Particle spectrograph

Wave operator and propagator

$$\mathcal{S} == \iiiint \Big(f^{\alpha\beta}{}_{\tau_{\alpha\beta}} + c_2 \big(-\tfrac{1}{3}\,\partial_\beta f^{\mu}{}_{\mu}\,\partial^\beta f^{\alpha}{}_{\alpha} - \tfrac{1}{3}\,\partial_\beta f^{\alpha\beta}\,\partial_\mu f_{\alpha}{}^{\mu} + \tfrac{2}{3}\,\partial^\beta f^{\alpha}{}_{\alpha}\,\partial_\mu f_{\beta}{}^{\mu} - 2\,\partial_\alpha f_{\beta\mu}\,\partial^\mu f^{\alpha\beta} + \partial_\beta f_{\alpha\mu}\,\partial^\mu f^{\alpha\beta} + \partial_\mu f_{\beta\alpha}\,\partial^\mu f^{\alpha\beta}\big) + c_1 \big(-\tfrac{2}{3}\,\partial_\mu f^{\nu}{}_{\nu}\,\partial^\mu f^{\alpha}{}_{\alpha} - \tfrac{2}{3}\,\partial_\mu f^{\alpha\mu}\,\partial_\nu f_{\alpha}{}^{\nu} + \tfrac{4}{3}\,\partial^\mu f^{\alpha}{}_{\alpha}\,\partial_\nu f_{\mu}{}^{\nu} - 2\,\partial_\alpha f_{\nu\mu}\,\partial^\nu f^{\alpha\mu} + 2\,\partial_\nu f_{\alpha\mu}\,\partial^\nu f^{\alpha\mu}\big)\Big)[t, x, y, z]\,dl\,z\,dl\,y\,dl\,x\,dl\,t$$

Spin-parity form	Covariant form	Multiplicities
$0^+_{\#2}\ \tau == 0$	$\partial_\beta\partial_\alpha \tau^{\alpha\beta} == 0$	1
$0^+_{\#1}\ \tau == 0$	$\partial_\beta\partial_\alpha \tau^{\alpha\beta} == \partial_\beta\partial^\beta \tau^{\alpha}{}_{\alpha}$	1
$1^-_{\#1}\ \tau^{\alpha} == 0$	$\partial_\chi\partial_\beta\partial^\alpha \tau^{\beta\chi} == \partial_\chi\partial^\chi\partial_\beta \tau^{\beta\alpha}$	3
Total expected gauge generators:		5

	$0^+_{\#1}\,f$	$0^+_{\#2}\,f$
$0^+_{\#1}\,f\dagger$	0	0
$0^+_{\#2}\,f\dagger$	0	0

	$0^+_{\#1}\,\tau$	$0^+_{\#2}\,\tau$
$0^+_{\#1}\,\tau\dagger$	0	0
$0^+_{\#2}\,\tau\dagger$	0	0

	$2^+_{\#1}\,\tau\dagger^{\alpha\beta}$
$2^+_{\#1}\,\tau\dagger^{\alpha\beta}$	$\frac{1}{(2c_1+c_2)k^2}$

	$1^+_{\#1}\,f\dagger^{\alpha}$	$1^-_{\#1}\,f\dagger^{\alpha}$	$1^-_{\#2}\,f\dagger^{\alpha}$
$1^+_{\#1}\,f\dagger^{\alpha\beta}$	0	$(2c_1 - c_2)k^2$	0
$1^-_{\#1}\,f\dagger^{\alpha}$	0	0	$\frac{2}{3}(2c_1 + c_2)k^2$
$1^-_{\#2}\,f\dagger^{\alpha}$	0	0	0

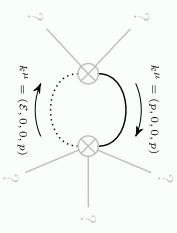
	$1^+_{\#1}\,\tau\dagger^{\alpha}$	$1^-_{\#1}\,\tau\dagger^{\alpha}$	$1^-_{\#2}\,\tau\dagger^{\alpha}$
$1^+_{\#1}\,\tau\dagger^{\alpha\beta}$	0	0	$\frac{1}{(2c_1+c_2)k^2}$
$1^-_{\#1}\,\tau\dagger^{\alpha}$	0	0	0
$1^-_{\#2}\,\tau\dagger^{\alpha}$	0	0	$\frac{3}{2(2c_1+c_2)k^2}$

	$2^+_{\#1}\,f_{\alpha\beta}$
$2^+_{\#1}\,f\dagger^{\alpha\beta}$	$(2c_1 + c_2)k^2$

Massive and massless spectra

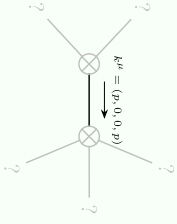
Quartic pole

Pole residue:	$< \frac{-2c_1+3c_2}{4c_1^2+c_2^2}$ && $\frac{-2c_1+3c_2}{4c_1^2+c_2^2} > 0$
Polarisations:	2



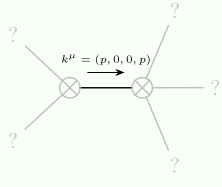
Massless particle

Poleresidue:	$\frac{\sqrt{100c_1^2+60c_1c_2+41c_2^2}}{4c_1^2+c_2^2} > 0$
Polarisations:	2



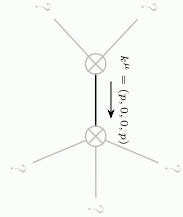
Massless particle

Poleresidue:	$\frac{1}{2c_1+c_2} > 0$
Polarisations:	2



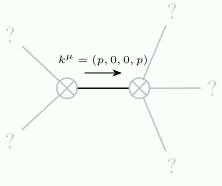
Massless particle

Pole residue:	$-\frac{\sqrt{100c_1^2+60c_1c_2+41c_2^2}}{4c_1^2+c_2^2} > 0$
Polarisations:	2



Massless particle

Poleresidue:	$\frac{1}{2c_1+c_2} > 0$
Polarisations:	1



(No particles)

Unitarity conditions