Particle spectrograph

Wave operator and propagator

Source constraints/gauge generators	
SO(3) irreps	Multiplicities
$\tau^{\#2}_{0^+} == 0$	1
$\tau^{\#1}_{0^+} == 0$	1
$\sigma^{\#1}_{0^+} == 0$	1
$\tau^{\#2\,\alpha}_{1^-} == 0$	3
$\tau^{\#1\,\alpha}_{1^-} == 0$	3
$\sigma^{\#2\,\alpha}_{1^-} == 0$	3
$\sigma^{\#1\,\alpha}_{1^-} == 0$	3
$\tau^{\#1\,\alpha\beta}_{1^+} + i\,k\,\sigma^{\#1\,\alpha\beta}_{1^+} == 0$	3
$\sigma^{\#1\,\alpha\beta}_{1^+} == \sigma^{\#2\,\alpha\beta}_{1^+}$	3
$\sigma^{\#1\,\alpha\beta\chi}_{2^-} == 0$	5
$\tau^{\#1\,\alpha\beta}_{2^+} == 0$	5
$\sigma^{\#1\,\alpha\beta}_{2^+} == 0$	5
Total constraints:	36

Quadratic (free) action

$$S_F == \iiiint \Big(\tfrac{1}{6}\big(4 t_2\, \omega_\iota{}^{\kappa\lambda}\, \omega_{\kappa\lambda}{}^{\iota} + 2 t_2\, \omega_{\kappa\lambda}{}^{\iota}\, \omega^{\kappa\lambda}{}_{\iota} + 6 f^{\alpha\beta}\, \tau_{\alpha\beta} + 6\, \omega^{\alpha\beta\chi}\, \sigma_{\alpha\beta\chi} +$$
$$4 r_2\, \partial^\beta \omega^{\theta\alpha}{}_\kappa\, \partial_\theta \omega_{\alpha\beta}{}^\kappa - 2 r_2\, \partial_\theta \omega_{\alpha\beta}{}^\kappa\, \partial_\kappa \omega^{\alpha\beta\theta} - 4 r_2\, \partial_\theta \omega_{\alpha\beta}{}^\kappa\, \partial_\kappa \omega^{\theta\alpha\beta} +$$
$$t_2\, \partial^\alpha f_{\theta\kappa}\, \partial^\kappa f_\alpha{}^\theta - t_2\, \partial^\alpha f_{\kappa\theta}\, \partial^\kappa f_\alpha{}^\theta + t_2\, \partial^\alpha f^\lambda{}_\kappa\, \partial^\kappa f_{\alpha\lambda} + 2 t_2\, \omega_{\iota\theta\kappa}\, \partial^\kappa f^{\iota\theta} -$$
$$4 t_2\, \omega_{\iota\kappa\theta}\, \partial^\kappa f^{\iota\theta} - 2 t_2\, \omega_{\theta\iota\kappa}\, \partial^\kappa f^{\iota\theta} + 4 t_2\, \omega_{\theta\kappa\iota}\, \partial^\kappa f^{\iota\theta} - t_2\, \partial^\alpha f^\lambda{}_\kappa\, \partial^\kappa f_{\lambda\alpha} -$$
$$t_2\, \partial_\kappa f_\theta{}^\lambda\, \partial^\kappa f_\lambda{}^\theta + t_2\, \partial_\kappa f^\lambda{}_\theta\, \partial^\kappa f_\lambda{}^\theta + 2 r_2\, \partial_\kappa \omega^{\alpha\beta\theta}\, \partial^\kappa \omega_{\alpha\beta\theta} + 4 r_2\, \partial_\kappa \omega^{\theta\alpha\beta}\, \partial^\kappa \omega_{\alpha\beta\theta} -$$
$$4 r_2\, \partial^\beta \omega_\iota{}^{\alpha\lambda}\, \partial_\lambda \omega_{\alpha\beta}{}^\iota + 4 r_2\, \partial^\beta \omega_\iota{}^{\lambda\alpha}\, \partial_\lambda \omega_{\alpha\beta}{}^\iota\big)\Big)[t, x, y, z]\, dz\, dy\, dx\, dt$$

	$\omega^{\#1}_{1^+\,\alpha\beta}$	$\omega^{\#2}_{1^+\,\alpha\beta}$	$f^{\#1}_{1^+\,\alpha\beta}$	$\omega^{\#1}_{1^-\,\alpha}$	$\omega^{\#2}_{1^-\,\alpha}$	$f^{\#1}_{1^-\,\alpha}$	$f^{\#2}_{1^-\,\alpha}$
$\omega^{\#1}_{1^+}\dagger^{\alpha\beta}$	$\frac{2 t_2}{3}$	$\frac{\sqrt{2}\, t_2}{3}$	$\frac{1}{3} i \sqrt{2}\, k\, t_2$	0	0	0	0
$\omega^{\#2}_{1^+}\dagger^{\alpha\beta}$	$\frac{\sqrt{2}\, t_2}{3}$	$\frac{t_2}{3}$	$\frac{i\, k\, t_2}{3}$	0	0	0	0
$f^{\#1}_{1^+}\dagger^{\alpha\beta}$	$-\frac{1}{3} i \sqrt{2}\, k\, t_2$	$-\frac{1}{3} i\, k\, t_2$	$\frac{k^2 t_2}{3}$	0	0	0	0
$\omega^{\#1}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0
$\omega^{\#2}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0
$f^{\#1}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0
$f^{\#2}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0

	$\omega^{\#1}_{0^+}$	$f^{\#1}_{0^+}$	$f^{\#2}_{0^+}$	$\omega^{\#1}_{0^-}$
$\omega^{\#1}_{0^+}\dagger$	0	0	0	0
$f^{\#1}_{0^+}\dagger$	0	0	0	0
$f^{\#2}_{0^+}\dagger$	0	0	0	0
$\omega^{\#1}_{0^-}\dagger$	0	0	0	$k^2 r_2 + t_2$

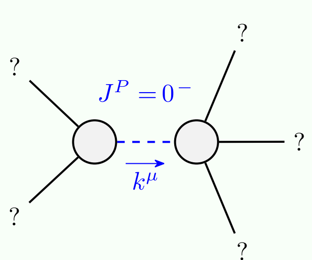
	$\sigma^{\#1}_{0^+}$	$\tau^{\#1}_{0^+}$	$\tau^{\#2}_{0^+}$	$\sigma^{\#1}_{0^-}$
$\sigma^{\#1}_{0^+}\dagger$	0	0	0	0
$\tau^{\#1}_{0^+}\dagger$	0	0	0	0
$\tau^{\#2}_{0^+}\dagger$	0	0	0	0
$\sigma^{\#1}_{0^-}\dagger$	0	0	0	$\frac{1}{k^2 r_2 + t_2}$

	$\sigma^{\#1}_{2^+\,\alpha\beta}$	$\tau^{\#1}_{2^+\,\alpha\beta}$	$\sigma^{\#1}_{2^-\,\alpha\beta\chi}$
$\sigma^{\#1}_{2^+}\dagger^{\alpha\beta}$	0	0	0
$\tau^{\#1}_{2^+}\dagger^{\alpha\beta}$	0	0	0
$\sigma^{\#1}_{2^-}\dagger^{\alpha\beta\chi}$	0	0	0

	$\omega^{\#1}_{2^+\,\alpha\beta}$	$f^{\#1}_{2^+\,\alpha\beta}$	$\omega^{\#1}_{2^-\,\alpha\beta\chi}$
$\omega^{\#1}_{2^+}\dagger^{\alpha\beta}$	0	0	0
$f^{\#1}_{2^+}\dagger^{\alpha\beta}$	0	0	0
$\omega^{\#1}_{2^-}\dagger^{\alpha\beta\chi}$	0	0	0

	$\sigma^{\#1}_{1^+\,\alpha\beta}$	$\sigma^{\#2}_{1^+\,\alpha\beta}$	$\tau^{\#1}_{1^+\,\alpha\beta}$	$\sigma^{\#1}_{1^-\,\alpha}$	$\sigma^{\#2}_{1^-\,\alpha}$	$\tau^{\#1}_{1^-\,\alpha}$	$\tau^{\#2}_{1^-\,\alpha}$
$\sigma^{\#1}_{1^+}\dagger^{\alpha\beta}$	$\frac{6}{(3+k^2)^2 t_2}$	$\frac{3\sqrt{2}}{(3+k^2)^2 t_2}$	$\frac{3 i \sqrt{2}\, k}{(3+k^2)^2 t_2}$	0	0	0	0
$\sigma^{\#2}_{1^+}\dagger^{\alpha\beta}$	$\frac{3\sqrt{2}}{(3+k^2)^2 t_2}$	$\frac{3}{(3+k^2)^2 t_2}$	$\frac{3 i k}{(3+k^2)^2 t_2}$	0	0	0	0
$\tau^{\#1}_{1^+}\dagger^{\alpha\beta}$	$-\frac{3 i \sqrt{2}\, k}{(3+k^2)^2 t_2}$	$-\frac{3 i k}{(3+k^2)^2 t_2}$	$\frac{3 k^2}{(3+k^2)^2 t_2}$	0	0	0	0
$\sigma^{\#1}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0
$\sigma^{\#2}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0
$\tau^{\#1}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0
$\tau^{\#2}_{1^-}\dagger^{\alpha}$	0	0	0	0	0	0	0

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

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