Particle spectrograph

Wave operator and propagator

Quadratic (free) action

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

Source constraints/gauge generators

SO(3) irreps	Multiplicities
$\mathcal{T}^{\#2}_{0^+} == 0$	1
$\mathcal{T}^{\#1\,\alpha}_{1^-} == 0$	3
Total constraints:	4

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

	$h^{\#1}_{0^+}$	$h^{\#2}_{0^+}$	$\phi^{\#1}_{0^+}$
$h^{\#1}_{0^+}\dagger$	αk^2	0	0
$h^{\#2}_{0^+}\dagger$	0	0	0
$\phi^{\#1}_{0^+}\dagger$	0	0	βk^2

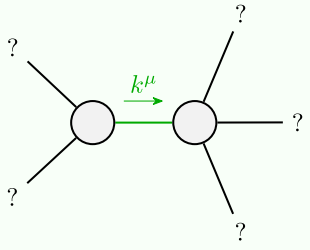
	$\mathcal{T}^{\#1}_{2^+}\dagger^{\alpha\beta}$
$\mathcal{T}^{\#1}_{2^+}{}_{\alpha\beta}$	$-\frac{2}{\alpha k^2}$

	$h^{\#1}_{2^+}\dagger^{\alpha\beta}$
$h^{\#1}_{2^+}{}_{\alpha\beta}$	$-\frac{\alpha k^2}{2}$

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

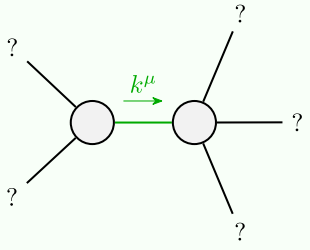
	$h^{\#1}_{1^-}\dagger^{\alpha}$
$h^{\#1}_{1^-}{}_{\alpha}$	0

Massive and massless spectra



Quadratic pole

Pole residue:	$-\frac{1}{\alpha} > 0$
Polarisations:	2



Quadratic pole

Pole residue:	$\frac{1}{\beta} > 0$
Polarisations:	1

(No massive particles)

Unitarity conditions

$\alpha < 0$ && $\beta > 0$