Particle spectrograph

Wave operator and propagator

Massive and massless spectra

Unitarity conditions

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
$1^+_{\#1}\ \tau^{\alpha\beta} == 0$	$\partial_\chi\partial^\alpha\tau^{\beta\chi} + \partial_\chi\partial^\beta\tau^{\chi\alpha} + \partial_\chi\partial^\chi\tau^{\alpha\beta} == \partial_\chi\partial^\alpha\tau^{\chi\beta} + \partial_\chi\partial^\beta\tau^{\alpha\chi} + \partial_\chi\partial^\chi\tau^{\beta\alpha}$	3
Total expected gauge generators:		8

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

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

$2^+_{\#1}\ f_{\alpha\beta}$

$2^+_{\#1}\ f\dagger^{\alpha\beta}$	$4\,c_1\,k^2$

$$\mathcal{S} == \iiiint (\beta\,\mathcal{B}_{\alpha\beta}\ \mathcal{B}^{\alpha\beta} + f^{\alpha\beta}\ \tau_{\alpha\beta} + \mathcal{B}^{\alpha\beta}\ \mathcal{J}_{\alpha\beta} - \frac{1}{3}\,\alpha\,(2\,\partial_\beta\mathcal{B}_{\alpha\chi} - \partial_\chi\mathcal{B}_{\alpha\beta})\,\partial^\chi\mathcal{B}^{\alpha\beta} -$$
$$\frac{2}{3}\,c_1\,(2\,\partial_\beta f^\chi{}_\chi\,\partial^\beta f^\alpha{}_\alpha - 4\,\partial^\beta f^\alpha{}_\alpha\,\partial_\chi f_\beta{}^\chi + 2\,\partial_\beta f^{\alpha\beta}\,(\partial_\chi f_\alpha{}^\chi + 2\,\partial_\chi\mathcal{B}_\alpha{}^\chi) - 2\,\partial_\alpha\mathcal{B}^{\alpha\beta}\,\partial_\chi\mathcal{B}_\beta{}^\chi -$$
$$4\,\partial^\beta f^\alpha{}_\alpha\,\partial_\chi\mathcal{B}_\beta{}^\chi + 6\,\partial_\alpha f_{\beta\chi}\,\partial^\chi f^{\alpha\beta} + 3\,\partial_\alpha f_{\chi\beta}\,\partial^\chi f^{\alpha\beta} - 3\,\partial_\beta f_{\alpha\chi}\,\partial^\chi f^{\alpha\beta} - 12\,\partial_\beta\mathcal{B}_{\alpha\chi}$$
$$\partial^\chi f^{\alpha\beta} - 3\,\partial_\chi f_{\alpha\beta}\,\partial^\chi f^{\alpha\beta} - 3\,\partial_\chi f_{\beta\alpha}\,\partial^\chi f^{\alpha\beta} - 6\,\partial_\beta\mathcal{B}_{\alpha\chi}\,\partial^\chi\mathcal{B}^{\alpha\beta}))[t, x, y, z]\,dt\,dz\,dy\,dx\,dt$$

	$1^+_{\#1}\ \mathcal{B}_{\alpha\beta}$	$1^+_{\#1}\ f_{\alpha\beta}$	$1^-_{\#1}\ \mathcal{B}_\alpha$	$1^-_{\#1}\ f_\alpha$	$1^-_{\#2}\ f_\alpha$
$1^+_{\#1}\ \mathcal{B}\dagger^{\alpha\beta}$	$\frac{k^2\,\alpha}{3} + \beta$	0	0	0	0
$1^+_{\#1}\ f\dagger^{\alpha\beta}$	0	0	0	0	0
$1^-_{\#1}\ \mathcal{B}\dagger^\alpha$	0	0	$\frac{4\,c_1\,k^2}{3} + \beta$	0	$\frac{4}{3}\sqrt{2}\,c_1\,k^2$
$1^-_{\#1}\ f\dagger^\alpha$	0	0	0	0	0
$1^-_{\#2}\ f\dagger^\alpha$	0	0	$\frac{4}{3}\sqrt{2}\,c_1\,k^2$	0	$\frac{8\,c_1\,k^2}{3}$

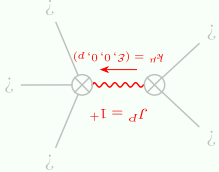
$1^+_{\#1}\ \tau_{\alpha\beta}$

$2^+_{\#1}\ \tau\dagger^{\alpha\beta}$	$\frac{1}{4\,c_1\,k^2}$

	$1^+_{\#1}\ \mathcal{J}_{\alpha\beta}$	$1^+_{\#1}\ \tau_{\alpha\beta}$	$1^-_{\#1}\ \mathcal{J}_\alpha$	$1^-_{\#1}\ \tau_\alpha$	$1^-_{\#2}\ \tau_\alpha$
$1^+_{\#1}\ \mathcal{J}\dagger^{\alpha\beta}$	$\frac{1}{\frac{k^2\,\alpha}{3} + \beta}$	0	0	0	0
$1^+_{\#1}\ \tau\dagger^{\alpha\beta}$	0	0	0	0	0
$1^-_{\#1}\ \mathcal{J}\dagger^\alpha$	0	0	$\frac{1}{\beta}$	0	$-\frac{1}{\sqrt{2}\,\beta}$
$1^-_{\#1}\ \tau\dagger^\alpha$	0	0	0	0	0
$1^-_{\#2}\ \tau\dagger^\alpha$	0	0	$-\frac{1}{\sqrt{2}\,\beta}$	0	$\frac{3}{8\,c_1\,k^2} + \frac{1}{2\,\beta}$

Massive particle

Polereslidue:	$\frac{3}{\alpha} > 0$
Square mass:	$-\frac{3\,\beta}{\alpha} > 0$
Spin:	1
Parity:	Even



Massless particle

Polereslidue:	$\frac{1}{c_1} > 0$
Polarisations:	2