

# Particle spectrograph

## Wave operator and propagator

Spin-parity	form	Covariant form	Multiplicities
$\#_2^0 \tau^+ = 0$		$\partial_\mu \partial_\nu \tau^{+\alpha\beta} = 0$	1
$\#_1^1 \tau^+ = 0$		$\partial_\chi \partial_\beta \partial_\gamma \tau^+ = \partial_\chi \partial_\beta \partial_\gamma \tau^{+\alpha\beta}$	3
Total expected gauge generators: 4			

$\#_1^1$   
 $1^- h^\alpha$

$\alpha$

$\#_1^1$   
 $0^+ \tau^+$

$\frac{1}{\alpha \ell^2}$

$\#_2^2$   
 $0^+ \tau^+$

0

0

$\#_1^1$   
 $1^- h^\alpha$

$\alpha$

$\#_1^1$   
 $0^+ \tau^+$

0

$\#_2^2$   
 $0^+ h$

$\alpha \kappa^2$

0

0

$\#_1^1$   
 $2^+ h^\alpha$

$\frac{-\alpha \ell^2}{2}$

$\#_2^2$   
 $2^+ \tau^{+\alpha\beta}$

$\frac{-2}{\alpha \ell^2}$

$\#_1^1$   
 $1^- \tau^+ \alpha$

0

$\#_1^1$   
 $0^+ h$

$\alpha$

$\#_2^2$   
 $0^+ h^\alpha$

0

$\#_1^1$   
 $2^+ \tau^{+\alpha\beta}$

$\frac{-\alpha \ell^2}{2}$

$$S = \iiint (h^{\alpha\beta} \mathcal{T}_{\alpha\beta} + \frac{1}{2} \alpha (\partial_\beta h^\chi_\chi \partial^\beta h^\alpha_\alpha + 2 \partial_a h^{\alpha\beta} \partial_\chi h^\chi_\beta - 2 \partial^\beta h^\alpha_\alpha \partial_\chi h^\chi_\beta - \partial_\chi h_{\alpha\beta} \partial^\chi h^{\alpha\beta})) [t, x, y, z] d z d y d x$$

## Massive and massless spectra

(No particles)

Massless particle

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

Polarisations: 2

$k^\mu = (p, 0, 0, p)$

## Unitarity conditions

