Particle spectrograph

Wave operator and propagator

Quadratic (free) action

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

Source constraints

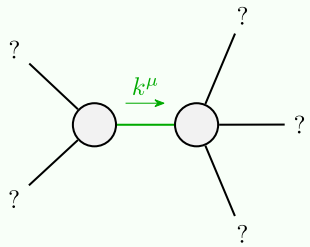
SO(3) irreps	Fundamental fields	Multiplicities
$\mathcal{T}_{0^+}^{\#2} == 0$	$\partial_\beta\partial_\alpha\mathcal{T}^{\alpha\beta} == 0$	1
$\mathcal{T}_{1^-}^{\#1\,\alpha} == 0$	$\partial_\chi\partial_\beta\partial^\alpha\mathcal{T}^{\beta\chi} == \partial_\chi\partial^\chi\partial_\beta\mathcal{T}^{\alpha\beta}$	3
Total constraints/gauge generators:		4

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

	$h_{0^+}^{\#1}$	$h_{0^+}^{\#2}$	$\phi_{0^+}^{\#1}$
$h_{0^+}^{\#1}\,\dagger$	αk^2	0	0
$h_{0^+}^{\#2}\,\dagger$	0	0	0
$\phi_{0^+}^{\#1}\,\dagger$	0	0	βk^2

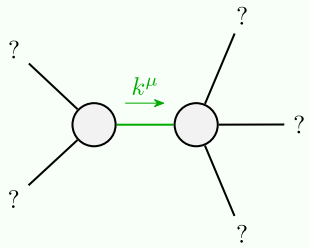
	$\mathcal{T}_{2^+\,\alpha\beta}^{\#1}$	$h_{2^+\,\alpha\beta}^{\#1}$	$\mathcal{T}_{1^-\,\alpha}^{\#1}$	$h_{1^-\,\alpha}^{\#1}$
$\mathcal{T}_{2^+}^{\#1}\,\dagger^{\alpha\beta}$	$-\frac{2}{\alpha k^2}$			
$h_{2^+}^{\#1}\,\dagger^{\alpha\beta}$		$-\frac{\alpha k^2}{2}$		
$\mathcal{T}_{1^-}^{\#1}\,\dagger^{\alpha}$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

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