Particle spectrograph

Wave operator and propagator

Spin-parity form	Covariant form	Multiplicities
$\overset{\#2}{0^+}\mathcal{T} == 0$	$\partial_\beta\partial_\alpha\mathcal{T}^{\alpha\beta} == 0$	1
$\overset{\#1}{0^+}j + \overset{\#1}{0^+}\mathcal{T} == 0$	$\partial_\beta\partial_\alpha j^{\alpha\beta} + \partial_\beta\partial_\alpha\mathcal{T}^{\alpha\beta} == \partial_\beta\partial^\beta j^\alpha{}_\alpha + \partial_\beta\partial^\beta\mathcal{T}^\alpha{}_\alpha$	1
$\overset{\#2}{0^+}j == 0$	$\partial_\beta\partial_\alpha j^{\alpha\beta} == 0$	1
$\overset{\#2}{1^-}\mathcal{T}^\alpha == 0$	$\partial_\chi\partial_\beta\partial^\alpha\mathcal{T}^{\beta\chi} == \partial_\chi\partial^\chi\partial_\beta\mathcal{T}^{\alpha\beta}$	3
$\overset{\#1}{1^-}j^\alpha + \overset{\#1}{1^-}\mathcal{T}^\alpha == 0$	$\partial_\chi\partial_\beta\partial^\alpha j^{\beta\chi} + \partial_\chi\partial_\beta\partial^\alpha\mathcal{T}^{\beta\chi} == \partial_\chi\partial^\chi\partial_\beta j^{\beta\alpha} + \partial_\chi\partial^\chi\partial_\beta\mathcal{T}^{\beta\alpha}$	3
$\overset{\#2}{1^-}j^\alpha == 0$	$\partial_\chi\partial_\beta\partial^\alpha j^{\beta\chi} == \partial_\chi\partial^\chi\partial_\beta j^{\alpha\beta}$	3
$\overset{\#1}{1^+}j^{\alpha\beta} + \overset{\#1}{1^+}\mathcal{T}^{\alpha\beta} == 0$	$\partial_\chi\partial^\alpha j^{\beta\chi} + \partial_\chi\partial^\alpha\mathcal{T}^{\beta\chi} + \partial_\chi\partial^\beta j^{\chi\alpha} + \partial_\chi\partial^\beta\mathcal{T}^{\chi\alpha} + \partial_\chi\partial^\chi j^{\alpha\beta} + \partial_\chi\partial^\chi\mathcal{T}^{\alpha\beta} ==$ $\partial_\chi\partial^\alpha j^{\chi\beta} + \partial_\chi\partial^\alpha\mathcal{T}^{\chi\beta} + \partial_\chi\partial^\beta j^{\alpha\chi} + \partial_\chi\partial^\beta\mathcal{T}^{\alpha\chi} + \partial_\chi\partial^\chi j^{\beta\alpha} + \partial_\chi\partial^\chi\mathcal{T}^{\beta\alpha}$	3
$\overset{\#1}{2^+}j^{\alpha\beta} + \overset{\#1}{2^+}\mathcal{T}^{\alpha\beta} == 0$	$4\,\partial_\delta\partial_\chi\partial^\beta\partial^\alpha j^{\chi\delta} + 4\,\partial_\delta\partial_\chi\partial^\beta\partial^\alpha\mathcal{T}^{\chi\delta} + 2\,\partial_\delta\partial^\delta\partial^\beta\partial^\alpha j^\chi{}_\chi + 2\,\partial_\delta\partial^\delta\partial^\beta\partial^\alpha\mathcal{T}^\chi{}_\chi +$ $3\,\partial_\delta\partial^\delta\partial_\chi\partial^\chi j^{\alpha\beta} + 3\,\partial_\delta\partial^\delta\partial_\chi\partial^\chi j^{\beta\alpha} + 3\,\partial_\delta\partial^\delta\partial_\chi\partial^\chi\mathcal{T}^{\alpha\beta} +$ $3\,\partial_\delta\partial^\delta\partial_\chi\partial^\chi\mathcal{T}^{\beta\alpha} + 2\,\eta^{\alpha\beta}\,\partial_\epsilon\partial^\epsilon\partial_\delta\partial_\chi j^{\chi\delta} + 2\,\eta^{\alpha\beta}\,\partial_\epsilon\partial^\epsilon\partial_\delta\partial_\chi\mathcal{T}^{\chi\delta} ==$ $3\,\partial_\delta\partial^\delta\partial_\chi\partial^\alpha j^{\beta\chi} + 3\,\partial_\delta\partial^\delta\partial_\chi\partial^\alpha j^{\chi\beta} + 3\,\partial_\delta\partial^\delta\partial_\chi\partial^\alpha\mathcal{T}^{\beta\chi} + 3\,\partial_\delta\partial^\delta\partial_\chi\partial^\alpha\mathcal{T}^{\chi\beta} +$ $3\,\partial_\delta\partial^\delta\partial_\chi\partial^\beta j^{\alpha\chi} + 3\,\partial_\delta\partial^\delta\partial_\chi\partial^\beta j^{\chi\alpha} + 3\,\partial_\delta\partial^\delta\partial_\chi\partial^\beta\mathcal{T}^{\alpha\chi} +$ $3\,\partial_\delta\partial^\delta\partial_\chi\partial^\beta\mathcal{T}^{\chi\alpha} + 2\,\eta^{\alpha\beta}\,\partial_\epsilon\partial^\epsilon\partial_\delta\partial^\delta j^\chi{}_\chi + 2\,\eta^{\alpha\beta}\,\partial_\epsilon\partial^\epsilon\partial_\delta\partial^\delta\mathcal{T}^\chi{}_\chi$	5
Total expected gauge generators:		20

$$\mathcal{S} == \iiiint \left(f^{\alpha\beta}\,j_{\alpha\beta} + h^{\alpha\beta}\,\mathcal{T}_{\alpha\beta} + \frac{\partial_\nu f_{\mu\rho}\,\partial^\rho f^{\mu\nu} - \partial_\rho f_{\mu\nu}\,\partial^\rho f^{\mu\nu} + 2\,\partial_\rho h_{\mu\nu}\,\partial^\rho f^{\mu\nu} - \partial_\rho h_{\mu\nu}\,\partial^\rho h^{\mu\nu} + \partial_\nu h_{\mu\rho}\,(-2\,\partial^\rho f^{\mu\nu} + \partial^\rho h^{\mu\nu})}{\kappa}\right)[t,x,y,z]\;dz\,dy\,dx\,dt$$

	$\overset{\#1}{1^+}f_{\alpha\beta}$	$\overset{\#1}{1^+}h_{\alpha\beta}$	$\overset{\#1}{1^-}f_\alpha$	$\overset{\#2}{1^-}f_\alpha$	$\overset{\#1}{1^-}h_\alpha$	$\overset{\#2}{1^-}h_\alpha$
$\overset{\#1}{1^+}f\dagger^{\alpha\beta}$	$-\frac{k^2}{\kappa}$	$\frac{k^2}{\kappa}$	0	0	0	0
$\overset{\#1}{1^+}h\dagger^{\alpha\beta}$	$\frac{k^2}{\kappa}$	$-\frac{k^2}{\kappa}$	0	0	0	0
$\overset{\#1}{1^-}f\dagger^\alpha$	0	0	$-\frac{k^2}{\kappa}$	0	$\frac{k^2}{\kappa}$	0
$\overset{\#2}{1^-}f\dagger^\alpha$	0	0	0	0		0
$\overset{\#1}{1^-}h\dagger^\alpha$	0	0	$\frac{k^2}{\kappa}$	0	$-\frac{k^2}{\kappa}$	0
$\overset{\#2}{1^-}h\dagger^\alpha$	0	0	0	0		0

	$\overset{\#1}{0^+}j$	$\overset{\#2}{0^+}j$	$\overset{\#1}{0^+}\mathcal{T}$	$\overset{\#2}{0^+}\mathcal{T}$
$\overset{\#1}{0^+}j\dagger$	$-\frac{\kappa}{4k^2}$	0	$\frac{\kappa}{4k^2}$	0
$\overset{\#2}{0^+}j\dagger$	0	0	0	0
$\overset{\#1}{0^+}\mathcal{T}\dagger$	$\frac{\kappa}{4k^2}$	0	$-\frac{\kappa}{4k^2}$	0
$\overset{\#2}{0^+}\mathcal{T}\dagger$	0	0	0	0

	$\overset{\#1}{0^+}f$	$\overset{\#2}{0^+}f$	$\overset{\#1}{0^+}h$	$\overset{\#2}{0^+}h$
$\overset{\#1}{0^+}f\dagger$	$-\frac{k^2}{\kappa}$	0	$\frac{k^2}{\kappa}$	0
$\overset{\#2}{0^+}f\dagger$	0	0	0	0
$\overset{\#1}{0^+}h\dagger$	$\frac{k^2}{\kappa}$	0	$-\frac{k^2}{\kappa}$	0
$\overset{\#2}{0^+}h\dagger$	0	0	0	0

	$\overset{\#1}{1^+}j_{\alpha\beta}$	$\overset{\#1}{1^+}\mathcal{T}_{\alpha\beta}$	$\overset{\#1}{1^-}j_\alpha$	$\overset{\#2}{1^-}j_\alpha$	$\overset{\#1}{1^-}\mathcal{T}_\alpha$	$\overset{\#2}{1^-}\mathcal{T}_\alpha$
$\overset{\#1}{1^+}j\dagger^{\alpha\beta}$	$-\frac{\kappa}{4k^2}$	$\frac{\kappa}{4k^2}$	0	0	0	0
$\overset{\#1}{1^+}\mathcal{T}\dagger^{\alpha\beta}$	$\frac{\kappa}{4k^2}$	$-\frac{\kappa}{4k^2}$	0	0	0	0
$\overset{\#1}{1^-}j\dagger^\alpha$	0	0	$-\frac{\kappa}{4k^2}$	0	$\frac{\kappa}{4k^2}$	0
$\overset{\#2}{1^-}j\dagger^\alpha$	0	0	0	0		0
$\overset{\#1}{1^-}\mathcal{T}\dagger^\alpha$	0	0	$\frac{\kappa}{4k^2}$	0	$-\frac{\kappa}{4k^2}$	0
$\overset{\#2}{1^-}\mathcal{T}\dagger^\alpha$	0	0	0	0		0

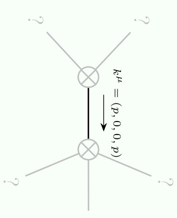
	$\overset{\#1}{2^+}f_{\alpha\beta}$	$\overset{\#1}{2^+}h_{\alpha\beta}$
$\overset{\#1}{2^+}f\dagger^{\alpha\beta}$	$-\frac{k^2}{\kappa}$	$\frac{k^2}{\kappa}$
$\overset{\#1}{2^+}h\dagger^{\alpha\beta}$	$\frac{k^2}{\kappa}$	$-\frac{k^2}{\kappa}$

	$\overset{\#1}{2^+}j_{\alpha\beta}$	$\overset{\#1}{2^+}\mathcal{T}_{\alpha\beta}$
$\overset{\#1}{2^+}j\dagger^{\alpha\beta}$	$-\frac{\kappa}{4k^2}$	$\frac{\kappa}{4k^2}$
$\overset{\#1}{2^+}\mathcal{T}\dagger^{\alpha\beta}$	$\frac{\kappa}{4k^2}$	$-\frac{\kappa}{4k^2}$

Massive and massless spectra

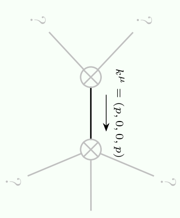
Massless particle

Pole residue:	$-\kappa > 0$
Polarisations:	6



Massless particle

Pole residue:	$\kappa > 0$
Polarisations:	2



(No particles)

Unitarity conditions