Particle spectrograph

Wave operator and propagator

	$\sigma^{\#1}_{1^+}{}_{\alpha\beta}$	$\sigma^{\#2}_{1^+}{}_{\alpha\beta}$	$\tau^{\#1}_{1^+}{}_{\alpha\beta}$	$\sigma^{\#1}_{1^-}{}_{\alpha}$	$\sigma^{\#2}_{1^-}{}_{\alpha}$	$\tau^{\#1}_{1^-}{}_{\alpha}$	$\tau^{\#2}_{1^-}{}_{\alpha}$
$\sigma^{\#1}_{1^+}{}^{\dagger\alpha\beta}$	$\frac{1}{k^2 r_5}$	$-\frac{\sqrt{2}}{k^2 r_5+k^4 r_5}$	$-\frac{i\sqrt{2}}{k r_5+k^3 r_5}$	0	0	0	0
$\sigma^{\#2}_{1^+}{}^{\dagger\alpha\beta}$	$-\frac{\sqrt{2}}{k^2 r_5+k^4 r_5}$	$\frac{3k^2 r_5+2t_2}{(k+k^3)^2 r_5 t_2}$	$\frac{i(3k^2 r_5+2t_2)}{k(1+k^2)^2 r_5 t_2}$	0	0	0	0
$\tau^{\#1}_{1^+}{}^{\dagger\alpha\beta}$	$\frac{i\sqrt{2}}{k r_5+k^3 r_5}$	$-\frac{i(3k^2 r_5+2t_2)}{k(1+k^2)^2 r_5 t_2}$	$\frac{3k^2 r_5+2t_2}{(1+k^2)^2 r_5 t_2}$	0	0	0	0
$\sigma^{\#1}_{1^-}{}^{\dagger\alpha}$	0	0	0	$\frac{1}{k^2 r_5}$	$\frac{\sqrt{2}}{k^2 r_5+2k^4 r_5}$	0	$\frac{2i}{k r_5+2k^3 r_5}$
$\sigma^{\#2}_{1^-}{}^{\dagger\alpha}$	0	0	0	$\frac{\sqrt{2}}{k^2 r_5+2k^4 r_5}$	$\frac{3k^2 r_5+2t_3}{(k+2k^3)^2 r_5 t_3}$	0	$\frac{i\sqrt{2}(3k^2 r_5+2t_3)}{k(1+2k^2)^2 r_5 t_3}$
$\tau^{\#1}_{1^-}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$\tau^{\#2}_{1^-}{}^{\dagger\alpha}$	0	0	0	$-\frac{2i}{k r_5+2k^3 r_5}$	$-\frac{i\sqrt{2}(3k^2 r_5+2t_3)}{k(1+2k^2)^2 r_5 t_3}$	0	$\frac{6k^2 r_5+4t_3}{(1+2k^2)^2 r_5 t_3}$

Quadratic (free) action

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$$\iiint\int(\tfrac{1}{6}(-4t_3\,\omega^{\alpha\prime}{}_{\alpha}\,\omega_{\prime}{}^{\kappa}{}_{\kappa}+6\,f^{\alpha\beta}\,\tau_{\alpha\beta}+6\,\omega^{\alpha\beta\chi}\,\sigma_{\alpha\beta\chi}+8t_3\,\omega_{\alpha}{}^{\kappa}{}_{\kappa}\,\partial_{\prime}f^{\alpha\prime}-8t_3\,\omega_{\prime}{}^{\kappa}{}_{\kappa}\,\partial^{\prime}f^{\alpha}{}_{\alpha}+4t_3\,\partial_{\prime}f^{\kappa}{}_{\kappa}\partial^{\prime}f^{\alpha}{}_{\alpha}+4t_2\,\omega_{\prime\theta\alpha}\,\partial^{\theta}f^{\alpha\prime}+2t_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}-t_2\,\partial_{\theta}f_{\prime\alpha}\partial^{\theta}f^{\alpha\prime}-4t_2\,\omega_{\alpha\theta\prime}\,(\omega^{\alpha\prime\theta}+\partial^{\theta}f^{\alpha\prime})+2t_2\,\omega_{\alpha\prime\theta}\,(\omega^{\alpha\prime\theta}+2\,\partial^{\theta}f^{\alpha\prime})+8r_2\,\partial_{\beta}\omega_{\alpha\prime\theta}\partial^{\theta}\omega^{\alpha\beta\prime}-4r_2\,\partial_{\beta}\omega_{\alpha\theta\prime}\partial^{\theta}\omega^{\alpha\beta\prime}+4r_2\,\partial_{\beta}\omega_{\prime\theta\alpha}\partial^{\theta}\omega^{\alpha\beta\prime}-2r_2\,\partial_{\prime}\omega_{\alpha\beta\theta}\partial^{\theta}\omega^{\alpha\beta\prime}+2r_2\,\partial_{\theta}\omega_{\alpha\beta\prime}\partial^{\theta}\omega^{\alpha\beta\prime}-4r_2\,\partial_{\theta}\omega_{\alpha\prime\beta}\partial^{\theta}\omega^{\alpha\beta\prime}+6r_5\,\partial_{\prime}\omega_{\theta}{}^{\kappa}{}_{\kappa}\partial^{\theta}\omega^{\alpha\prime}{}_{\alpha}-6r_5\,\partial_{\theta}\omega_{\prime}{}^{\kappa}{}_{\kappa}\partial^{\theta}\omega^{\alpha\prime}{}_{\alpha}+4t_3\,\partial_{\prime}f^{\alpha\prime}\partial_{\kappa}f_{\alpha}{}^{\kappa}-8t_3\,\partial^{\prime}f^{\alpha}{}_{\alpha}\partial_{\kappa}f_{\prime}{}^{\kappa}-6r_5\,\partial_{\alpha}\omega^{\alpha\prime\theta}\partial_{\kappa}\omega_{\prime}{}^{\kappa}{}_{\theta}+12r_5\,\partial^{\theta}\omega^{\alpha\prime}{}_{\alpha}\partial_{\kappa}\omega_{\prime}{}^{\kappa}{}_{\theta}+6r_5\,\partial_{\alpha}\omega^{\alpha\prime\theta}\partial_{\kappa}\omega_{\theta}{}^{\kappa}{}_{\prime}-12r_5\,\partial^{\theta}\omega^{\alpha\prime}{}_{\alpha}\partial_{\kappa}\omega_{\theta}{}^{\kappa}{}_{\prime}))[t,x,y,z]\,dz\,dy\,dx\,dt$$

	$\omega^{\#1}_{1^+}{}_{\alpha\beta}$	$\omega^{\#2}_{1^+}{}_{\alpha\beta}$	$f^{\#1}_{1^+}{}_{\alpha\beta}$	$\omega^{\#1}_{1^-}{}_{\alpha}$	$\omega^{\#2}_{1^-}{}_{\alpha}$	$f^{\#1}_{1^-}{}_{\alpha}$	$f^{\#2}_{1^-}{}_{\alpha}$
$\omega^{\#1}_{1^+}{}^{\dagger\alpha\beta}$	$k^2 r_5+\frac{2t_2}{3}$	$\frac{\sqrt{2}\,t_2}{3}$	$\frac{1}{3}i\sqrt{2}\,k t_2$	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	$k^2 r_5+\frac{2t_3}{3}$	$-\frac{\sqrt{2}\,t_3}{3}$	0	$-\frac{2}{3}i k t_3$
$\omega^{\#2}_{1^-}{}^{\dagger\alpha}$	0	0	0	$-\frac{\sqrt{2}\,t_3}{3}$	$\frac{t_3}{3}$	0	$\frac{1}{3}i\sqrt{2}\,k t_3$
$f^{\#1}_{1^-}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$f^{\#2}_{1^-}{}^{\dagger\alpha}$	0	0	0	$\frac{2ik t_3}{3}$	$-\frac{1}{3}i\sqrt{2}\,k t_3$	0	$\frac{2k^2 t_3}{3}$

Source constraints/gauge generators

SO(3) irreps	Multiplicities
$\tau^{\#2}_{0^+}==0$	1
$\tau^{\#1}_{0^+}-2i k\,\sigma^{\#1}_{0^+}==0$	1
$\tau^{\#2\alpha}_{1^-}+2i k\,\sigma^{\#2\alpha}_{1^-}==0$	3
$\tau^{\#1\alpha}_{1^-}==0$	3
$\tau^{\#1\alpha\beta}_{1^+}+i k\,\sigma^{\#2\alpha\beta}_{1^+}==0$	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:	26

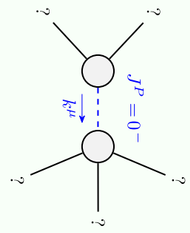
	$\omega^{\#1}_{2^-}{}^{\dagger\alpha\beta\chi}$	$f^{\#1}_{2^+}{}^{\dagger\alpha\beta}$	$\omega^{\#1}_{2^+}{}^{\dagger\alpha\beta}$
$\omega^{\#1}_{2^+}{}_{\alpha\beta}$	0	0	0
$f^{\#1}_{2^+}{}_{\alpha\beta}$	0	0	0
$\omega^{\#1}_{2^-}{}_{\alpha\beta\chi}$	0	0	0

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

	$\sigma^{\#1}_{0^+}$	$\tau^{\#1}_{0^+}$	$\tau^{\#2}_{0^+}$	$\sigma^{\#1}_{0^-}$
$\sigma^{\#1}_{0^+}{}^{\dagger}$	$\frac{1}{(1+2k^2)^2 t_3}$	$-\frac{i\sqrt{2}\,k}{(1+2k^2)^2 t_3}$	0	0
$\tau^{\#1}_{0^+}{}^{\dagger}$	$\frac{i\sqrt{2}\,k}{(1+2k^2)^2 t_3}$	$\frac{2k^2}{(1+2k^2)^2 t_3}$	0	0
$\tau^{\#2}_{0^+}{}^{\dagger}$	0	0	0	0
$\sigma^{\#1}_{0^-}{}^{\dagger}$	0	0	0	$\frac{1}{k^2 r_2+t_2}$

	$\omega^{\#1}_{0^+}$	$f^{\#1}_{0^+}$	$f^{\#2}_{0^+}$	$\omega^{\#1}_{0^-}$
$\omega^{\#1}_{0^+}{}^{\dagger}$	t_3	$-i\sqrt{2}\,k t_3$	0	0
$f^{\#1}_{0^+}{}^{\dagger}$	$i\sqrt{2}\,k t_3$	$2k^2 t_3$	0	0
$f^{\#2}_{0^+}{}^{\dagger}$	0	0	0	0
$\omega^{\#1}_{0^-}{}^{\dagger}$	0	0	0	$k^2 r_2+t_2$

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

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