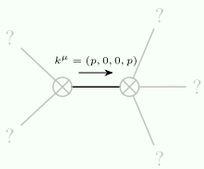
Particle spectrograph

Wave operator and propagator

Spin-parity	form	Covariant form	Multiplicities
0^+ τ	=0	$\partial_\beta \partial_\alpha \tau^{\alpha\beta} == 0$	1
2^+ τ	$+2\, i\, k\, {}^{\#2}_{1^-}\sigma^{\alpha} == 0$	$\partial_\chi \partial_\beta \tau^{\alpha\beta} == \partial_\delta \partial^\delta \partial_\chi \partial_\beta \sigma^{\alpha\beta\chi}$	3
1^- τ	$== 0$	$\partial_\chi \partial_\beta \tau^{\alpha\beta} == \partial_\delta \partial^\delta \partial_\beta \tau^{\alpha}$	3
1^+ τ	$+ i\, k\, {}^{\#2}_{1^+}\sigma^{\alpha\beta} == 0$	$\partial_\chi \partial^\alpha \tau^{\beta\chi} + \partial_\chi \partial^\chi \tau^{\alpha\beta} + 2\, \partial_\delta \partial_\chi \partial^\alpha \sigma^{\beta\chi\delta} + 2\, \partial_\delta \partial^\delta \partial_\chi \sigma^{\alpha\beta\chi} == \partial_\chi \partial^\alpha \chi^\beta + \partial_\chi \partial^\beta \tau^{\alpha\chi} + \partial_\chi \partial^\chi \tau^{\beta\alpha} + 2\, \partial_\delta \partial^\beta \partial^\alpha \sigma^{\alpha\chi\delta}$	3
Total expected gauge generators:			10

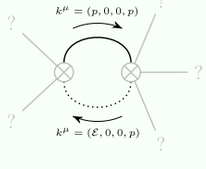
$$S == \iiiint (f^{\alpha\beta}\ \tau_{\alpha\beta} + \mathcal{A}^{\alpha\beta\chi}\ \sigma_{\alpha\beta\chi} + 2\,\beta_1 (-\mathcal{A}_{\alpha\chi\beta}\ \mathcal{A}^{\alpha\beta\chi} + (2\ \mathcal{A}_{\beta\chi\alpha} - \partial_\alpha f_{\chi\beta} + \partial_\chi f_{\alpha\beta})\, \partial^\chi f^{\alpha\beta} + \mathcal{A}_{\alpha\beta\chi}\ (\mathcal{A}^{\alpha\beta\chi} + 2\, \partial^\chi f^{\alpha\beta})) + 2\ \alpha_1 (-\partial_\chi \mathcal{A}_{\alpha\beta\delta} + \partial_\delta \mathcal{A}_{\alpha\beta\chi})\, \partial^\delta \mathcal{A}^{\alpha\beta\chi})\, [t, x, y, z]\, dl\ z\ dl\ y\ dl\ x\ dl\ t$$

Massive and massless spectra



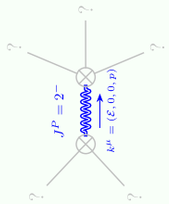
Massless particle

Pole residue:	$\frac{\beta_1{}^2 + 28\,\alpha_1\,\beta_1\,p^2 + 3\,\sqrt{\beta_1{}^2\,(9\,\beta_1{}^2 - 8\,\alpha_1\,\beta_1\,p^2 + 144\,\alpha_1{}^2\,p^4)}}{\alpha_1\,\beta_1{}^2\,p^2} > 0$
Polarisations:	3



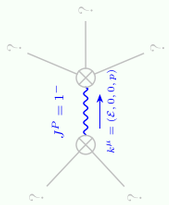
Quartic pole

Pole residue:	$0 < \frac{1}{\alpha_1}$ && $\frac{1}{\alpha_1} > 0$
Polarisations:	3



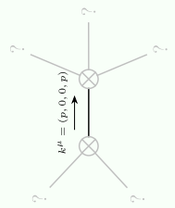
Massive particle

Pole residue:	$\frac{1}{2\,\alpha_1} > 0$
Square mass:	$\frac{\beta_1}{2\,\alpha_1} > 0$
Spin:	2
Parity:	Odd



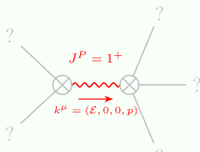
Massive particle

Pole residue:	$\frac{1}{2\,\alpha_1} > 0$
Square mass:	$\frac{\beta_1}{2\,\alpha_1} > 0$
Spin:	1
Parity:	Odd



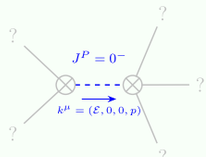
Massless particle

Poleresidue:	$\frac{-\beta_1\,(\beta_1 + 28\,\alpha_1\,p^2) + 3\,\sqrt{\beta_1{}^2\,(9\,\beta_1{}^2 - 8\,\alpha_1\,\beta_1\,p^2 + 144\,\alpha_1{}^2\,p^4)}}{\alpha_1\,\beta_1{}^2\,p^2} > 0$
Polarisations:	3



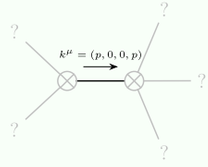
Massive particle

Poleresidue:	$\frac{3\,\alpha_1 - 2\,\beta_1}{4\,\alpha_1{}^2 - 4\,\alpha_1\,\beta_1} > 0$
Square mass:	$\frac{\beta_1}{\alpha_1} > 0$
Spin:	1
Parity:	Even



Massive particle

Pole residue:	$\frac{1}{2\,\alpha_1} > 0$
Square mass:	$\frac{2\,\beta_1}{\alpha_1} > 0$
Spin:	0
Parity:	Odd



Massless particle

Poleresidue:	$\frac{1}{\alpha_1\,\beta_1{}^2\,p^2} > 0$
Polarisations:	2

Unitarity conditions