Particle spectrograph

Wave operator and propagator

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

	$\overset{\#1}{0}{}^{+}h$	$\overset{\#2}{0}{}^{+}h$
$\overset{\#1}{0}{}^{+}h\dagger$	$\frac{1}{2}(3\alpha-\beta)k^2$	0
$\overset{\#2}{0}{}^{+}h\dagger$	0	$\frac{1}{2}(\alpha-\beta)k^2$

(No source constraints)

	$\overset{\#2}{0}{}^{+}\mathcal{T}\dagger$	$\overset{\#1}{0}{}^{+}\mathcal{T}\dagger$
$\overset{\#1}{0}{}^{+}\mathcal{T}$	0	$\frac{2}{(3\alpha-\beta)k^2}$
$\overset{\#2}{0}{}^{+}\mathcal{T}$	$\frac{2}{(\alpha-\beta)k^2}$	0

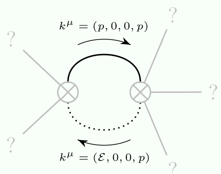
	$\overset{\#1}{1}{}^{-}h\dagger^{\alpha}$
$\overset{\#1}{1}{}^{-}h_{\alpha}$	$\frac{1}{2}(\alpha-\beta)k^2$

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

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

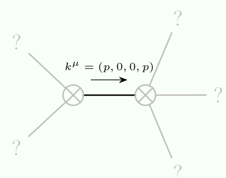
	$\overset{\#1}{1}{}^{-}\mathcal{T}_{\alpha}$
$\overset{\#1}{1}{}^{-}\mathcal{T}\dagger^{\alpha}$	$\frac{2}{(\alpha-\beta)k^2}$

Massive and massless spectra



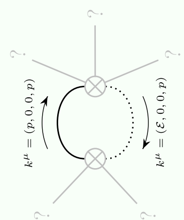
Quartic pole

Pole residue:	$0 < \frac{-3+\sqrt{57+48(\alpha-\beta)^2 p^2}}{(\alpha-\beta)(3\alpha-\beta)\beta}$ && $\frac{-3+\sqrt{57+48(\alpha-\beta)^2 p^2}}{(\alpha-\beta)(3\alpha-\beta)\beta} > 0$
Polarisations:	1



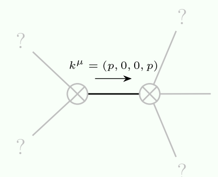
Massless particle

Pole residue:	$-\frac{2\alpha^2-5\alpha\beta+2\beta^2+\sqrt{\alpha^2(4\alpha^2-8\alpha\beta+5\beta^2)}}{3\alpha^2\beta-4\alpha\beta^2+\beta^3} > 0$
Polarisations:	1



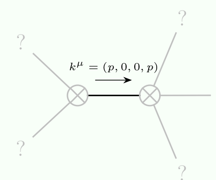
Quartic pole

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



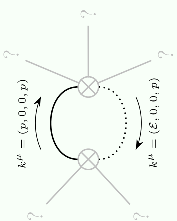
Massless particle

Pole residue:	$\frac{\alpha^2-6\alpha\beta+2\beta^2}{3\alpha^2\beta-4\alpha\beta^2+\beta^3} > 0$
Polarisations:	1



Massless particle

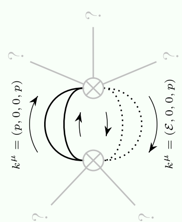
Pole residue:	$-\frac{1}{\beta} > 0$
Polarisations:	2



Quartic pole

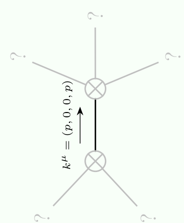
Pole residue:	$0 < -\frac{3+\sqrt{57+48(\alpha-\beta)^2 p^2}}{(\alpha-\beta)(3\alpha-\beta)\beta}$ && $-\frac{3+\sqrt{57+48(\alpha-\beta)^2 p^2}}{(\alpha-\beta)(3\alpha-\beta)\beta} > 0$
Polarisations:	1

(No particles)



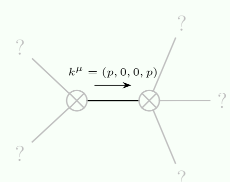
Hexic pole

Pole residue:	$0 < -\frac{1}{3\alpha^2\beta-4\alpha\beta^2+\beta^3}$ && $-\frac{1}{3\alpha^2\beta-4\alpha\beta^2+\beta^3} > 0$
Polarisations:	1



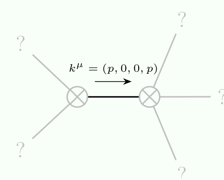
Massless particle

Pole residue:	$\frac{-2\alpha^2+5\alpha\beta-2\beta^2+\sqrt{\alpha^2(4\alpha^2-8\alpha\beta+5\beta^2)}}{\beta(3\alpha^2-4\alpha\beta+\beta^2)} > 0$
Polarisations:	1



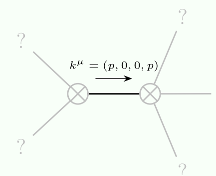
Massless particle

Pole residue:	$-\frac{\alpha^2-6\alpha\beta+2\beta^2}{3\alpha^2\beta-4\alpha\beta^2+\beta^3} > 0$
Polarisations:	1



Massless particle

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



Massless particle

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

Unitarity conditions