Particle spectrograph

Wave operator and propagator

Source constraints/gauge generators

SO(3) irreps	Multiplicities
$\sigma_{0^-}^{\#1} == 0$	1
$\tau_{0^+}^{\#2} == 0$	1
$\tau_{0^+}^{\#1} - 2\,i\,k\,\sigma_{0^+}^{\#1} == 0$	1
$\tau_{1^-}^{\#2\,\alpha} + 2\,i\,k\,\sigma_{1^-}^{\#2\,\alpha} == 0$	3
$\tau_{1^-}^{\#1\,\alpha} == 0$	3
$\tau_{1^+}^{\#1\,\alpha\beta} + i\,k\,\sigma_{1^+}^{\#2\,\alpha\beta} == 0$	3
$\tau_{2^+}^{\#1\,\alpha\beta} - 2\,i\,k\,\sigma_{2^+}^{\#1\,\alpha\beta} == 0$	5
Total constraints:	17

	$\sigma_{0^+}^{\#1}$	$\tau_{0^+}^{\#1}$	$\tau_{0^+}^{\#2}$	$\sigma_{0^-}^{\#1}$
$\sigma_{0^+}^{\#1}\dagger$	$-\dfrac{1}{(1+2\,k^2)^2\,t_1}$	$\dfrac{i\,\sqrt{2}\,k}{(1+2\,k^2)^2\,t_1}$	0	0
$\tau_{0^+}^{\#1}\dagger$	$\dfrac{i\,\sqrt{2}\,k}{(1+2\,k^2)^2\,t_1}$	$-\dfrac{2\,k^2}{(1+2\,k^2)^2\,t_1}$	0	0
$\tau_{0^+}^{\#2}\dagger$	0	0	0	0
$\sigma_{0^-}^{\#1}\dagger$	0	0	0	0

	$\sigma_{2^+}^{\#1}{}_{\alpha\beta}$	$\tau_{2^+}^{\#1}{}_{\alpha\beta}$	$\sigma_{2^-}^{\#1}{}_{\alpha\beta\chi}$
$\sigma_{2^+}^{\#1}\dagger^{\alpha\beta}$	$\dfrac{2}{(1+2\,k^2)^2\,t_1}$	$-\dfrac{2\,i\,\sqrt{2}\,k}{(1+2\,k^2)^2\,t_1}$	0
$\tau_{2^+}^{\#1}\dagger^{\alpha\beta}$	$\dfrac{2\,i\,\sqrt{2}\,k}{(1+2\,k^2)^2\,t_1}$	$\dfrac{4\,k^2}{(1+2\,k^2)^2\,t_1}$	0
$\sigma_{2^-}^{\#1}\dagger^{\alpha\beta\chi}$	0	0	$\dfrac{2}{2\,k^2\,r_1+t_1}$

	$\omega_{2^+}^{\#1}{}_{\alpha\beta}$	$f_{2^+}^{\#1}{}_{\alpha\beta}$	$\omega_{2^-}^{\#1}{}_{\alpha\beta\chi}$
$\omega_{2^+}^{\#1}\dagger^{\alpha\beta}$	$\dfrac{t_1}{2}$	$-\dfrac{i\,k\,t_1}{\sqrt{2}}$	0
$f_{2^+}^{\#1}\dagger^{\alpha\beta}$	$\dfrac{i\,k\,t_1}{\sqrt{2}}$	$k^2\,t_1$	0
$\omega_{2^-}^{\#1}\dagger^{\alpha\beta\chi}$	0	0	$k^2\,r_1+\dfrac{t_1}{2}$

	$f_0^{\#1}{}$	$f_0^{\#2}{}$	$\omega_0^{\#1}{}$
$\omega_{0^+}^{\#1}\dagger$	0	0	0
$f_{0^+}^{\#1}\dagger$	$i\,\sqrt{2}\,k\,t_1$	$-2\,k^2\,t_1$	0
$f_{0^+}^{\#2}\dagger$	$-i\,\sqrt{2}\,k\,t_1$	0	0
$\omega_{0^-}^{\#1}\dagger$	$-t_1$	0	0

Quadratic (free) Lagrangian density

$$-t_1\,\omega_i{}^{\alpha l}\,\omega_{i\kappa\alpha}{}^{\kappa}-\tfrac{1}{3}\,t_1\,\omega_{i\kappa\lambda}\,\omega_i{}^{\kappa\lambda}+\tfrac{1}{3}\,t_1\,\omega_{\kappa\lambda i}{}^{\prime}\,\omega_i{}^{\kappa\lambda}{}_{,}+f^{\alpha\beta}\,\tau_{\alpha\beta}+ \cdots$$

Massive and massless spectra
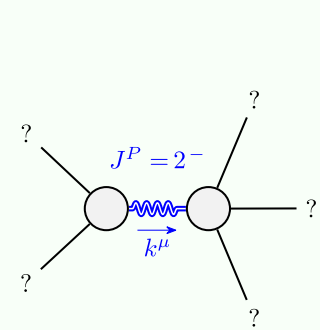
Massive particle

Pole residue:	$-\dfrac{1}{r_1} > 0$
Polarisations:	5
Square mass:	$-\dfrac{t_1}{2\,r_1} > 0$
Spin:	2
Parity:	Odd
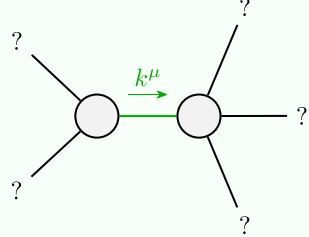
Quadratic pole

Pole residue:	$\dfrac{1}{(2\,r_1+r_5)\,t_1{}^2\,p^2} > 0$
Polarisations:	2

Unitarity conditions

$r_1 < 0 \,\&\&\, r_5 > -2\,r_1 \,\&\&\, t_1 > 0$