Particle spectrograph

Wave operator and propagator

Quadratic (free) action

$$S_F == \iiint\!\!\iint (\tfrac{1}{2} (2\ \omega^{\alpha\beta\chi}\ \sigma_{\alpha\beta\chi} \cdot (r_3 + 2\,r_5)\,\partial_\iota \omega^{\kappa\lambda}{}_\kappa\ \partial' \omega_\lambda{}^\alpha{}_\alpha + r_3\,\partial_\alpha \omega_\lambda{}^\alpha{}_\theta\ \partial_\kappa \omega^{\theta\kappa\lambda} \cdot 2\,r_5\,\partial_\alpha \omega_\lambda{}^\alpha{}_\theta\ \partial_\kappa \omega^{\theta\kappa\lambda} + 2\,r_5\,\partial_\theta \omega_\lambda{}^\alpha{}_\alpha\ \partial_\kappa \omega^{\theta\kappa\lambda} \cdot r_3\,\partial_\alpha \omega_\lambda{}^\alpha{}_\theta\ \partial_\kappa \omega^{\kappa\lambda\theta} \cdot 2\,r_5\,\partial_\alpha \omega_\lambda{}^\alpha{}_\theta\ \partial_\kappa \omega^{\kappa\lambda\theta} + 4\,r_5\,\partial_\theta \omega_\lambda{}^\alpha{}_\alpha\ \partial_\kappa \omega^{\kappa\lambda\theta} \cdot 8\,r_3\,\partial^\beta \omega_\iota{}^{\lambda\alpha}\ \partial_\lambda \omega_{\alpha\beta}{}' \cdot r_3\,\partial_\alpha \omega_\lambda{}^\alpha{}_\theta\ \partial^\lambda \omega^{\theta\kappa}{}_\kappa + 2\,r_5\,\partial_\alpha \omega_\lambda{}^\alpha{}_\theta\ \partial^\lambda \omega^{\theta\kappa} \cdot r_3\,\partial_\theta \omega_\lambda{}^\alpha{}_\alpha\ \partial^\lambda \omega^{\theta\kappa}{}_\kappa - 2\,r_5\,\partial_\theta \omega_\lambda{}^\alpha{}_\alpha\ \partial^\lambda \omega^{\theta\kappa}{}_\kappa))[t,\ x,\ y,\ z]\,dz\,dy\,dx\,dt$$

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

	$\omega_{1^+\,\alpha\beta}^{\#1}$	$\omega_{1^+\,\alpha\beta}^{\#2}$	$\omega_{1^-\,\alpha}^{\#1}$	$\omega_{1^-\,\alpha}^{\#2}$
$\omega_{1^+}^{\#1\,\alpha\beta}$	$k^2\,(2\,r_3 + r_5)$	0	0	0
$\omega_{1^+}^{\#2\,\alpha\beta}$	0	0	0	0
$\omega_{1^-}^{\#1\,\alpha}$	0	0	$\frac{1}{2}\,k^2\,(r_3 + 2\,r_5)$	0
$\omega_{1^-}^{\#2\,\alpha}$	0	0	0	0

	$\omega_{2^+\,\alpha\beta}^{\#1}$	$\omega_{2^-\,\alpha\beta\chi}^{\#1}$
$\omega_{2^+}^{\#1\,\alpha\beta}$	$-\frac{3\,k^2\,r_3}{2}$	0
$\omega_{2^-}^{\#1\,\alpha\beta\chi}$	0	0

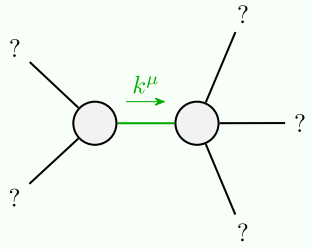
	$\sigma_{2^+\,\alpha\beta}^{\#1}$	$\sigma_{2^-\,\alpha\beta\chi}^{\#1}$
$\sigma_{2^+}^{\#1\,\alpha\beta}$	$-\frac{2}{3\,k^2\,r_3}$	0
$\sigma_{2^-}^{\#1\,\alpha\beta\chi}$	0	0

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

	$\sigma_{1^+\,\alpha\beta}^{\#1}$	$\sigma_{1^+\,\alpha\beta}^{\#2}$	$\sigma_{1^-\,\alpha}^{\#1}$	$\sigma_{1^-\,\alpha}^{\#2}$
$\sigma_{1^+}^{\#1\,\alpha\beta}$	$\frac{1}{k^2\,(2\,r_3 + r_5)}$	0	0	0
$\sigma_{1^+}^{\#2\,\alpha\beta}$	0	0	0	0
$\sigma_{1^-}^{\#1\,\alpha}$	0	0	$\frac{2}{k^2\,(r_3 + 2\,r_5)}$	0
$\sigma_{1^-}^{\#2\,\alpha}$	0	0	0	0

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

Massive and massless spectra



Quadratic pole

Pole residue:	$-\frac{1}{r_3\,(2\,r_3 + r_5)\,(r_3 + 2\,r_5)} > 0$
Polarisations:	2

(No massive particles)

Unitarity conditions

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