

Particle spectrograph

Wave operator and propagator

Quadratic (free) action

$S_F ==$

$$\iiint \int (h^{\alpha\beta} \mathcal{T}_{\alpha\beta} + \frac{1}{2} \alpha \partial_\beta h^\chi_\chi \partial^\beta h^\alpha_\alpha + \beta \partial_\alpha h^{\alpha\beta} \partial_\chi h^\chi_\beta - \alpha \partial^\beta h^\alpha_\alpha \partial_\chi h^\chi_\beta - \frac{1}{2} \alpha \partial_\chi h_{\alpha\beta} \partial^\chi h^{\alpha\beta}) [t, x, y, z] dz dy dx dt$$

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

0	$\frac{1}{2\alpha k^2}$
$\frac{1}{2(\alpha+\beta)k^2}$	0

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

0	0
0	$(-\alpha + \beta) k^2$

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

αk^2	0
0	$(-\alpha + \beta) k^2$

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

$-\frac{2}{\alpha k^2}$

$h_{2+}^{\#1} + h_{2+}^{\#2}$

$-\frac{\alpha k^2}{2}$

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

$\frac{1}{2} (-\alpha + \beta) k^2$

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

$-\frac{2}{(\alpha-\beta) k^2}$

(No source constraints)

Massive and massless spectra

Quartic pole	
Pole residue:	$0 < \frac{6\alpha+3\beta-\sqrt{3}}{\alpha(\alpha-\beta)} \frac{\sqrt{12\alpha^2+12\alpha\beta+19\beta^2+64(\alpha-\beta)^2 p^2}}{\alpha(\alpha-\beta)} && \frac{6\alpha+3\beta-\sqrt{3}}{\alpha(\alpha-\beta)} \frac{\sqrt{12\alpha^2+12\alpha\beta+19\beta^2+64(\alpha-\beta)^2 p^2}}{\alpha(\alpha-\beta)} > 0$
Polarisations:	1

Quartic pole	
Pole residue:	$0 < \frac{6\alpha+3\beta+\sqrt{3}}{\alpha(\alpha-\beta)} \frac{\sqrt{12\alpha^2+12\alpha\beta+19\beta^2+64(\alpha-\beta)^2 p^2}}{\alpha(\alpha-\beta)} && \frac{6\alpha+3\beta+\sqrt{3}}{\alpha(\alpha-\beta)} \frac{\sqrt{12\alpha^2+12\alpha\beta+19\beta^2+64(\alpha-\beta)^2 p^2}}{\alpha(\alpha-\beta)} > 0$
Polarisations:	1

Quadratic pole	
Pole residue:	$-\frac{2\alpha-\beta+\sqrt{20\alpha^2-36\alpha\beta+17\beta^2}}{\alpha(\alpha-\beta)} > 0$
Polarisations:	1

Quadratic pole	
Pole residue:	$-\frac{1}{\alpha} + \frac{5}{-\alpha+\beta} > 0$
Polarisations:	1

Quadratic pole	
Pole residue:	$\frac{1}{\alpha} + \frac{1}{\alpha-\beta} > 0$
Polarisations:	2

Quadratic pole	
Pole residue:	$\frac{1}{\alpha} + \frac{5}{\alpha-\beta} > 0$
Polarisations:	1

Hexic pole	
Pole residue:	$0 < \frac{2\alpha+\beta}{\alpha^2-\alpha\beta} && \frac{2\alpha+\beta}{\alpha^2-\alpha\beta} > 0$
Polarisations:	1

Quartic pole	
Pole residue:	$0 < \frac{\beta}{\alpha^2-\alpha\beta} && \frac{\beta}{\alpha^2-\alpha\beta} > 0$
Polarisations:	2

Quadratic pole	
Pole residue:	$-\frac{1}{\alpha} + \frac{1}{-\alpha+\beta} > 0$
Polarisations:	2

Unitarity conditions

(Unitarity is demonstrably impossible)