Particle spectrograph

Wave operator and propagator

Quadratic (free) action

$\mathcal{S} ==$

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

$dx\, dt$

Source constraints/gauge generators

SO(3) irreps	Multiplicities
$\mathcal{T}_{1^-}^{\#1\,\alpha} == 0$	3
Total constraints:	3

	$\mathcal{T}_{0^+}^{\#1}$	$\mathcal{T}_{0^+}^{\#2}$
$\mathcal{T}_{0^+}^{\#1}\dagger$	0	$\dfrac{1}{\sqrt{3}\,\alpha k^2}$
$\mathcal{T}_{0^+}^{\#2}\dagger$	$\dfrac{1}{\sqrt{3}\,\alpha k^2}$	$-\dfrac{4}{3\,\alpha k^2}$

	$h_{0^+}^{\#1}$	$h_{0^+}^{\#2}$
$h_{0^+}^{\#1}\dagger$	$4\,\alpha k^2$	$\sqrt{3}\,\alpha k^2$
$h_{0^+}^{\#2}\dagger$	$\sqrt{3}\,\alpha k^2$	0

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

	$h_{2^+\,\alpha\beta}^{\#1}$
$h_{2^+}^{\#1}\dagger^{\alpha\beta}$	αk^2

	$\mathcal{T}_{1^-\,\alpha}^{\#1}$
$\mathcal{T}_{1^-}^{\#1}\dagger^{\alpha}$	0

	$h_{1^-\,\alpha}^{\#1}$
$h_{1^-}^{\#1}\dagger^{\alpha}$	0

Massive and massless spectra

Quadratic pole

Pole residue:	$\dfrac{1}{\alpha} > 0$
Polarisations:	3

(No massive particles)

Unitarity conditions

$\alpha > 0$