

# Particle spectrograph

## Wave operator and propagator

Quadratic (free) Lagrangian density

$$-\beta \phi^2 + \phi \rho + \alpha \partial_\alpha \phi \partial^\alpha \phi$$

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

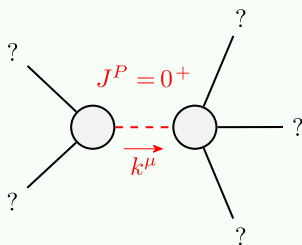
$$\phi_{0+}^{\#1} \dagger \boxed{-\beta + \alpha k^2}$$

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

$$\rho_{0+}^{\#1} \dagger \boxed{\frac{1}{-\beta + \alpha k^2}}$$

(No source constraints)

## Massive and massless spectra



Massive particle

Pole residue:	$\frac{1}{\alpha} > 0$
Polarisations:	1
Square mass:	$\frac{\beta}{\alpha} > 0$
Spin:	0
Parity:	Even

(No massless particles)

## Unitarity conditions

$$\alpha > 0 \ \&\& \ \beta > 0$$