Particle spectrograph

Wave operator and propagator

Quadratic (free) action

$$\mathcal{S}_F == \iiiint (h^{\alpha\beta}\,\mathcal{T}_{\alpha\beta} + \tfrac{1}{2}\,\alpha\,\partial_\beta h^\chi{}_\chi\,\partial^\beta h^\alpha{}_\alpha + \beta\,\partial_\alpha h^{\alpha\beta}\,\partial_\chi h_\beta{}^\chi - \alpha\,\partial^\beta h^\alpha{}_\alpha\,\partial_\chi h_\beta{}^\chi - \tfrac{1}{2}\,\alpha\,\partial_\chi h_{\alpha\beta}\,\partial^\chi h^{\alpha\beta})[t, x, y, z]\,dz\,dy\,dx\,dt$$

	$\mathcal{T}^{\#2}_{0^+}$	$\mathcal{T}^{\#1}_{0^+}$
$h^{\#1}_{0^+}$	0	$\frac{1}{\alpha k^2}$
$h^{\#2}_{0^+}$	$\frac{1}{(-\alpha+\beta)\,k^2}$	0

	$h^{\#1}_{0^+}$	$h^{\#2}_{0^+}$
$h^{\#1}_{0^+}$	αk^2	0
$h^{\#2}_{0^+}$	0	$(-\alpha+\beta)\,k^2$

	$h^{\#1}_{1^-}{}_\alpha$
$h^{\#1}_{1^-}{}^\alpha$	$\frac{1}{2}\,(-\alpha+\beta)\,k^2$

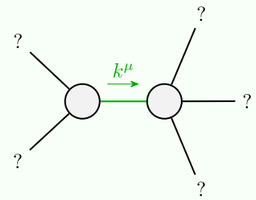
	$\mathcal{T}^{\#1}_{1^-}{}_\alpha$
$\mathcal{T}^{\#1}_{1^-}{}^\alpha$	$-\frac{2}{(\alpha-\beta)\,k^2}$

	$h^{\#1}_{2^+}{}_{\alpha\beta}$
$h^{\#1}_{2^+}{}^{\alpha\beta}$	$-\frac{\alpha k^2}{2}$

	$\mathcal{T}^{\#1}_{2^+}{}_{\alpha\beta}$
$\mathcal{T}^{\#1}_{2^+}{}^{\alpha\beta}$	$-\frac{2}{\alpha k^2}$

(No source constraints)

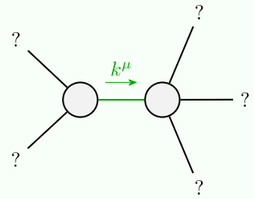
Massive and massless spectra



Quadratic pole

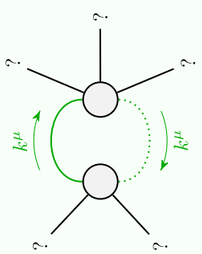
Pole residue:	$-\frac{2\,\alpha-\beta+\sqrt{20\,\alpha^2-36\,\alpha\,\beta+17\,\beta^2}}{\alpha^2-\alpha\,\beta} > 0$
Polarisations:	1

(No massive particles)



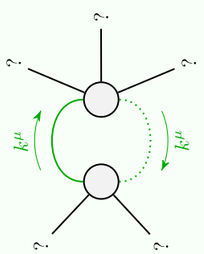
Quadratic pole

Pole residue:	$-\frac{1}{\alpha} > 0$
Polarisations:	2



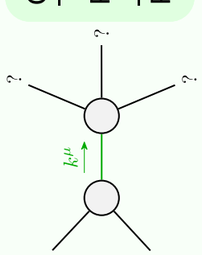
Quartic pole

Pole residue:	$0 < \frac{6\,\alpha+3\,\beta-\sqrt{3}\,\sqrt{12\,\alpha^2+12\,\alpha\,\beta+19\,\beta^2+64\,(\alpha-\beta)^2\,p^2}}{\alpha\,(\alpha-\beta)}$ && $\frac{6\,\alpha+3\,\beta-\sqrt{3}\,\sqrt{12\,\alpha^2+12\,\alpha\,\beta+19\,\beta^2+64\,(\alpha-\beta)^2\,p^2}}{\alpha\,(\alpha-\beta)} > 0$
Polarisations:	1



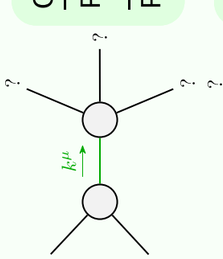
Quartic pole

Pole residue:	$0 < \frac{6\,\alpha+3\,\beta+\sqrt{3}\,\sqrt{12\,\alpha^2+12\,\alpha\,\beta+19\,\beta^2+64\,(\alpha-\beta)^2\,p^2}}{\alpha\,(\alpha-\beta)}$ && $\frac{6\,\alpha+3\,\beta+\sqrt{3}\,\sqrt{12\,\alpha^2+12\,\alpha\,\beta+19\,\beta^2+64\,(\alpha-\beta)^2\,p^2}}{\alpha\,(\alpha-\beta)} > 0$
Polarisations:	1



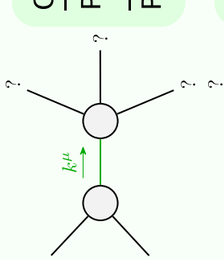
Quadratic pole

Pole residue:	$\frac{-2\,\alpha+\beta+\sqrt{20\,\alpha^2-36\,\alpha\,\beta+17\,\beta^2}}{\alpha\,(\alpha-\beta)} > 0$
Polarisations:	1



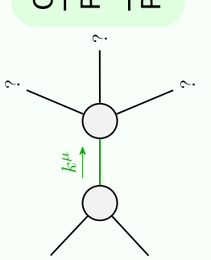
Quadratic pole

Pole residue:	$-\frac{1}{\alpha} + \frac{5}{-\alpha+\beta} > 0$
Polarisations:	1



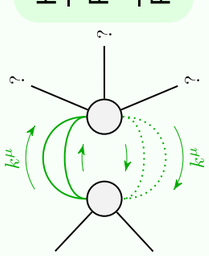
Quadratic pole

Pole residue:	$\frac{1}{\alpha} + \frac{1}{\alpha-\beta} > 0$
Polarisations:	2



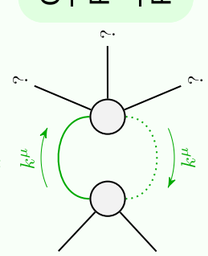
Quadratic pole

Pole residue:	$\frac{1}{\alpha} + \frac{5}{\alpha-\beta} > 0$
Polarisations:	1



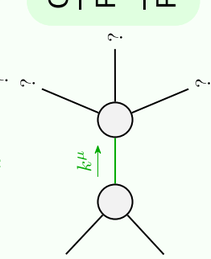
Hexic pole

Pole residue:	$0 < \frac{2\,\alpha+\beta}{\alpha^2-\alpha\,\beta}$ && $\frac{2\,\alpha+\beta}{\alpha^2-\alpha\,\beta} > 0$
Polarisations:	1



Quartic pole

Pole residue:	$0 < \frac{\beta}{\alpha^2-\alpha\,\beta}$ && $\frac{\beta}{\alpha^2-\alpha\,\beta} > 0$
Polarisations:	2



Quadratic pole

Pole residue:	$-\frac{1}{\alpha} + \frac{1}{-\alpha+\beta} > 0$
Polarisations:	2

Unitarity conditions

(Unitarity is demonstrably impossible)