Particle spectrograph

Wave operator and propagator

Quadratic (free) action
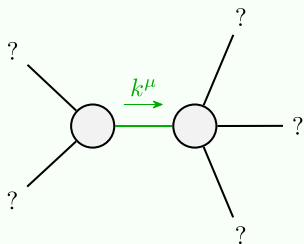
$$\mathcal{S}_F == \iiint (\phi\,\rho + \alpha\,\partial_\alpha\phi\,\partial^\alpha\phi)[t, x, y, z]\,dz\,dy\,dx\,dt$$

(No source constraints)

$$\rho_{0^+}^{\#1}$$

$$\rho_{0^+}^{\#1}\dagger \boxed{\dfrac{1}{\alpha\,k^2}}$$

$$\phi_{0^+}^{\#1}$$

$$\phi_{0^+}^{\#1}\dagger \boxed{\alpha\,k^2}$$

Massive and massless spectra

Quadratic pole	
Pole residue:	$\dfrac{1}{\alpha} > 0$
Polarisations:	1

(No massive particles)

Unitarity conditions

$\alpha > 0$