Particle spectrograph

Wave operator and propagator

$ au_{1}^{\#2}$	0	0	0	0	0	0	0
$\sigma_{1^-}^{\#2}$ $\tau_{1^-}^{\#1}$ $\sigma_{1^-}^{\#2}$	0	0	0	0	0	0	0
$\sigma_{1}^{\#2}{}_{lpha}$	0	0	0	0	0	0	0
$\sigma_{1^{-}\alpha}^{\#1}$	0	0	0	$\frac{2}{k^2 (r_3 + 2 r_5)}$	0	0	0
$\tau_{1}^{\#1}_{\alpha\beta}$	$-\frac{i\sqrt{2}}{k(1+k^2)(2r_3+r_5)}$	$\frac{i(3k^2(2r_3+r_5)+2t_2)}{k(1+k^2)^2(2r_3+r_5)t_2}$	$\frac{3k^2(2r_3+r_5)+2t_2}{(1+k^2)^2(2r_3+r_5)t_2}$	0	0	0	0
$\sigma_{1}^{\#2}$	$-\frac{\sqrt{2}}{k^2(1+k^2)(2r_3+r_5)}$	$\frac{3k^2(2r_3+r_5)+2t_2}{(k+k^3)^2(2r_3+r_5)t_2}$	$-\frac{i(3k^2(2r_3+r_5)+2t_2)}{k(1+k^2)^2(2r_3+r_5)t_2}$	0	0	0	0
$\sigma_{1}^{\#1}{}_{\alpha\beta}$	$\frac{1}{k^2 (2 r_3 + r_5)}$	$-\frac{\sqrt{2}}{k^2(1+k^2)(2r_3+r_5)}$	$\frac{i \sqrt{2}}{k(1+k^2)(2r_3+r_5)}$	0	0	0	0
	$\sigma_{1}^{\#1} + \alpha \beta$	$\sigma_{1}^{\#2} + \alpha \beta$	$\tau_1^{\#1} + ^{\alpha \beta}$	$\sigma_{1}^{\#_1} +^{\alpha}$	$\sigma_1^{\#2} +^{\alpha}$	$\tau_{1}^{\#1} +^{\alpha}$	$\tau_1^{\#2} + ^{\alpha}$

Quadratic (free) action
== S
$\iiint (\frac{1}{6} \left(4 t_2 \omega_{\kappa^{\lambda}}^{\ \ \kappa^{\lambda}} + 2 t_2 \omega_{\kappa^{\lambda}}^{\ \ \prime} \omega^{\kappa^{\lambda}}_{\ \ \prime} + 6 f^{\alpha\beta} \tau_{\alpha\beta} + 6 \omega^{\alpha\beta\chi} \sigma_{\alpha\beta\chi}^{\ \ -} 3 r_3 \partial_{i} \omega^{\kappa\lambda}_{\ \ \kappa}$
$\partial' \omega_{\lambda}{}^{\alpha}{}_{-} 6 r_{5} \partial_{i} \omega^{\kappa \lambda}{}_{\kappa} \partial' \omega_{\lambda}{}^{\alpha}{}_{-} + 3 r_{3} \partial_{\alpha} \omega_{\lambda}{}^{\alpha}{}_{\theta} \partial_{\kappa} \omega^{\theta \kappa \lambda}{}_{-} 6 r_{5} \partial_{\alpha} \omega_{\lambda}{}^{\alpha}{}_{\theta} \partial_{\kappa} \omega^{\theta \kappa \lambda}{}_{-}$
$3r_3\partial_\theta\omega_\lambda^{\alpha}\partial_\kappa\omega^{\theta\kappa\lambda}+6r_5\partial_\theta\omega_\lambda^{\alpha}\partial_\kappa\omega^{\theta\kappa\lambda}-3r_3\partial_\alpha\omega_\lambda^{\alpha}\partial_\kappa\omega^{\kappa\lambda\theta}-6r_5\partial_\alpha\omega_\lambda^{\alpha}$
$\partial_{\kappa}\omega^{\kappa\lambda\theta} + 6r_3\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega^{\kappa\lambda\theta} + 12r_5\partial_{\theta}\omega_{\lambda}^{\alpha}\partial_{\kappa}\omega^{\kappa\lambda\theta} + t_2\partial^{\alpha}f_{\theta\kappa}\partial^{\kappa}f_{\alpha}^{\theta} -$
$t_2\partial^{lpha}f_{\kappa heta}\partial^{\kappa}f_{lpha}^{}+t_2\partial^{lpha}f^{\lambda}_{\kappa}\partial^{\kappa}f_{lpha\lambda}^{}+2t_2\omega_{_{I} heta\kappa}\partial^{\kappa}f^{_{I} heta}_{}-4t_2\omega_{_{I}\kappa heta}\partial^{\kappa}f^{_{I} heta}_{}-$
$2t_2\omega_{\theta_{1}\kappa}\partial^\kappa f^{\prime\theta} + 4t_2\omega_{\theta\kappa_{1}}\partial^\kappa f^{\prime\theta} - t_2\partial^\alpha f^\lambda_{\ \kappa}\partial^\kappa f_{\lambda\alpha} - t_2\partial_\kappa f_{\theta}^{\ \ \lambda}\partial^\kappa f_{\lambda}^{\ \ \theta} +$
$t_2 \partial_\kappa f^\lambda_{\ \theta} \partial^\kappa f_\lambda^{\ \theta} - 24 r_3 \partial^\beta \omega_{_I}^{\ \lambda \alpha} \partial_\lambda \omega_{_{\alpha}\beta}^{\ \prime} - 3 r_3 \partial_\alpha \omega_{_A}^{\ \alpha}_{\ \theta} \partial^\lambda \omega_{_R}^{\ \theta} + 6 r_5 \partial_\alpha \omega_{_A}^{\ \alpha}_{\ \theta} \partial^\lambda \omega_{_R}^{\ \theta} +$
$3 r_3 \partial_\theta \omega_\lambda^{\ lpha} \partial^\lambda \omega^{\theta \kappa}_{\ \ \kappa} - 6 r_5 \partial_\theta \omega_\lambda^{\ lpha} \partial^\lambda \omega^{\theta \kappa}_{\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $

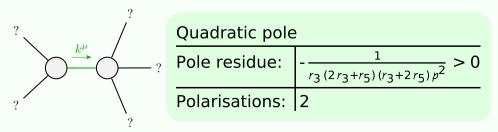
$f_{1^-}^{\#2}$	0	0	0	0	0	0	0
$f_{1^{ ext{-}}}^{\#1}{}_{lpha}$	0	0	0	0	0	0	0
$\omega_{1^-}^{\#2}{}_{lpha}$.	0	0	0	0	0	0	0
$\omega_{1^{-}\alpha}^{\#1}$	0	0	0	$\frac{1}{2}k^{2}(r_{3}+2r_{5})$	0	0	0
$f_1^{\#1}_{\alpha\beta}$	$\frac{1}{3}\bar{I}\sqrt{2}kt_2$	<i>ikt</i> 2 3	$\frac{k^2 t_2}{3}$	0	0	0	0
$\omega_1^{\#2}{}_+\alpha\beta$	$\frac{\sqrt{2} t_2}{3}$	2 2 3	$-\frac{1}{3}$ ikt ₂	0	0	0	0
$\omega_1^{\#1}{}_+\alpha\beta$	$\omega_{1}^{\#1} + \alpha^{\beta} k^{2} (2 r_{3} + r_{5}) + \frac{2t_{2}}{3}$	$\frac{\sqrt{2} t_2}{3}$	$-\frac{1}{3}$ i $\sqrt{2}$ kt ₂	0	0	0	0
	$\omega_1^{\#1} + \alpha^{eta}$	$\omega_1^{\#2} + \alpha^{eta}$	$f_{1}^{\#1} + \alpha \beta$	$\omega_{1}^{\#_{1}} \dagger^{\alpha}$	$\omega_1^{\#2} \dagger^{lpha}$	$f_{1}^{\#1} \dagger^{lpha}$	$f_1^{\#2} +^{\alpha}$

$\sigma_{0}^{\#1}$ $\tau_{0}^{\#1}$ $\tau_{0}^{\#2}$ $\sigma_{0}^{\#}$	0 0 0 0	0 0 0	0 0 0)	ω_{0}^{*} f_{0}^{*} f_{0}^{*} ω_{0}^{*}		ω ₀ ^{#1} 0 0	f ₀ ^{#1} 0 0	f ₀ ^{#2} 0 0	ω ₀ ^{#1} 0 0
9	$\sigma_{0}^{#1}$ †	$\tau_{0}^{#1} +$	τ ^{#2} + τ ₀ +	, c = 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1	-	$\omega_{0}^{\#}$	+ † † • • • • • • • • • • • • • • • • •	0	0	0	0 t ₂
Source constraints/gauge generators	SO(3) irreps Multiplicities	$\sigma_{0}^{\#1} == 0$ 1	$\tau_0^{\#1} == 0$ 1	$\tau_{0+}^{\#2} == 0$ 1	$t_1^{\#2}\alpha == 0$ 3	$t_1^{\#1}\alpha == 0$ 3	$\sigma_{1}^{\#2}{}^{\alpha} == 0$ 3	$\tau_{1}^{\#1}\alpha\beta + ik \ \sigma_{1}^{\#2}\alpha\beta == 0 \ 3$	$\sigma_{2}^{*1}\alpha\beta\chi=0$ 5	$T_{\mu}^{\dagger}\alpha\beta$ == 0	onstraints:

\ \ \				
$\sigma_{2}^{\#1}$ $\sigma_{2}^{\#1}$ $\sigma_{2}^{\#1}$ $\sigma_{2}^{\#1}$ $\sigma_{3}^{\#1}$	0	0	0	
$\tau_{2}^{\#1}_{+}\alpha\beta$	0	0	0	
$\sigma_{2}^{\#1}{}_{\alpha\beta}$	$-\frac{2}{3k^2r_3}$	0	0	
	$\sigma_{2}^{\#1} + \alpha^{eta}$	$\tau_{2}^{#1} + \alpha \beta$	$\sigma_{2}^{*1} + ^{\alpha \beta \chi}$	
	$\sigma_{2}^{\#1} +^{\alpha\beta}$	$\tau_2^{#1} + ^{\alpha\beta}$	$\sigma_{2}^{\#1} +^{lphaeta\chi}$	

0

Massive and massless spectra



(No massive particles)

Unitarity conditions

$$r_3 < 0 \&\& (r_5 < -\frac{r_3}{2} || r_5 > -2 r_3) || r_3 > 0 \&\& -2 r_3 < r_5 < -\frac{r_3}{2}$$