + 6 r_{3}$	$\partial_{\theta}\omega_{\lambda}^{\alpha}\partial^{\lambda}\omega^{\epsilon}$	$_{\kappa}^{)\kappa})][t, .$	x, y, z]dzd	אםאס	lt	
	$\omega_{1}^{\#1}_{\alpha\beta}$	$\omega_1^{\#2}{}_+^2$	$f_{1}^{\#1}{}_{lphaeta}$	$\omega_{1^{\bar{-}}\alpha}^{\#1}$	$\omega_{1^{\bar{-}}\alpha}^{\#2}$	$f_{1^{-}}^{\#1}{}_{\alpha}$	$f_{1^-}^{\#2}{}_{\alpha}$	
$\omega_1^{\#1} +^{\alpha\beta}$	$\omega_{1}^{\#1} + \alpha \beta = \frac{1}{6} (9 k^2 r_3 + 4 t_2)$	$\frac{\sqrt{2}t_2}{3}$	$\frac{1}{3}\bar{l}\sqrt{2}kt_2$	0	0	0	0	
$\omega_1^{\#2} + \alpha^{eta}$	$\frac{\sqrt{2}t_2}{3}$	1	<u>i kt2</u> 3	0	0	0	0	
$f_1^{\#1} + \alpha^{eta}$	$-\frac{1}{3}$ i $\sqrt{2}$ kt_2	$-\frac{1}{3}$ \bar{l} kt_2	$\frac{k^2 t_2}{3}$	0	0	0	0	
$\omega_{1}^{\#_{1}} +^{\alpha}$	0	0	0	$\frac{2t_3}{3}$	$-\frac{\sqrt{2}t_3}{3}$	0	$-\frac{2}{3}ikt_3$	
$\omega_{1}^{\#2} +^{lpha}$	0	0	0	$-\frac{\sqrt{2}t_3}{3}$	<u>£3</u>	0	$\frac{1}{3}\bar{l}\sqrt{2}kt_3$	

	$\sigma_{2^{+}\alpha\beta}^{\sharp 1}$	$ au_2^{\#1}_{lphaeta}$	$\sigma_{2}^{\#1}$	βχ									
$\sigma_{2}^{\#1} \dagger^{\alpha \mu}$	$-\frac{2}{3k^2r_3}$	0	0										
$\tau_{2^{+}}^{\#1} + \alpha \mu$	0	0	0										
$\sigma_2^{\#1} \dagger^{\alpha\beta}$	0	0	0				Χβχ						
	$\sigma_{0}^{\#1}$	$ au_0^{\#}$	±1	$ au_{0^{+}}^{#2}$	#1		$\omega_{2^{-}}^{\#1}$	0	0	0			
$\sigma_{0^{+}}^{#1}$ †	$\frac{1}{1+2k^2)^2t_3}$		$\frac{\sqrt{2} k}{(2)^2 t_3}$	0	$\sigma_0^{\sharp 1}$	1	$f_{2+}^{\#1}$ $\omega_{2}^{\#1}$ $aeta_{\chi}$	0	0	0			
							$\omega_{2}^{\#1}{}_{\alpha\beta}$)	$-\frac{3k^2r_3}{2}$	0	0			
	$\frac{i\sqrt{2}k}{1+2k^2)^2t_3}$			0	0		<u>.</u> 3,	$\alpha\beta$	αβ	g_{χ}			
$\tau_{0^{+}}^{#2} \dagger$ $\sigma_{0^{-}}^{#1} \dagger$	0	(0	0			$\omega_2^{\#1} + ^{\alpha\beta}$	$f_2^{#1} \dagger^{\alpha\beta}$	$\omega_{2}^{\#1} +^{\alpha \beta \chi}$	ı		
00- 1	U		,	0	$\overline{k^2 r_2 + t_2}$			J		3			
ors								15				+ t2	I
ge generators ultiplicities								$\omega_{0^{\text{-}}}^{\#1}$	0	0	0	$k^2 r_2 + t_2$	
ge generat ultiplicities								$f_{0}^{#2}$	0	0	0	0	
0 D							-		ďω				1

 $\tau_{1}^{\#1}\alpha\beta + ik \ \sigma_{1}^{\#2}\alpha\beta == 0$

 $\sigma_{2}^{\#1}\alpha\beta\chi == 0$

 $\sigma_{1}^{\#_{1}\alpha} + 2 \ \sigma_{1}^{\#_{2}\alpha} = 0$

 $\tau_{1}^{\#2}{}^{\alpha} - i k \sigma_{1}^{\#1}{}^{\alpha} == 0$

 $\tau_0^{\#1} - 2 \, i \, k \, \sigma_0^{\#1} = 0$

 $t_2^{\#1} \alpha \beta == 0$ Total constraints:

 $2 k^2 t_3$

 $\sqrt{2} kt_3$

 $w_{0}^{#1}+f_{0}^{#1}+f_{0}^{#1}+f_{0}^{#2}+f_{0}^{#2}+g_{0}^{#1}+g_{0}^{*1$

0

 $\omega_{0}^{\#1}$

 $2k^2t_3$

 $-\frac{1}{3}$ i $\sqrt{2}$ kt₃

 $2ikt_3$

Source constraints/gaug SO(3) irreps Mu

0

0

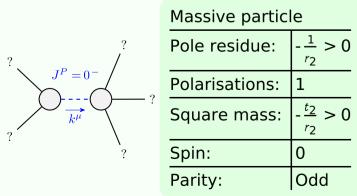
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 $f_{1}^{\#1} +^{\alpha}$

Massive and massless spectra



(No massless particles)

Unitarity conditions

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