Particle spectrograph

Wave operator and propagator

$$
\begin{aligned}
\mathcal{S} == \iiiint (\phi\, \mathcal{J} + h^{\alpha\beta}\, \mathcal{T}_{\alpha\beta} + \tfrac{1}{2}\beta\, \partial_\alpha\phi\, \partial^\alpha\phi - 6\, \partial_\alpha\phi\, \partial^\alpha\phi - 4\, \partial_\alpha h^\beta{}_\beta\, \partial^\alpha\phi + 4\, \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 (-2\, \partial_\beta\partial_\alpha\phi\, \partial^\beta\partial^\alpha\phi - 2\, \partial_\beta\partial_\alpha h^\chi{}_\chi\, \partial^\beta\partial^\alpha\phi + 2\, \partial^\beta\partial^\alpha\phi\, \partial_\chi\partial_\alpha h_\beta{}^\chi + 2\, \partial^\beta\partial^\alpha\phi\, \partial_\chi\partial_\beta h_\alpha{}^\chi - \\
2\, \partial^\beta\partial^\alpha\phi\, \partial_\chi\partial^\chi h_{\alpha\beta} + 2\, \partial_\alpha\partial^\alpha\phi (\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_\chi{}^\delta - 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
\end{aligned}
$$

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

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

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

$^{\#2}0^+h$

0	0	0

$^{\#1}0^+h$

$-\frac{\alpha\,k^2}{4}$	0	$-\frac{1}{4}\sqrt{3}\,\alpha\,k^2$

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

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

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

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

0	0	0

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

$-\frac{2\sqrt{3}}{\beta\,k^2}$	0	$\frac{2}{\beta\,k^2}$

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

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

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

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

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

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

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

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

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

0

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

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

0

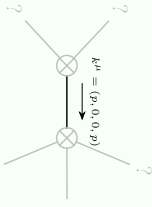
$^{\#1}1^-h_\alpha$

Massive and massless spectra

Massless particle

Polaresidue: $\frac{1}{\beta} > 0$

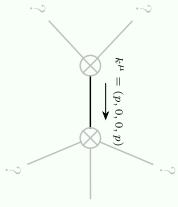
Polarisations: 1



Massless particle

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

Polarisations: 2



(No particles)

Unitarity conditions