Particle spectrograph

Wave operator and propagator

Quadratic (free) action

$$\mathcal{S} == \iiiint \Big(h^{\alpha\beta}\ \mathcal{T}_{\alpha\beta} + \tfrac{1}{2}\ \alpha\,(\partial_{\beta}h^{\chi}{}_{\chi}\,\partial^{\beta}h^{\alpha}{}_{\alpha} + 2\,\partial_{\alpha}h^{\alpha\beta}\,\partial_{\chi}h_{\beta}{}^{\chi} - 2\,\partial^{\beta}h^{\alpha}{}_{\alpha}\,\partial_{\chi}h_{\beta}{}^{\chi} - \partial_{\chi}h_{\alpha\beta}\,\partial^{\chi}h^{\alpha\beta})\Big)[t,\,x,\,y,\,z]\,dz\,dy\,dx\,dt$$

Source constraints

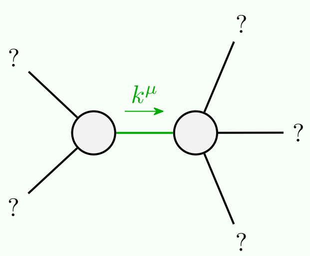
SO(3) irreps	Fundamental fields	Multiplicities
$\mathcal{T}^{\#2}_{0^+} == 0$	$\partial_{\beta}\partial_{\alpha}\mathcal{T}^{\alpha\beta} == 0$	1
$\mathcal{T}^{\#1}_{1^-}{}^{\alpha} == 0$	$\partial_{\chi}\partial_{\beta}\partial^{\alpha}\mathcal{T}^{\beta\chi} == \partial_{\chi}\partial^{\chi}\partial_{\beta}\mathcal{T}^{\alpha\beta}$	3
Total constraints/gauge generators:		4

$$\begin{array}{c|cc} & \mathcal{T}^{\#1}_{0^+} & \mathcal{T}^{\#2}_{0^+} \\ \hline \mathcal{T}^{\#1}_{0^+}{}^{\dagger} & \frac{1}{\alpha k^2} & 0 \\ \mathcal{T}^{\#2}_{0^+}{}^{\dagger} & 0 & 0 \end{array} \qquad \begin{array}{c|c} & \mathcal{T}^{\#1}_{2^+\alpha\beta} \\ \hline \mathcal{T}^{\#1}_{2^+}{}^{\dagger\alpha\beta} & -\frac{2}{\alpha k^2} \end{array}$$

$$\begin{array}{c|cc} & h^{\#1}_{0^+} & h^{\#2}_{0^+} \\ \hline h^{\#1}_{0^+}{}^{\dagger} & \alpha k^2 & 0 \\ h^{\#2}_{0^+}{}^{\dagger} & 0 & 0 \end{array} \qquad \begin{array}{c|c} & h^{\#1}_{2^+\alpha\beta} \\ \hline h^{\#1}_{2^+}{}^{\dagger\alpha\beta} & -\frac{\alpha k^2}{2} \end{array}$$

$$\begin{array}{c|c} & \mathcal{T}^{\#1}_{1^-\alpha} \\ \hline \mathcal{T}^{\#1}_{1^-}{}^{\dagger\alpha} & 0 \end{array} \qquad \begin{array}{c|c} & h^{\#1}_{1^-\alpha} \\ \hline h^{\#1}_{1^-}{}^{\dagger\alpha} & 0 \end{array}$$

Massive and massless spectra



Quadratic pole

Pole residue:	$-\frac{1}{\alpha} > 0$
Polarisations:	2

(No massive particles)

Unitarity conditions

$\alpha < 0$