

Particle spectrograph

Wave operator and propagator

Quadratic (free) Lagrangian density

$$h^{\alpha\beta} \mathcal{T}_{\alpha\beta} + \alpha \partial_\beta h^\chi_\chi \partial^\beta h^\alpha_\alpha - 2 \alpha \partial_\beta h_{\alpha\chi} \partial^\chi h^{\alpha\beta} + \alpha \partial_\chi h_{\alpha\beta} \partial^\chi h^{\alpha\beta}$$

Source constraints/gauge generators	
SO(3) irreps	Multiplicities
$\mathcal{T}^{\#1\alpha}_{1-} = 0$	3
Total constraints: 3	

$$\begin{array}{cc} & h^{\#1}_{0+} & h^{\#2}_{0+} \\ \begin{array}{c} h^{\#1}_{0+} \\ h^{\#2}_{0+} \end{array} + & \begin{array}{|c|c|} \hline 4\alpha k^2 & \sqrt{3}\alpha k^2 \\ \hline \sqrt{3}\alpha k^2 & 0 \\ \hline \end{array} \end{array}$$

$$\begin{array}{cc} & \mathcal{T}^{\#2}_{0+} \\ \begin{array}{c} \mathcal{T}^{\#1}_{0+} \\ \mathcal{T}^{\#2}_{0+} \end{array} + & \begin{array}{|c|c|} \hline 0 & \frac{1}{\sqrt{3}\alpha k^2} \\ \hline \frac{1}{\sqrt{3}\alpha k^2} & -\frac{4}{3\alpha k^2} \\ \hline \end{array} \end{array}$$

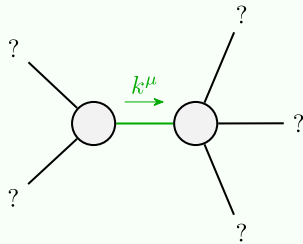
$$\begin{array}{c} \mathcal{T}^{\#1}_{2+} + \alpha\beta \\ \mathcal{T}^{\#1}_{2+} + \alpha\beta \end{array} \begin{array}{|c|} \hline \frac{1}{\alpha k^2} \\ \hline \end{array}$$

$$\begin{array}{c} h^{\#1}_{2+} + \alpha\beta \\ h^{\#1}_{2+} + \alpha\beta \end{array} \begin{array}{|c|} \hline \alpha k^2 \\ \hline \end{array}$$

$$\begin{array}{c} h^{\#1}_{1-} + \alpha \\ h^{\#1}_{1-} + \alpha \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array}$$

$$\begin{array}{c} \mathcal{T}^{\#1}_{1-} + \alpha \\ \mathcal{T}^{\#1}_{1-} + \alpha \end{array} \begin{array}{|c|} \hline 0 \\ \hline \end{array}$$

Massive and massless spectra



Quadratic pole

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

Polarisations: 3

(No massive particles)

Unitarity conditions

$$\alpha > 0$$