Particle spectrograph

Wave operator and propagator

Quadratic (free) action

$$S == \int\int\int (\omega^{\alpha\beta\chi} \, \sigma_{\alpha\beta\chi} - \frac{2}{3} r_1 \, (2 \, \partial_\beta \omega_{\alpha\iota\theta} - \partial_\beta \omega_{\alpha\theta\iota} + 4 \, \partial_\beta \omega_{\iota\theta\alpha} + \partial_\iota \omega_{\alpha\beta\theta} - \partial_\theta \omega_{\alpha\beta\iota} - \partial_\theta \omega_{\alpha\iota\beta}) \, \partial^\theta \omega^{\alpha\beta\iota} + r_5 \, (\partial_\iota \omega_\theta{}^\kappa \, \partial^\theta \omega^{\alpha\iota}{}_\alpha - \partial_\theta \omega_\iota{}^\kappa \, \partial^\theta \omega^{\alpha\iota}{}_\alpha - (\partial_\alpha \omega^{\alpha\iota\theta} - 2 \, \partial^\theta \omega^{\alpha\iota}{}_\alpha) \, (\partial_\kappa \omega_\iota{}^\kappa{}_\theta - \partial_\kappa \omega_\theta{}^\kappa{}_\iota))) [t, x, y, z] \, dt \, dx \, dy \, dz$$

	$\sigma_{2^+}^{\#1}{}_{\alpha\beta}$	$\sigma_{2^-}^{\#1}{}_{\alpha\beta\chi}$
$\sigma_{2^+}^{\#1}{}^{\dagger\alpha\beta}$	0	0
$\sigma_{2^-}^{\#1}{}^{\dagger\alpha\beta\chi}$	0	$\frac{1}{k^2 \, r_1}$

	$\omega_{0^+}^{\#1}$	$\omega_{0^-}^{\#1}$
$\omega_{0^+}^{\#1}{}^{\dagger}$	0	0
$\omega_{0^-}^{\#1}{}^{\dagger}$	0	0

	$\sigma_{0^-}^{\#1}$	
$\sigma_{0^+}^{\#1}$	0	0
	0	0
	$\sigma_{0^+}^{\#1}{}^{\dagger}$	$\sigma_{0^-}^{\#1}{}^{\dagger}$

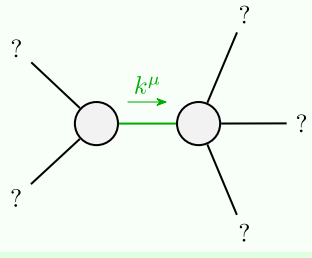
	$\sigma_{1^+}^{\#1}{}_{\alpha\beta}$	$\sigma_{1^+}^{\#2}{}_{\alpha\beta}$	$\sigma_{1^-}^{\#1}{}_{\alpha}$	$\sigma_{1^-}^{\#2}{}_{\alpha}$
$\sigma_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	$\frac{1}{k^2 \, (2 \, r_1 + r_5)}$	0	0	0
$\sigma_{1^+}^{\#2}{}^{\dagger\alpha\beta}$	0	0	0	0
$\sigma_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	$\frac{1}{k^2 \, (r_1 + r_5)}$	0
$\sigma_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	0

	$\omega_{2^+}^{\#1}{}_{\alpha\beta}$	$\omega_{2^-}^{\#1}{}_{\alpha\beta\chi}$
$\omega_{2^+}^{\#1}{}^{\dagger\alpha\beta}$	0	0
$\omega_{2^-}^{\#1}{}^{\dagger\alpha\beta\chi}$	0	$k^2 \, r_1$

	$\omega_{1^-}^{\#2}{}_{\alpha}$	$\omega_{1^-}^{\#1}{}_{\alpha}$	$\omega_{1^+}^{\#2}{}_{\alpha\beta}$	$\omega_{1^+}^{\#1}{}_{\alpha\beta}$
$\omega_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	0	0	0	$k^2 \, (2 \, r_1 + r_5)$
$\omega_{1^+}^{\#2}{}^{\dagger\alpha\beta}$	0	0	0	0
$\omega_{1^-}^{\#1}{}^{\dagger\alpha}$	0	$k^2 \, (r_1 + r_5)$	0	0
$\omega_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	0

Source constraints/gauge generators	
SO(3) irreps	Multiplicities
$\sigma_{0^-}^{\#1} == 0$	1
$\sigma_{0^+}^{\#1} == 0$	1
$\sigma_{1^-}^{\#2\,\alpha} == 0$	3
$\sigma_{1^+}^{\#2\,\alpha\beta} == 0$	3
$\sigma_{2^+}^{\#1\,\alpha\beta} == 0$	5
Total constraints:	13

Massive and massless spectra



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

(No massive particles)

Unitarity conditions

$r_1 < 0 \,\&\&\, (r_5 < -r_1 \,||\, r_5 > -2 \, r_1) \,\|\, r_1 > 0 \,\&\&\, -2 \, r_1 < r_5 < -r_1$