Particle spectrograph

Wave operator and propagator

	$\sigma_{1^+}^{\#1\,\alpha\beta}$	$\tau_{1^+}^{\#1\,\alpha\beta}$	$\sigma_{1^-}^{\#1\,\alpha}$	$\sigma_{1^-}^{\#2\,\alpha}$	$\tau_{1^-}^{\#1\,\alpha}$	$\tau_{1^-}^{\#2\,\alpha}$
$\sigma_{1^+}^{\#1\,\dagger\,\alpha\beta}$	$\frac{2}{3k^2r_3}$	$-\frac{2i\sqrt{2}}{3kr_3+3k^3r_3}$	0	0	0	0
$\sigma_{1^+}^{\#2\,\dagger\,\alpha\beta}$	$-\frac{2\sqrt{2}}{3k^2r_3+3k^4r_3}$	$\frac{9k^2r_3+4t_2)}{3(k+k^3)^2r_3t_2}$	0	0	0	0
$\tau_{1^+}^{\#1\,\dagger\,\alpha\beta}$	$\frac{2i\sqrt{2}}{3kr_3+3k^3r_3}$	$-\frac{i(9k^2r_3+4t_2)}{3k(1+k^2)^2r_3t_2}$	0	0	0	0
$\sigma_{1^-}^{\#1\,\dagger\,\alpha}$	0	0	0	0	0	0
$\sigma_{1^-}^{\#2\,\dagger\,\alpha}$	0	0	0	0	0	0
$\tau_{1^-}^{\#1\,\dagger\,\alpha}$	0	0	0	0	0	0
$\tau_{1^-}^{\#2\,\dagger\,\alpha}$	0	0	0	0	0	0

Quadratic (free) action

$$S == \iiint\int \left(\frac{1}{6}\left(6\,f^{\alpha\beta}\,\tau_{\alpha\beta} + 6\,\omega^{\alpha\beta\chi}\,\sigma_{\alpha\beta\chi} - 6\,r_3\,\partial_\beta\omega_{\ \theta}^{\theta}\,\partial'\omega^{\alpha\beta}_{\ \ \alpha} - 6\,r_3\,\partial_\alpha\omega^{\alpha\beta\prime}\,\partial_\theta\omega_{\ \prime\ \beta}^{\ \theta} + 12\right.\right.$$
$$r_3\,\partial'\omega^{\alpha\beta}_{\ \ \alpha}\,\partial_\theta\omega_{\ \prime\ \beta}^{\ \theta} + 4\,t_2\,\omega_{\prime\theta\alpha}\,\partial^\theta f^{\alpha\prime} + 2\,t_2\,\partial_\alpha f_{\prime\theta}\,\partial^\theta f^{\alpha\prime} - t_2\,\partial_\alpha f_{\ \theta\prime}\,\partial^\theta f^{\alpha\prime} -$$
$$t_2\,\partial_\prime f_{\alpha\theta}\,\partial^\theta f^{\alpha\prime} + t_2\,\partial_\theta f_{\ \alpha\prime}\,\partial^\theta f^{\alpha\prime} - 4\,t_2\,\omega_{\alpha\theta\prime}\,(\omega^{\alpha\prime\theta} + \partial^\theta f^{\alpha\prime}) +$$
$$2\,t_2\,\omega_{\alpha\prime\theta}\,(\omega^{\alpha\prime\theta} + 2\,\partial^\theta f^{\alpha\prime}) + 8\,r_2\,\partial_\beta\omega_{\alpha\prime\theta}\,\partial^\theta\omega^{\alpha\beta\prime} - 4\,r_2\,\partial_\beta\omega_{\alpha\theta\prime}\,\partial^\theta\omega^{\alpha\beta\prime} +$$
$$4\,r_2\,\partial_\beta\omega_{\prime\theta\alpha}\,\partial^\theta\omega^{\alpha\beta\prime} - 24\,r_3\,\partial_\beta\omega_{\prime\theta\alpha}\,\partial^\theta\omega^{\alpha\beta\prime} - 2\,r_2\,\partial_\prime\omega_{\alpha\beta\theta}\,\partial^\theta\omega^{\alpha\beta\prime} +$$
$$\left.\left.2\,r_2\,\partial_\theta\omega_{\alpha\prime\beta}\,\partial^\theta\omega^{\alpha\beta\prime} - 4\,r_2\,\partial_\theta\omega_{\alpha\beta\prime}\,\partial^\theta\omega^{\alpha\beta\prime}\right)\right)[t,\,x,\,y,\,z]\,dt\,dx\,dy\,dz$$

	$\omega_{1^+}^{\#1\,\alpha\beta}$	$\omega_{1^+}^{\#2\,\alpha\beta}$	$f_{1^+}^{\#1\,\alpha\beta}$	$\omega_{1^-}^{\#1\,\alpha}$	$\omega_{1^-}^{\#2\,\alpha}$	$f_{1^-}^{\#1\,\alpha}$	$f_{1^-}^{\#2\,\alpha}$
$\omega_{1^+}^{\#1\,\dagger\,\alpha\beta}$	$\frac{1}{6}(9k^2r_3+4t_2)$	$\frac{\sqrt{2}\,t_2}{3}$	$-\frac{1}{3}i\sqrt{2}\,kt_2$	0	0	0	0
$\omega_{1^+}^{\#2\,\dagger\,\alpha\beta}$	$\frac{\sqrt{2}\,t_2}{3}$	$\frac{t_2}{3}$	$\frac{ikt_2}{3}$	0	0	0	0
$f_{1^+}^{\#1\,\dagger\,\alpha\beta}$	$-\frac{1}{3}i\sqrt{2}\,kt_2$	$\frac{ikt_2}{3}$	$\frac{k^2t_2}{3}$	0	0	0	0
$\omega_{1^-}^{\#1\,\dagger\,\alpha}$	0	0	0	0	0	0	0
$\omega_{1^-}^{\#2\,\dagger\,\alpha}$	0	0	0	0	0	0	0
$f_{1^-}^{\#1\,\dagger\,\alpha}$	0	0	0	0	0	0	0
$f_{1^-}^{\#2\,\dagger\,\alpha}$	0	0	0	0	0	0	0

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

	$\omega_{0^+}^{\#1}$	$f_{0^+}^{\#1}$	$f_{0^+}^{\#2}$	$\omega_{0^-}^{\#1}$
$\omega_{0^+}^{\#1\,\dagger}$	0	0	0	0
$f_{0^+}^{\#1\,\dagger}$	0	0	0	0
$f_{0^+}^{\#2\,\dagger}$	0	0	0	0
$\omega_{0^-}^{\#1\,\dagger}$	0	0	0	$k^2r_2+t_2$

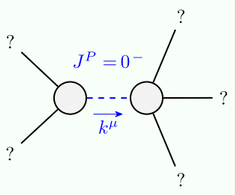
Source constraints/gauge generators

SO(3) irreps	Multiplicities
$\tau_{0^+}^{\#2} == 0$	1
$\tau_{0^+}^{\#1} == 0$	1
$\sigma_{0^+}^{\#1} == 0$	1
$\tau_{1^-}^{\#2\,\alpha} == 0$	3
$\tau_{1^-}^{\#1\,\alpha} == 0$	3
$\sigma_{1^-}^{\#2\,\alpha} == 0$	3
$\sigma_{1^-}^{\#1\,\alpha} == 0$	3
$\tau_{1^+}^{\#1\,\alpha\beta} + ik\,\sigma_{1^+}^{\#2\,\alpha\beta} == 0$	3
$\sigma_{2^-}^{\#1\,\alpha\beta\chi} == 0$	5
$\tau_{2^+}^{\#1\,\alpha\beta} == 0$	5
Total constraints:	28

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

	$\sigma_{0^+}^{\#1}$	$\tau_{0^+}^{\#1}$	$\tau_{0^+}^{\#2}$	$\sigma_{0^-}^{\#1}$
$\sigma_{0^+}^{\#1\,\dagger}$	0	0	0	0
$\tau_{0^+}^{\#1\,\dagger}$	0	0	0	0
$\tau_{0^+}^{\#2\,\dagger}$	0	0	0	0
$\sigma_{0^-}^{\#1\,\dagger}$	0	0	0	$\frac{1}{k^2r_2+t_2}$

Massive and massless spectra



Massive particle	
Pole residue:	$-\frac{1}{r_2} > 0$
Polarisations:	1
Square mass:	$-\frac{t_2}{r_2} > 0$
Spin:	0
Parity:	Odd

(No massless particles)

Unitarity conditions

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