

Particle spectrograph

Wave operator and propagator

Quadratic (free) action

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

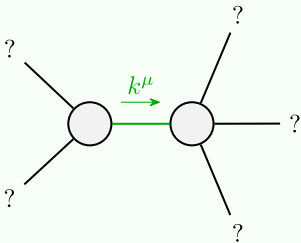
Source constraints

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

$$\begin{array}{c} \mathcal{T}^{\#1\alpha}_{2^+} \dagger \\ \mathcal{T}^{\#1\alpha}_{2^+} \dagger \end{array} \begin{array}{c} \mathcal{T}^{\#1}_{2^+} \alpha\beta \\ \frac{1}{\alpha k^2} \end{array} \begin{array}{c} h^{\#1}_{2^+} \alpha\beta \\ \alpha k^2 \end{array} \begin{array}{c} \mathcal{T}^{\#1}_{1^-} \alpha \\ 0 \end{array} \begin{array}{c} \mathcal{T}^{\#1}_{1^-} \alpha \\ 0 \end{array} \begin{array}{c} h^{\#1}_{1^-} \alpha \\ 0 \end{array}$$

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

Massive and massless spectra



| | |
|----------------|------------------------|
| Quadratic pole | |
| Pole residue: | $\frac{1}{\alpha} > 0$ |
| Polarisations: | 3 |

(No massive particles)

Unitarity conditions

$$\alpha > 0$$