Particle spectrograph

Wave operator and propagator

Quadratic (free) action

$$S_F == \int\int\int\int (\tfrac{1}{2}(-2\lambda\,\omega'^{\theta}{}_{\iota}\,\omega_{\theta}{}^{\kappa}-2\lambda\,\omega_{\iota}{}^{\kappa\zeta}\,\omega_{\kappa\zeta}{}'+2\,f^{\alpha\beta}\,\tau_{\alpha\beta}+2\,\omega^{\alpha\beta\chi}\,\sigma_{\alpha\beta\chi}-4\lambda\,f'^{\theta}\,\partial_{\theta}\omega_{\iota}{}^{\kappa}+4\lambda\,f'^{\theta}\,\partial_{\kappa}\omega'^{\kappa}{}_{\theta}+4\lambda\,\partial_{\theta}\omega'^{\theta}{}_{\iota}-4\lambda\,f'_{\iota}\,\partial_{\kappa}\omega^{\theta\kappa}{}_{\theta}-\lambda\,\partial^{\alpha}f_{\theta\kappa}\,\partial^{\kappa}f_{\alpha}{}^{\theta}-\lambda\,\partial^{\alpha}f_{\kappa\theta}\,\partial^{\kappa}f_{\alpha}{}^{\theta}+2\lambda\,\omega_{\kappa\zeta}{}^{\zeta}\,\partial^{\kappa}f'_{\iota}+4\lambda\,\partial^{\alpha}f_{\kappa\alpha}\,\partial^{\kappa}f'_{\iota}+2\lambda\,\omega_{\iota\alpha}{}^{\alpha}\,\partial^{\kappa}f'_{\kappa}-2\lambda\,\omega_{\iota\zeta}{}^{\zeta}\,\partial^{\kappa}f'_{\kappa}+2\lambda\,\omega_{\iota\kappa\theta}\,(\omega'^{\theta\kappa}-2\,\partial^{\kappa}f'^{\theta})-2\lambda\,\omega_{\iota}{}^{\alpha\iota}\,\omega_{\kappa\alpha}{}^{\kappa}-2\lambda\,\partial^{\alpha}f^{\zeta}{}_{\kappa}\,\partial^{\kappa}f_{\zeta\alpha}+\lambda\,\partial_{\kappa}f^{\zeta}{}_{\theta}\,\partial^{\kappa}f_{\zeta}{}^{\theta}+\lambda\,\partial_{\kappa}f^{\zeta}{}_{\theta}\,\partial^{\kappa}f_{\zeta}{}^{\theta}-2\lambda\,\partial^{\alpha}f^{\zeta}{}_{\alpha}\,\partial^{\kappa}f_{\zeta\kappa}))[t,x,y,z]\,dz\,dy\,dx\,dt$$

Source constraints/gauge generators

SO(3) irreps	Multiplicities
$\sigma_{0^-}^{\#1} == 0$	1
$\tau_{0^+}^{\#2} == 0$	1
$\sigma_{0^+}^{\#1} == 0$	1
$\tau_{1^-}^{\#2\,\alpha} == 0$	3
$\tau_{1^-}^{\#1\,\alpha} == 0$	3
$\sigma_{1^-}^{\#2\,\alpha} == 0$	3
$\sigma_{1^-}^{\#1\,\alpha} == 0$	3
$\tau_{1^+}^{\#1\,\alpha\beta} == 0$	3
$\sigma_{1^+}^{\#2\,\alpha\beta} == 0$	3
$\sigma_{1^+}^{\#1\,\alpha\beta} == 0$	3
$\sigma_{2^-}^{\#1\,\alpha\beta\chi} == 0$	5
$\sigma_{2^+}^{\#1\,\alpha\beta} == 0$	5
Total constraints:	34

	$\omega_{2^+}^{\#1\,\alpha\beta}$	$f_{2^+}^{\#1\,\alpha\beta}$	$\omega_{2^-}^{\#1\,\alpha\beta\chi}$
$\omega_{2^+}^{\#1}{}^{\dagger\alpha\beta}$	0	0	0
$f_{2^+}^{\#1}{}^{\dagger\alpha\beta}$	0	$k^2\,\lambda$	0
$\omega_{2^-}^{\#1}{}^{\dagger\alpha\beta\chi}$	0	0	0

	$\sigma_{2^+}^{\#1\,\alpha\beta}$	$\tau_{2^+}^{\#1\,\alpha\beta}$	$\sigma_{2^-}^{\#1\,\alpha\beta\chi}$
$\sigma_{2^+}^{\#1}{}^{\dagger\alpha\beta}$	0	0	0
$\tau_{2^+}^{\#1}{}^{\dagger\alpha\beta}$	0	$\frac{1}{k^2\,\lambda}$	0
$\sigma_{2^-}^{\#1}{}^{\dagger\alpha\beta\chi}$	0	0	0

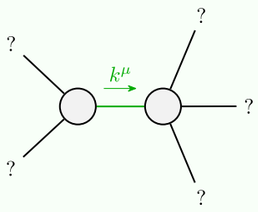
	$\omega_{0^+}^{\#1}$	$f_{0^+}^{\#1}$	$f_{0^+}^{\#2}$	$\omega_{0^-}^{\#1}$
$\omega_{0^+}^{\#1}{}^{\dagger}$	0	0	0	0
$f_{0^+}^{\#1}{}^{\dagger}$	0	$-2\,k^2\,\lambda$	0	0
$f_{0^+}^{\#2}{}^{\dagger}$	0	0	0	0
$\omega_{0^-}^{\#1}{}^{\dagger}$	0	0	0	0

	$\omega_{1^+}^{\#1\,\alpha\beta}$	$\omega_{1^+}^{\#2\,\alpha\beta}$	$f_{1^+}^{\#1\,\alpha\beta}$	$\omega_{1^-}^{\#1\,\alpha}$	$\omega_{1^-}^{\#2\,\alpha}$	$f_{1^-}^{\#1\,\alpha}$	$f_{1^-}^{\#2\,\alpha}$
$\omega_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	0	0	0	0	0	0	0
$\omega_{1^+}^{\#2}{}^{\dagger\alpha\beta}$	0	0	0	0	0	0	0
$f_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	0	0	0	0	0	0	0
$\omega_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$\omega_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$f_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$f_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	0	0	0	0

	$\sigma_{0^+}^{\#1}$	$\tau_{0^+}^{\#1}$	$\tau_{0^+}^{\#2}$	$\sigma_{0^-}^{\#1}$
$\sigma_{0^+}^{\#1}{}^{\dagger}$	0	0	0	0
$\tau_{0^+}^{\#1}{}^{\dagger}$	0	$-\frac{1}{2\,k^2\,\lambda}$	0	0
$\tau_{0^+}^{\#2}{}^{\dagger}$	0	0	0	0
$\sigma_{0^-}^{\#1}{}^{\dagger}$	0	0	0	0

	$\sigma_{1^+}^{\#1\,\alpha\beta}$	$\sigma_{1^+}^{\#2\,\alpha\beta}$	$\tau_{1^+}^{\#1\,\alpha\beta}$	$\sigma_{1^-}^{\#1\,\alpha}$	$\sigma_{1^-}^{\#2\,\alpha}$	$\tau_{1^-}^{\#1\,\alpha}$	$\tau_{1^-}^{\#2\,\alpha}$
$\sigma_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	0	0	0	0	0	0	0
$\sigma_{1^+}^{\#2}{}^{\dagger\alpha\beta}$	0	0	0	0	0	0	0
$\tau_{1^+}^{\#1}{}^{\dagger\alpha\beta}$	0	0	0	0	0	0	0
$\sigma_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$\sigma_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$\tau_{1^-}^{\#1}{}^{\dagger\alpha}$	0	0	0	0	0	0	0
$\tau_{1^-}^{\#2}{}^{\dagger\alpha}$	0	0	0	0	0	0	0

Massive and massless spectra



Quadratic pole

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

(No massive particles)

Unitarity conditions

$\lambda > 0$