

# Particle spectrograph

## Wave operator and propagator

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

#1 0 <sup>+</sup> h <sup>†</sup>	#2 0 <sup>+</sup> h	#1 0 <sup>+</sup> τ <sup>†</sup>	#2 0 <sup>+</sup> τ	#1 2 <sup>+</sup> τ <sup>†</sup> <sub>αβ</sub>	#1 2 <sup>+</sup> h <sup>†</sup> <sub>αβ</sub>	(No source constraints)	#1 1 <sup>+</sup> τ <sup>†</sup> <sub>α</sub>											
#2 0 <sup>+</sup> h <sup>†</sup>	<table><tr><td>-2β + ακ<sup>2</sup></td><td>-√3β</td></tr><tr><td>-√3β</td><td>0</td></tr></table>	-2β + ακ <sup>2</sup>	-√3β	-√3β	0	#2 0 <sup>+</sup> τ <sup>†</sup>	<table><tr><td>0</td><td>-1/√3β</td></tr><tr><td>-1/√3β</td><td>2β-ακ<sup>2</sup>/3β<sup>2</sup></td></tr></table>	0	-1/√3β	-1/√3β	2β-ακ <sup>2</sup> /3β <sup>2</sup>	<table><tr><td>1/βκ<sup>2</sup></td></tr></table>	1/βκ <sup>2</sup>	<table><tr><td>β - ακ<sup>2</sup>/2</td></tr></table>	β - ακ <sup>2</sup> /2	#1 1 <sup>+</sup> h <sup>†</sup> <sub>α</sub>	<table><tr><td>1/β</td></tr></table>	1/β
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1/β																		

## Massive and massless spectra

Pole residue:	1/2 > 0
Square mass:	2β/α > 0
Spin:	2
Parity:	Even

Massive particle

(No particles)

## Unitarity conditions

