Particle spectrograph

Wave operator and propagator

Quadratic (free) action

$\mathcal{S}==$

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

$$\begin{array}{c|cc} & \mathcal{T}^{\#1}_{0^+} & \mathcal{T}^{\#2}_{0^+} \\ \hline \mathcal{T}^{\#1}_{0^+}{}^{\dagger} & \dfrac{1}{\frac{\beta(\beta-4\gamma)}{\beta-\gamma}+\alpha k^2} & \dfrac{\sqrt{3}\,\gamma}{\beta(\beta-4\gamma)+\alpha(\beta-\gamma)k^2} \\ \mathcal{T}^{\#2}_{0^+}{}^{\dagger} & \dfrac{\sqrt{3}\,\gamma}{\beta(\beta-4\gamma)+\alpha(\beta-\gamma)k^2} & \dfrac{1}{\beta+\gamma\left(-1-\frac{3\gamma}{\beta-3\gamma+\alpha k^2}\right)} \end{array}$$

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

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

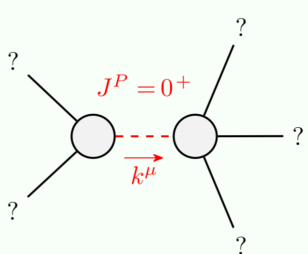
$$\begin{array}{c|c} & \mathcal{T}^{\#1}_{1^-\,\alpha} \\ \hline \mathcal{T}^{\#1}_{1^-}{}^{\dagger\,\alpha} & \dfrac{1}{\beta} \end{array}$$

$$\begin{array}{c|c} & h^{\#1}_{1^-\,\alpha} \\ \hline h^{\#1}_{1^-}{}^{\dagger\,\alpha} & \beta \end{array}$$

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

(No source constraints)

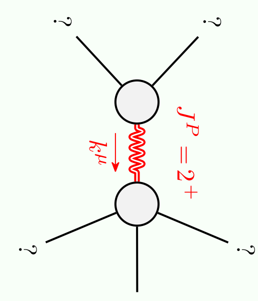
Massive and massless spectra



Massive particle

Pole residue:	$\frac{\beta^2-2\beta\gamma+4\gamma^2}{\alpha(\beta-\gamma)^2}>0$
Polarisations:	1
Square mass:	$-\frac{\beta(\beta-4\gamma)}{\alpha(\beta-\gamma)}>0$
Spin:	0
Parity:	Even

(No massless particles)



Massive particle

Pole residue:	$-\frac{2}{\alpha}>0$
Polarisations:	5
Square mass:	$\frac{2\beta}{\alpha}>0$
Spin:	2
Parity:	Even

Unitarity conditions

(Unitarity is demonstrably impossible)