Particle spectrograph

Wave operator and propagator

$$\mathcal{S} == \iiiint (\phi\, \mathcal{J} + h^{\alpha\beta}\, \mathcal{T}_{\alpha\beta} + \frac{1}{2}\beta\, \partial_\chi\phi\, \partial^\chi\phi + \frac{1}{8}\alpha(36(1+2\,\phi)\partial_\alpha\partial^\alpha\phi + 18\,\partial_\alpha\phi\,\partial^\alpha\phi - 12\,\partial_\alpha h^\beta{}_\beta\,\partial^\alpha\phi + 12\,\partial^\alpha\phi\,\partial_\beta h_\alpha{}^\beta - 4\,\partial_\beta\partial_\alpha h^{\alpha\beta} + 4\,\partial_\beta\partial^\beta h^\alpha{}_\alpha - \partial_\beta h^\chi{}_\chi\,\partial^\beta h^\alpha{}_\alpha + 2\,\partial^\beta h^\alpha{}_\alpha\,\partial_\chi h_\beta{}^\chi - 2\,\partial_\beta h_{\alpha\chi}\,\partial^\chi h^{\alpha\beta} + \partial_\chi h_{\alpha\beta}\,\partial^\chi h^{\alpha\beta}) + \epsilon(-18\,\partial_\beta\partial_\alpha\phi\,\partial^\beta\partial^\alpha\phi - 6\,\partial_\beta\partial_\alpha h^\chi{}_\chi\,\partial^\beta\partial^\alpha\phi + 6\,\partial^\beta\partial^\alpha\phi\,\partial_\chi\partial_\alpha h_\beta{}^\chi + 6\,\partial^\beta\partial^\alpha\phi\,\partial_\chi\partial_\beta h_\alpha{}^\chi - 6\,\partial^\beta\partial^\alpha\phi\,\partial_\chi\partial^\chi h_{\alpha\beta} + 6\,\partial_\alpha\partial^\alpha\phi(3\,\partial_\beta\partial^\beta\phi - \partial_\chi\partial_\beta h^{\beta\chi} + \partial_\chi\partial^\chi h^\beta{}_\beta) - \partial_\chi\partial_\beta h^\delta{}_\delta\,\partial^\chi\partial^\beta h^\alpha{}_\alpha - 2\,\partial^\chi\partial_\alpha h^{\alpha\beta}\,\partial_\delta\partial_\beta h^\delta{}_\chi - 2\,\partial^\chi\partial_\alpha h^{\alpha\beta}\,\partial_\delta\partial_\chi h_\beta{}^\delta + 4\,\partial^\chi\partial^\beta h^\alpha{}_\alpha\,\partial_\delta\partial_\chi h_\beta{}^\delta + \partial_\beta\partial_\alpha h^{\alpha\beta}\,\partial_\delta\partial_\chi h^{\chi\delta} - 2\,\partial_\beta\partial^\beta h^\alpha{}_\alpha\,\partial_\delta\partial_\chi h^{\chi\delta} - \partial_\chi\partial^\chi h^{\alpha\beta}\,\partial_\delta\partial^\delta h_{\alpha\beta} + 4\,\partial^\chi\partial_\alpha h^{\alpha\beta}\,\partial_\delta\partial^\delta h_{\beta\chi} - 2\,\partial^\chi\partial^\beta h^\alpha{}_\alpha\,\partial_\delta\partial^\delta h_{\beta\chi} + \partial_\beta\partial^\beta h^\alpha{}_\alpha\,\partial_\delta\partial^\delta h^\chi{}_\chi + \partial_\beta\partial_\alpha h_{\chi\delta}\,\partial^\delta\partial^\chi h^{\alpha\beta} - \partial_\chi\partial_\beta h_{\alpha\delta}\,\partial^\delta\partial^\chi h^{\alpha\beta} - \partial_\delta\partial_\beta h_{\alpha\chi}\,\partial^\delta\partial^\chi h^{\alpha\beta} + \partial_\delta\partial_\chi h_{\alpha\beta}\,\partial^\delta\partial^\chi h^{\alpha\beta}))[t, x, y, z]\,dl\ z\ dl\ y\ dl\ x\ dl\ t$$

Spin-parity form	Covariant form	Multiplicities
$^{\#2}0^+\mathcal{T} == 0$	$\partial_\beta\partial_\alpha\mathcal{T}^{\alpha\beta} == 0$	1
$^{\#1}1^-\mathcal{T}^\alpha == 0$	$\partial_\chi\partial_\beta\partial^\alpha\mathcal{T}^{\beta\chi} == \partial_\chi\partial^\chi\partial_\beta\mathcal{T}^{\alpha\beta}$	3
Total expected gauge generators:		4

$^{\#1}0^+\phi$ | $^{\#2}0^+h$ | $^{\#1}0^+h$

$-\frac{3}{4}\sqrt{3}\,\alpha\,k^2$	0	$-\frac{\alpha\,k^2}{4}$
0	0	0
$\frac{1}{4}(-27\,\alpha+2\,\beta)\,k^2$	0	$-\frac{3}{4}\sqrt{3}\,\alpha\,k^2$

$^{\#1}0^+\mathcal{T}$ | $^{\#2}0^+\mathcal{T}$ | $^{\#1}0^+\mathcal{J}$

$\frac{54\,\alpha-4\,\beta}{\alpha\,\beta\,k^2}$	0	$-\frac{6\sqrt{3}}{\beta\,k^2}$
0	0	0
$-\frac{6\sqrt{3}}{\beta\,k^2}$	0	$\frac{2}{\beta\,k^2}$

$^{\#1}0^+\mathcal{T}\dagger$ | $^{\#2}0^+\mathcal{T}\dagger$ | $^{\#1}0^+\mathcal{J}\dagger$

$^{\#1}0^+h\dagger$ | $^{\#2}0^+h\dagger$

$^{\#1}0^+\phi\dagger$

$^{\#1}2^+\mathcal{T}\dagger^{\alpha\beta}$

$\frac{8}{\alpha\,k^2}$

$^{\#1}2^+h\dagger^{\alpha\beta}$

$\frac{\alpha\,k^2}{8}$

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

$^{\#1}1^-\mathcal{T}\dagger^\alpha$

0

$^{\#1}1^-\mathcal{T}_\alpha$

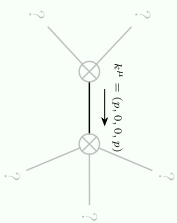
$^{\#1}1^-h\dagger^\alpha$

0

$^{\#1}1^-h_\alpha$

Massive and massless spectra

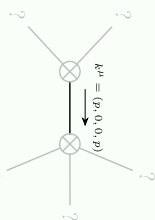
(No particles)



Massless particle

Poleresidue: $\frac{1}{\alpha} > 0$

Polarisations: 2



Massless particle

Poleresidue: $\frac{19}{\beta} > 0$

Polarisations: 1

Unitarity conditions