

Particle spectrograph

Wave operator and propagator

$S = \int \int \int \int (f^{\alpha\beta} \tau_{\alpha\beta} - \frac{2}{3} c_1 (2 \partial_\beta f^\mu{}_\mu \partial^\beta f^\alpha{}_\alpha + 2 \partial_\beta f^{\alpha\beta} \partial_\mu f^\mu{}_\alpha - 4 \partial^\beta f^\alpha{}_\alpha \partial_\mu f^\mu{}_\beta + 6 \partial_\alpha f_{\beta\mu} \partial^\mu f^{\alpha\beta} + 3 \partial_\alpha f_{\mu\beta} \partial^\mu f^{\alpha\beta} - 3 \partial_\beta f_{\alpha\mu} \partial^\mu f^{\alpha\beta} - 3 \partial_\mu f_{\alpha\beta} \partial^\mu f^{\alpha\beta} - 3 \partial_\mu f_{\beta\alpha} \partial^\mu f^{\alpha\beta})) [t, x, y, z] d^4x d^4y d^4z d^4t$

Spin-parity form	Covariant form	Multiplicities
$\begin{matrix} \#2 \\ 1^+ \tau = 0 \end{matrix}$	$\partial_\beta \partial_\alpha \tau^{\alpha\beta} = 0$	1
$\begin{matrix} \#1 \\ 1^+ \tau = 0 \end{matrix}$	$\partial_\beta \partial_\alpha \tau^{\alpha\beta} = \partial_\beta \partial_\mu \tau^\mu{}_\alpha$	1
$\begin{matrix} \#1 \\ 1^+ \alpha\beta = 0 \end{matrix}$	$\partial_\chi \partial^\alpha \tau^{\beta\chi} + \partial_\chi \partial^\beta \tau^{\alpha\chi} + \partial_\chi \partial^\alpha \tau^{\alpha\beta} = \partial_\chi \partial^\alpha \tau^{\chi\beta} + \partial_\chi \partial^\beta \tau^{\alpha\chi} + \partial_\chi \partial^\alpha \tau^{\chi\alpha}$	3
$\begin{matrix} \#1 \\ 1^+ \tau = 0 \end{matrix}$	$\partial_\chi \partial_\beta \partial^\alpha \tau^{\beta\chi} = \partial_\chi \partial^\alpha \partial_\beta \tau^{\beta\alpha}$	3
Total expected gauge generators:		8

$\begin{matrix} \#1 \\ 1^+ \tau\tau^{\alpha\beta} \end{matrix}$

$\begin{matrix} \#1 \\ 1^+ \tau\tau^\alpha \end{matrix}$

$\begin{matrix} \#2 \\ 1^+ \tau\tau^\alpha \end{matrix}$

0

0

0

$\begin{matrix} \#1 \\ 1^+ \tau\tau^\alpha \end{matrix}$

$\begin{matrix} \#1 \\ 1^+ \tau\tau^\alpha \end{matrix}$

$\begin{matrix} \#2 \\ 1^+ \tau\tau^\alpha \end{matrix}$

0

0

$\frac{3}{8c_1 k^2}$

$\begin{matrix} \#1 \\ 1^+ f\tau^{\alpha\beta} \end{matrix}$

$\begin{matrix} \#1 \\ 1^+ f\tau^\alpha \end{matrix}$

$\begin{matrix} \#2 \\ 1^+ f\tau^\alpha \end{matrix}$

0

0

0

$\begin{matrix} \#1 \\ 1^+ f\tau^\alpha \end{matrix}$

$\begin{matrix} \#1 \\ 1^+ f\tau^\alpha \end{matrix}$

$\begin{matrix} \#2 \\ 1^+ f\tau^\alpha \end{matrix}$

0

$\frac{8c_1 k^2}{3}$

0

$\begin{matrix} \#1 \\ 2^+ f\tau^{\alpha\beta} \end{matrix}$

$\begin{matrix} \#1 \\ 2^+ f\tau^\alpha \end{matrix}$

$\begin{matrix} \#1 \\ 2^+ \tau\alpha\beta \end{matrix}$

$4c_1 k^2$

$\frac{1}{4c_1 k^2}$

0

$\begin{matrix} \#1 \\ 2^+ f\tau^\alpha \end{matrix}$

$\begin{matrix} \#1 \\ 2^+ \tau\alpha\beta \end{matrix}$

$\begin{matrix} \#1 \\ 2^+ \tau\alpha\beta \end{matrix}$

0

0

0

$\begin{matrix} \#1 \\ 0^+ f\tau^{\alpha\beta} \end{matrix}$

$\begin{matrix} \#1 \\ 0^+ f\tau^\alpha \end{matrix}$

$\begin{matrix} \#2 \\ 0^+ f\tau^\alpha \end{matrix}$

0

0

0

$\begin{matrix} \#1 \\ 0^+ f\tau^\alpha \end{matrix}$

$\begin{matrix} \#1 \\ 0^+ f\tau^\alpha \end{matrix}$

$\begin{matrix} \#2 \\ 0^+ f\tau^\alpha \end{matrix}$

0

0

0

Massive and massless spectra

Massless particle

Polarisations: 2

Poleresidue: $\frac{1}{c_1} > 0$

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

\downarrow

$?$

$?$

$?$

$?$

$?$

(No particles)

Unitarity conditions

