Particle spectrograph

Wave operator and propagator

Source constraints		Multiplicities
Fundamental fields	$\partial_\beta \partial_\alpha \tau^{\alpha\beta} == 0$	1
SO(3) irreps		
$\tau_{0^+}^{\#2} == 0$	$\partial_\chi \partial_\beta \partial^\alpha \tau^{\beta\chi} == \partial_\chi \partial^\chi \partial_\beta \tau^{\alpha\beta} + 2\,\partial_\delta \partial^\delta \partial_\chi \partial_\beta \sigma^{\alpha\beta\chi}$	3
$\tau_{1^-}^{\#2\,\alpha} + 2\,i\,k\,\sigma_{1^-}^{\#2\,\alpha} == 0$	$\partial_\chi \partial_\beta \partial^\alpha \tau^{\beta\chi} == \partial_\chi \partial^\chi \partial_\beta \tau^{\beta\alpha}$	3
$\tau_{1^+}^{\#1\,\alpha\beta} + i\,k\,\sigma_{1^+}^{\#2\,\alpha\beta} == 0$	$\partial_\chi \partial^\alpha \tau^{\beta\chi} + \partial_\chi \partial^\beta \tau^{\chi\alpha} + \partial_\chi \partial^\chi \tau^{\alpha\beta} + 2\,\partial_\delta \partial_\chi \partial^\alpha \sigma^{\beta\chi\delta} + 2\,\partial_\delta \partial^\delta \partial_\chi \sigma^{\alpha\beta\chi} == \partial_\chi \partial^\chi \tau^{\beta\alpha} + \partial_\chi \partial^\beta \tau^{\alpha\chi} + \partial_\chi \partial^\chi \tau^{\beta\alpha} + 2\,\partial_\delta \partial_\chi \partial^\beta \sigma^{\alpha\chi\delta}$	3
Total constraints/gauge generators:		10

	$\tau_{1^+}^{\#1\,\alpha\beta}$	$\sigma_{1^-}^{\#1\,\alpha}$	$\sigma_{1^-}^{\#2\,\alpha}$	$\tau_{1^-}^{\#1\,\alpha}$	$\tau_{1^-}^{\#2\,\alpha}$
$\sigma_{1^+}^{\#1\,\alpha\beta}$	$-\frac{i\sqrt{2}\,k}{t_1+k^2 t_1}$	0	$-\frac{\sqrt{2}}{t_1+k^2 t_1}$	0	0
$\sigma_{1^+}^{\#2\,\alpha\beta}$	$\frac{ik}{(1+k^2)^2 t_1}$	0	$\frac{1}{(1+k^2)^2 t_1}$	0	0
$\tau_{1^+}^{\#1\,\alpha\beta}$	$\frac{k^2}{(1+k^2)^2 t_1}$	0	$-\frac{ik}{(1+k^2)^2 t_1}$	0	0
$\sigma_{1^-}^{\#1\,\alpha}$	0	$\frac{\sqrt{2}}{t_1+2k^2 t_1}$	0	$\frac{2ik}{t_1+2k^2 t_1}$	0
$\sigma_{1^-}^{\#2\,\alpha}$	0	$\frac{1}{(1+2k^2)^2 t_1}$	0	$\frac{i\sqrt{2}\,k}{(1+2k^2)^2 t_1}$	0
$\tau_{1^-}^{\#1\,\alpha}$	0	0	0	0	0
$\tau_{1^-}^{\#2\,\alpha}$	0	0	0	0	0

Quadratic (free) action

$$S == \iiiint (f^{\alpha\beta}\,\tau_{\alpha\beta} + \mathcal{A}^{\alpha\beta\chi}\,\sigma_{\alpha\beta\chi} + t_1\,(\mathcal{A}_{\prime\zeta\theta}\,\mathcal{A}^{\prime\theta\zeta} + \mathcal{A}^{\prime\theta}{}_{\prime}\,\mathcal{A}_{\theta}{}^{\zeta}{}_{\zeta} + 2\,f^{\prime\theta}\,\partial_\theta \mathcal{A}_{\prime}{}^{\zeta}{}_{\zeta} - 2\,\partial_\theta \mathcal{A}^{\prime\theta}{}_{\prime} - 2\,f^{\prime\theta}\,\partial_\zeta \mathcal{A}_{\prime}{}^{\zeta}{}_{\theta} + 2\,f^{\prime}{}_{\prime}\,\partial_\zeta \mathcal{A}^{\theta\zeta}{}_{\theta}))[t, x, y, z]\,dz\,dy\,dx\,dt$$

	$f_{1^+}^{\#1\,\alpha\beta}$	$\mathcal{A}_{1^+}^{\#1\,\alpha}$	$\mathcal{A}_{1^+}^{\#2\,\alpha}$	$f_{1^-}^{\#1\,\alpha}$	$f_{1^-}^{\#2\,\alpha}$
$\sigma_{1^+}^{\#1\,\alpha\beta}$	$-\frac{ikt_1}{\sqrt{2}}$	0	0	0	0
$\sigma_{1^+}^{\#2\,\alpha\beta}$	0	0	0	0	0
$\tau_{1^+}^{\#1\,\alpha\beta}$	0	0	0	0	0
$\sigma_{1^-}^{\#1\,\alpha}$	0	$-\frac{t_1}{2}$	$\frac{t_1}{\sqrt{2}}$	ikt_1	0
$\sigma_{1^-}^{\#2\,\alpha}$	0	0	0	0	0
$\tau_{1^-}^{\#1\,\alpha}$	0	0	0	0	0
$\tau_{1^-}^{\#2\,\alpha}$	0	$-ikt_1$	0	0	0

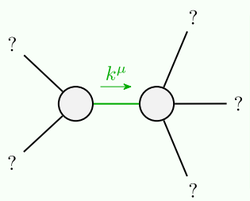
	$\tau_{2^+}^{\#1\,\alpha\beta}$	$\sigma_{2^-}^{\#1\,\alpha\beta\chi}$
$\sigma_{2^+}^{\#1\,\alpha\beta}$	$-\frac{i\sqrt{2}}{kt_1}$	0
$\tau_{2^+}^{\#1\,\alpha\beta}$	$-\frac{1}{k^2 t_1}$	0
$\sigma_{2^-}^{\#1\,\alpha\beta\chi}$	0	$\frac{2}{t_1}$

	$\mathcal{A}_{2^+}^{\#1\,\alpha\beta}$	$f_{2^+}^{\#1\,\alpha\beta}$	$\mathcal{A}_{2^-}^{\#1\,\alpha\beta\chi}$
$\mathcal{A}_{2^+}^{\#1}{}^{\alpha\beta}$	$\frac{t_1}{2}$	$-\frac{ikt_1}{\sqrt{2}}$	0
$f_{2^+}^{\#1}{}^{\alpha\beta}$	$\frac{ikt_1}{\sqrt{2}}$	0	0
$\mathcal{A}_{2^-}^{\#1}{}^{\alpha\beta\chi}$	0	0	$\frac{t_1}{2}$

	$\sigma_{0^+}^{\#1}$	$\tau_{0^+}^{\#1}$	$\tau_{0^+}^{\#2}$	$\sigma_{0^-}^{\#1}$
$\sigma_{0^+}^{\#1}$	0	$\frac{i}{\sqrt{2}\,kt_1}$	0	0
$\tau_{0^+}^{\#1}$	$-\frac{i}{\sqrt{2}\,kt_1}$	$\frac{1}{2k^2 t_1}$	0	0
$\tau_{0^+}^{\#2}$	0	0	0	0
$\sigma_{0^-}^{\#1}$	0	0	0	$-\frac{1}{t_1}$

	$f_{0^+}^{\#1}$	$f_{0^+}^{\#2}$	$\mathcal{A}_{0^-}^{\#1}$
$\mathcal{A}_{0^+}^{\#1}$	$-kt_1$	0	0
$f_{0^+}^{\#1}$	$-i\sqrt{2}\,kt_1$	0	0
$f_{0^+}^{\#2}$	0	0	0
$\mathcal{A}_{0^-}^{\#1}$	0	0	$-t_1$

Massive and massless spectra



Quadratic pole

Pole residue:	$-\frac{1}{t_1} > 0$
Polarisations:	2

(No massive particles)

Unitarity conditions

$t_1 < 0$