Particle spectrograph

Wave operator and propagator

Quadratic (free) action

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

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

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

(No source constraints)

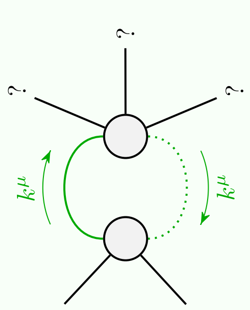
	$h^{\#1}_{1^-\,\alpha}$
$h^{\#1}_{1^-}\dagger^{\alpha}$	$\frac{1}{2}(-\alpha+\beta)k^2$

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

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

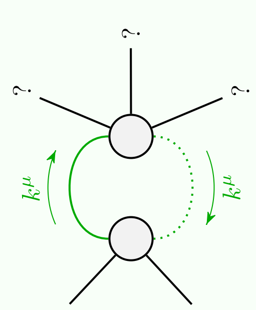
	$h^{\#1}_{2^+\,\alpha\beta}$
$h^{\#1}_{2^+}\dagger^{\alpha\beta}$	$-\frac{\alpha k^2}{2}$

Massive and massless spectra



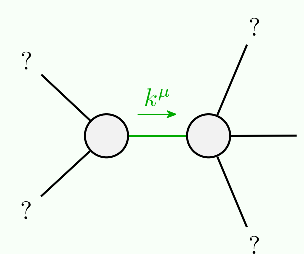
Quartic pole

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



Quartic pole

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

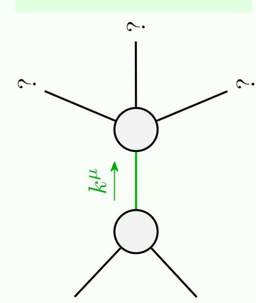


Quadratic pole

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

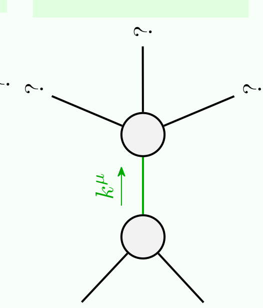
Quadratic pole

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



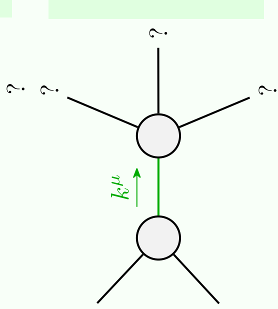
Quadratic pole

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



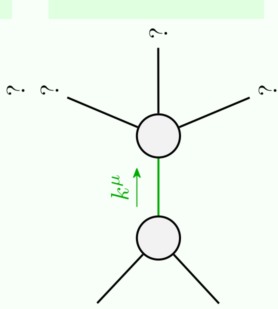
Quadratic pole

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

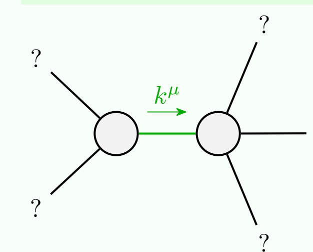


Quadratic pole

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



(No massive particles)

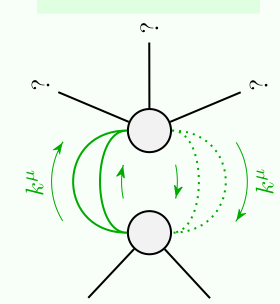


Quadratic pole

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

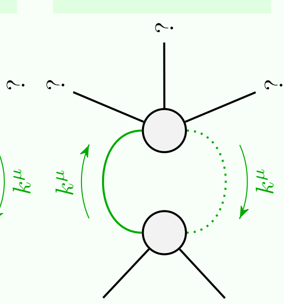
Hexic pole

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



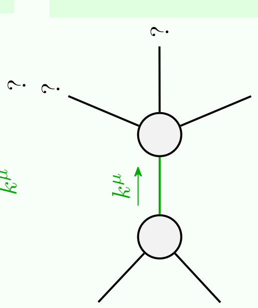
Quartic pole

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)