Particle spectrograph

Wave operator and propagator

$$\mathcal{S} == \iiiint \Big(\tfrac{1}{2}\big(-\mu^2\,\phi 0^2\,\varphi^2 + \nu\,\phi 0^2\,\mathcal{B}_\alpha\,\mathcal{B}^\alpha + 2\,\phi\,\rho + 2\,\varphi\,\varrho + \mathcal{B}^\alpha\,(2\,\mathcal{T}_\alpha - 2\,\nu\,\phi 0\,\partial_\alpha\phi - \phi 0\,\sigma\,\partial_\alpha\varphi) + \nu\,\partial_\alpha\phi\,\partial^\alpha\phi + \sigma\,\partial_\alpha\varphi\,\partial^\alpha\phi + \partial_\alpha\varphi\,\partial^\alpha\varphi + \xi\,\partial_\alpha\mathcal{B}_\beta\,\partial^\beta\mathcal{B}^\alpha - \xi\,\partial_\beta\mathcal{B}_\alpha\,\partial^\beta\mathcal{B}^\alpha\big)\Big)[t,x,y,z]\,dz\,dy\,dx\,dt$$

	${}^{\#1}0^+\mathcal{T}$	${}^{\#1}0^+\rho$	${}^{\#1}0^+\varrho$
${}^{\#1}0^+\mathcal{T}^\dagger$	$\frac{8\,\phi 0^2(\mu\,\phi 0-k)(\mu\,\phi 0+k)}{(\phi 0^2+k^2)^2(4\mu^2\,\nu\,\phi 0^2+(-4\nu+\sigma^2)k^2)}$	$-\frac{8\,i\,\phi 0(\mu\,\phi 0-k)\,k\,(\mu\,\phi 0+k)}{(\phi 0^2+k^2)^2(4\mu^2\,\nu\,\phi 0^2+(-4\nu+\sigma^2)k^2)}$	$-\frac{4\,i\,\phi 0\,\sigma\,k}{(\phi 0^2+k^2)(4\mu^2\,\nu\,\phi 0^2+(-4\nu+\sigma^2)k^2)}$
${}^{\#1}0^+\rho^\dagger$	$\frac{8\,i\,\phi 0(\mu\,\phi 0-k)\,k\,(\mu\,\phi 0+k)}{(\phi 0^2+k^2)^2(4\mu^2\,\nu\,\phi 0^2+(-4\nu+\sigma^2)k^2)}$	$\frac{8(\mu\,\phi 0-k)\,k^2(\mu\,\phi 0+k)}{(\phi 0^2+k^2)^2(4\mu^2\,\nu\,\phi 0^2+(-4\nu+\sigma^2)k^2)}$	$\frac{4\,\sigma\,k^2}{(\phi 0^2+k^2)(4\mu^2\,\nu\,\phi 0^2+(-4\nu+\sigma^2)k^2)}$
${}^{\#1}0^+\varrho^\dagger$	$\frac{4\,i\,\phi 0\,\sigma\,k}{(\phi 0^2+k^2)(4\mu^2\,\nu\,\phi 0^2+(-4\nu+\sigma^2)k^2)}$	$\frac{4\,\sigma\,k^2}{(\phi 0^2+k^2)(4\mu^2\,\nu\,\phi 0^2+(-4\nu+\sigma^2)k^2)}$	$-\frac{8\,\nu}{4\mu^2\,\nu\,\phi 0^2+(-4\nu+\sigma^2)k^2}$

	${}^{\#1}1^-\mathcal{B}_\alpha$
${}^{\#1}1^-\mathcal{B}^{\dagger\,\alpha}$	$\frac{1}{2}(\nu\,\phi 0^2-\xi\,k^2)$

	${}^{\#1}1^-\mathcal{T}_\alpha$
${}^{\#1}1^-\mathcal{T}^{\dagger\,\alpha}$	$\frac{2}{\nu\,\phi 0^2-\xi\,k^2}$

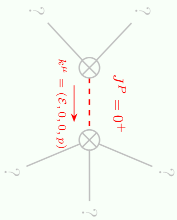
Spin-parity form	Covariant form	Multiplicities
$\phi 0\,{}^{\#1}0^+\rho - i\,k\,{}^{\#1}0^+\mathcal{T} == 0$	$\phi 0\,\rho == \partial_\alpha\mathcal{T}^\alpha$	1
Total expected gauge generators:		1

	${}^{\#1}0^+\mathcal{B}$	${}^{\#1}0^+\phi$	${}^{\#1}0^+\varphi$
${}^{\#1}0^+\mathcal{B}^\dagger$	$\frac{\nu\,\phi 0^2}{2}$	$-\frac{1}{2}\,i\,\nu\,\phi 0\,k$	$-\frac{1}{4}\,i\,\phi 0\,\sigma\,k$
${}^{\#1}0^+\phi^\dagger$	$\frac{1}{2}\,i\,\nu\,\phi 0\,k$	$\frac{\nu\,k^2}{2}$	$\frac{\sigma\,k^2}{4}$
${}^{\#1}0^+\varphi^\dagger$	$\frac{1}{4}\,i\,\phi 0\,\sigma\,k$	$\frac{\sigma\,k^2}{4}$	$\frac{1}{2}(-\mu^2\,\phi 0^2+k^2)$

Massive and massless spectra

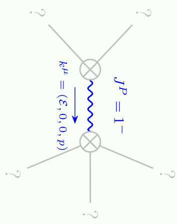
Massive particle

Poleresidue:	$\frac{8(1+\mu^2)}{4(1+\mu^2)\nu-\sigma^2} > 0$
Square mass:	$-\phi 0^2 > 0$
Spin:	0
Parity:	Even



Massive particle

Poleresidue:	$\frac{2}{\xi} > 0$
Squaremass:	$\frac{\nu\,\phi 0^2}{\xi} > 0$
Spin:	1
Parity:	Odd



(No particles)

Unitarity conditions