

Particle spectrograph

Wave operator and propagator

Quadratic (free) Lagrangian density

$$h^{\alpha\beta} \mathcal{T}_{\alpha\beta} + \frac{1}{2} \alpha \partial_\beta h^\chi{}_\chi \partial^\beta h^\alpha{}_\alpha + \beta \partial_\alpha h^{\alpha\beta} \partial_\chi h^\chi{}_\beta - \alpha \partial^\beta h^\alpha{}_\alpha \partial_\chi h^\chi{}_\beta - \frac{1}{2} \alpha \partial_\chi h_{\alpha\beta} \partial^\chi h^{\alpha\beta}$$

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

$h_{0+}^{\#1} \dagger$	αk^2	0
$h_{0+}^{\#2} \dagger$	0	$(-\alpha + \beta) k^2$

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

$\mathcal{T}_{2+}^{\#1} \dagger$	$-\frac{2}{\alpha k^2}$
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$\mathcal{T}_{0+}^{\#1}$
 $\mathcal{T}_{0+}^{\#2}$

$\mathcal{T}_{0+}^{\#1} \dagger$	$\frac{1}{\alpha k^2}$	0
$\mathcal{T}_{0+}^{\#2} \dagger$	0	$\frac{1}{(-\alpha + \beta) k^2}$

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

$h_{1-}^{\#1} \dagger$	$\frac{1}{2} (-\alpha + \beta) k^2$
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$\mathcal{T}_{1-}^{\#1} \dagger$
 α

$\mathcal{T}_{1-}^{\#1} \dagger$	$-\frac{2}{(\alpha - \beta) k^2}$
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$h_{2+}^{\#1} \dagger$
 $\alpha\beta$

$h_{2+}^{\#1} \dagger$	$-\frac{\alpha k^2}{2}$
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(No source constraints)

Massive and massless spectra

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

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

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

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

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

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

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

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

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

(No massive particles)

Unitarity conditions

(Unitarity is demonstrably impossible)