

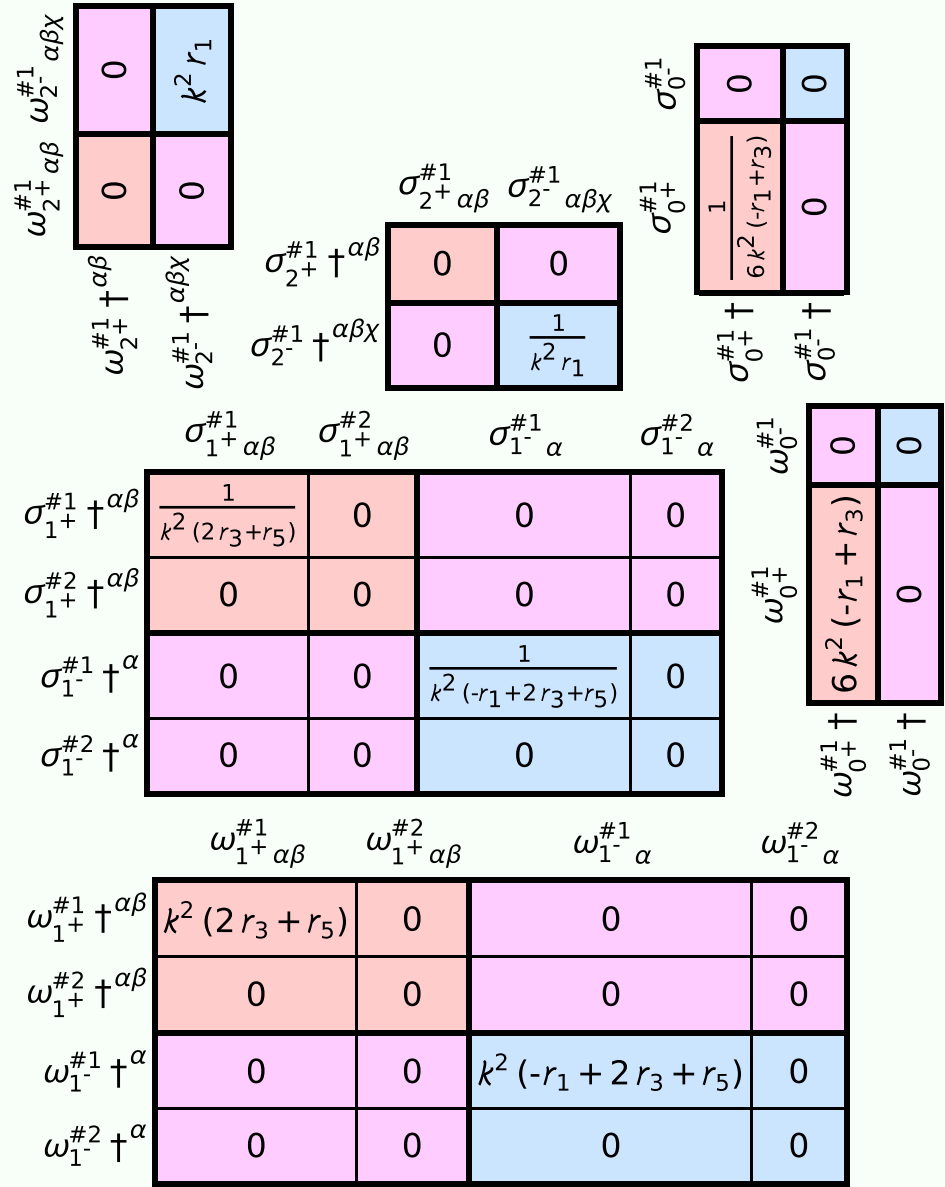
Particle spectrograph

Wave operator and propagator

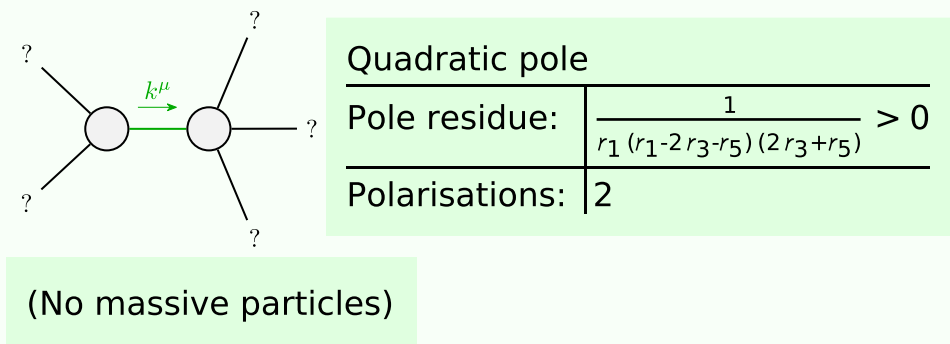
Quadratic (free) action

$$\begin{aligned}
 S = & \iiint (\omega^{\alpha\beta\chi} \sigma_{\alpha\beta\chi} - 2r_3 (\partial_\beta \omega^\theta_{\theta} \partial'_\theta \omega^{\alpha\beta}_\alpha + \partial'_\theta \omega^\theta_{\theta} \partial'_\theta \omega^{\alpha\beta}_\alpha + \\
 & \partial_\alpha \omega^{\alpha\beta\prime} \partial_\theta \omega^\theta_{\beta} - 2 \partial'_\theta \omega^{\alpha\beta}_\alpha \partial_\theta \omega^\theta_{\beta} + \partial_\alpha \omega^{\alpha\beta\prime} \partial_\theta \omega^\theta_{\beta} - \\
 & 2 \partial'_\theta \omega^{\alpha\beta}_\alpha \partial_\theta \omega^\theta_{\beta} + 2 \partial_\beta \omega_{\theta\alpha} \partial^\theta \omega^{\alpha\beta\prime}) + \\
 & \frac{2}{3} r_1 (3 \partial_\beta \omega^\theta_{\theta} \partial'_\theta \omega^{\alpha\beta}_\alpha + 3 \partial'_\theta \omega^\theta_{\theta} \partial'_\theta \omega^{\alpha\beta}_\alpha + 3 \partial_\alpha \omega^{\alpha\beta\prime} \partial_\theta \omega^\theta_{\beta} - \\
 & 6 \partial'_\theta \omega^{\alpha\beta}_\alpha \partial_\theta \omega^\theta_{\beta} + 3 \partial_\alpha \omega^{\alpha\beta\prime} \partial_\theta \omega^\theta_{\beta} - 6 \partial'_\theta \omega^{\alpha\beta}_\alpha \partial_\theta \omega^\theta_{\beta} - \\
 & 2 \partial_\beta \omega_{\alpha\theta} \partial^\theta \omega^{\alpha\beta\prime} + \partial_\beta \omega_{\alpha\theta} \partial^\theta \omega^{\alpha\beta\prime} + 2 \partial_\beta \omega_{\alpha\theta} \partial^\theta \omega^{\alpha\beta\prime} - \\
 & \partial'_\theta \omega_{\alpha\beta\theta} \partial^\theta \omega^{\alpha\beta\prime} + \partial_\theta \omega_{\alpha\beta\prime} \partial^\theta \omega^{\alpha\beta\prime} + \partial_\theta \omega_{\alpha\beta\prime} \partial^\theta \omega^{\alpha\beta\prime}) + \\
 & r_5 (\partial'_\theta \omega^\kappa_{\theta} \partial^\theta \omega^{\alpha\prime}_\alpha - \partial_\theta \omega^\kappa_{\theta} \partial^\theta \omega^{\alpha\prime}_\alpha - (\partial_\alpha \omega^{\alpha\prime\theta} - 2 \partial^\theta \omega^{\alpha\prime}_\alpha) \\
 & (\partial_\kappa \omega^\kappa_{\theta} - \partial_\kappa \omega^\kappa_{\theta})) [t, x, y, z] dz dy dx dt
 \end{aligned}$$

Source constraints		
SO(3) irreps	Fundamental fields	Multiplicities
$\sigma^{#1}_{0^-} == 0$	$\epsilon \eta_{\alpha\beta\chi\delta} \partial^\delta \sigma^{\alpha\beta\chi} == 0$	1
$\sigma^{#2\alpha}_{1^-} == 0$	$\partial_\chi \partial_\beta \sigma^{\alpha\beta\chi} == 0$	3
$\sigma^{#2\alpha\beta}_{1^+} == 0$	$\partial_\delta \partial_\chi \partial^\alpha \sigma^{\beta\chi\delta} + \partial_\delta \partial^\delta \partial_\chi \sigma^{\alpha\beta\chi} == \partial_\delta \partial_\chi \partial^\beta \sigma^{\alpha\chi\delta}$	3
$\sigma^{#1\alpha\beta}_{2^+} == 0$	$3 \partial_\delta \partial_\chi \partial^\alpha \sigma^{\beta\chi\delta} + 3 \partial_\delta \partial_\chi \partial^\beta \sigma^{\alpha\chi\delta} + 2 \eta^{\alpha\beta} \partial_\epsilon \partial^\epsilon \partial_\delta \sigma^{\chi\delta} =$ $2 \partial_\delta \partial^\beta \partial^\alpha \sigma^{\chi\delta} + 3 (\partial_\delta \partial^\delta \partial_\chi \sigma^{\alpha\chi\beta} + \partial_\delta \partial^\delta \partial_\chi \sigma^{\beta\chi\alpha})$	5
Total constraints/gauge generators:		12



Massive and massless spectra



Unitarity conditions

$r_1 < 0 \&\& (r_5 < r_1 - 2r_3 \parallel r_5 > -2r_3) \parallel r_1 > 0 \&\& -2r_3 < r_5 < r_1 - 2r_3$