PSALTer results panel

$$\mathcal{S} == \iiiint \left(\mathcal{A}^{\alpha\beta\chi}\ \sigma_{\alpha\beta\chi} + f^{\alpha\beta}\ \tau(\Delta+\mathcal{K})_{\alpha\beta} + 2\,\beta_{1}\left(-\mathcal{A}_{\alpha\chi\beta}\,\mathcal{A}^{\alpha\beta\chi} + \left(2\,\mathcal{A}_{\beta\chi\alpha} - \partial_{\alpha}f_{\chi\beta} + \partial_{\chi}f_{\alpha\beta}\right)\partial^{\chi}f^{\alpha\beta} + \mathcal{A}_{\alpha\beta\chi}\left(\mathcal{A}^{\alpha\beta\chi} + 2\,\partial^{\chi}f^{\alpha\beta}\right)\right) + 2\,\alpha_{1}\left(-\partial_{\chi}\mathcal{A}_{\alpha\beta\delta} + \partial_{\delta}\mathcal{A}_{\alpha\beta\chi}\right)\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}\right)[t, x, y, z]\ dz\,dy\,dx\,dt$$

Wave operator

$$\begin{array}{c|cccc}
 & {}^{0^+}\mathcal{A}^{\parallel} & {}^{0^+}f^{\parallel} & {}^{0^+}f^{\perp} & {}^{0^-}\mathcal{A}^{\parallel} \\ \hline
{}^{0^+}\mathcal{A}^{\parallel}\dagger & \beta_{1} + 2\,\alpha_{1}k^2 & -i\sqrt{2}\,\beta_{1}k & 0 & 0 \\
{}^{0^+}f^{\parallel}\dagger & i\sqrt{2}\,\beta_{1}k & 2\,\beta_{1}k^2 & 0 & 0 \\
{}^{0^+}f^{\perp}\dagger & 0 & 0 & 0 & 0 \\
{}^{0^-}\mathcal{A}^{\parallel}\dagger & 0 & 0 & 0 & 4\,\beta_{1} + 2\,\alpha_{1}k^2
\end{array}$$

$$\begin{array}{c|ccccccc}
 & {}^{1^+}\mathcal{A}^{\parallel}{}_{\alpha\beta} & {}^{1^+}\mathcal{A}^{\perp}{}_{\alpha\beta} & {}^{1^+}f^{\parallel}{}_{\alpha\beta} & {}^{1^-}\mathcal{A}^{\parallel}{}_{\alpha} & {}^{1^-}\mathcal{A}^{\perp}{}_{\alpha} & {}^{1^-}f^{\parallel}{}_{\alpha} & {}^{1^-}f^{\perp}{}_{\alpha} \\ \hline
{}^{1^+}\mathcal{A}^{\parallel}\dagger^{\alpha\beta} & 3\,\beta_{1} + 2\,\alpha_{1}k^2 & \sqrt{2}\,\beta_{1} & i\sqrt{2}\,\beta_{1}k & 0 & 0 & 0 & 0 \\
{}^{1^+}\mathcal{A}^{\perp}\dagger^{\alpha\beta} & \sqrt{2}\,\beta_{1} & 2\,\beta_{1} & 2\,i\,\beta_{1}k & 0 & 0 & 0 & 0 \\
{}^{1^+}f^{\parallel}\dagger^{\alpha\beta} & -i\sqrt{2}\,\beta_{1}k & -2\,i\,\beta_{1}k & 2\,\beta_{1}k^2 & 0 & 0 & 0 & 0 \\
{}^{1^-}\mathcal{A}^{\parallel}\dagger^{\alpha} & 0 & 0 & 0 & \beta_{1} + 2\,\alpha_{1}k^2 & 0 & 0 & 0 \\
{}^{1^-}\mathcal{A}^{\perp}\dagger^{\alpha} & 0 & 0 & 0 & 0 & \beta_{1} & 0 & i\sqrt{2}\,\beta_{1}k \\
{}^{1^-}f^{\parallel}\dagger^{\alpha} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
{}^{1^-}f^{\perp}\dagger^{\alpha} & 0 & 0 & 0 & 0 & -i\sqrt{2}\,\beta_{1}k & 0 & 2\,\beta_{1}k^2
\end{array}$$

$$\begin{array}{c|ccc}
 & {}^{2^+}\mathcal{A}^{\parallel}{}_{\alpha\beta} & {}^{2^+}f^{\parallel}{}_{\alpha\beta} & {}^{2^-}\mathcal{A}^{\parallel}{}_{\alpha\beta\chi} \\ \hline
{}^{2^+}\mathcal{A}^{\parallel}\dagger^{\alpha\beta} & \beta_{1} + 2\,\alpha_{1}k^2 & -i\sqrt{2}\,\beta_{1}k & 0 \\
{}^{2^+}f^{\parallel}\dagger^{\alpha\beta} & i\sqrt{2}\,\beta_{1}k & 2\,\beta_{1}k^2 & 0 \\
{}^{2^-}\mathcal{A}^{\parallel}\dagger^{\alpha\beta\chi} & 0 & 0 & \beta_{1} + 2\,\alpha_{1}k^2
\end{array}$$

Saturated propagator

$$\begin{array}{c|cccc}
 & {}^{0^+}\sigma^{\parallel} & {}^{0^+}\tau^{\parallel} & {}^{0^+}\tau^{\perp} & {}^{0^-}\sigma^{\parallel} \\ \hline
{}^{0^+}\sigma^{\parallel}\dagger & \frac{1}{2\,\alpha_{1}k^2} & \frac{i}{2\sqrt{2}\,\alpha_{1}k^3} & 0 & 0 \\
{}^{0^+}\tau^{\parallel}\dagger & -\frac{i}{2\sqrt{2}\,\alpha_{1}k^3} & \frac{\beta_{1}+2\,\alpha_{1}k^2}{4\,\alpha_{1}\beta_{1}k^4} & 0 & 0 \\
{}^{0^+}\tau^{\perp}\dagger & 0 & 0 & 0 & 0 \\
{}^{0^-}\sigma^{\parallel}\dagger & 0 & 0 & 0 & \frac{1}{4\,\beta_{1}+2\,\alpha_{1}k^2}
\end{array}$$

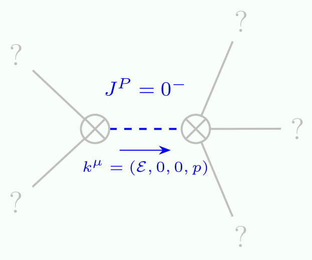
$$\begin{array}{c|ccccccc}
 & {}^{1^+}\sigma^{\parallel}{}_{\alpha\beta} & {}^{1^+}\sigma^{\perp}{}_{\alpha\beta} & {}^{1^+}\tau^{\parallel}{}_{\alpha\beta} & {}^{1^-}\sigma^{\parallel}{}_{\alpha} & {}^{1^-}\sigma^{\perp}{}_{\alpha} & {}^{1^-}\tau^{\parallel}{}_{\alpha} & {}^{1^-}\tau^{\perp}{}_{\alpha} \\ \hline
{}^{1^+}\sigma^{\parallel}\dagger^{\alpha\beta} & \frac{1}{2\,\beta_{1}+2\,\alpha_{1}k^2} & -\frac{1}{2\sqrt{2}\,(1+k^2)(\beta_{1}+\alpha_{1}k^2)} & -\frac{i\,k}{2\sqrt{2}\,(1+k^2)(\beta_{1}+\alpha_{1}k^2)} & 0 & 0 & 0 & 0 \\
{}^{1^+}\sigma^{\perp}\dagger^{\alpha\beta} & -\frac{1}{2\sqrt{2}\,(1+k^2)(\beta_{1}+\alpha_{1}k^2)} & \frac{3\,\beta_{1}+2\,\alpha_{1}k^2}{4\,\beta_{1}(1+k^2)^2(\beta_{1}+\alpha_{1}k^2)} & \frac{i\,k\,(3\,\beta_{1}+2\,\alpha_{1}k^2)}{4\,\beta_{1}(1+k^2)^2(\beta_{1}+\alpha_{1}k^2)} & 0 & 0 & 0 & 0 \\
{}^{1^+}\tau^{\parallel}\dagger^{\alpha\beta} & \frac{i\,k}{2\sqrt{2}\,(1+k^2)(\beta_{1}+\alpha_{1}k^2)} & -\frac{i\,k\,(3\,\beta_{1}+2\,\alpha_{1}k^2)}{4\,\beta_{1}(1+k^2)^2(\beta_{1}+\alpha_{1}k^2)} & \frac{k^2(3\,\beta_{1}+2\,\alpha_{1}k^2)}{4\,\beta_{1}(1+k^2)^2(\beta_{1}+\alpha_{1}k^2)} & 0 & 0 & 0 & 0 \\
{}^{1^-}\sigma^{\parallel}\dagger^{\alpha} & 0 & 0 & 0 & \frac{1}{\beta_{1}+2\,\alpha_{1}k^2} & 0 & 0 & 0 \\
{}^{1^-}\sigma^{\perp}\dagger^{\alpha} & 0 & 0 & 0 & 0 & \frac{1}{\beta_{1}(1+2\,k^2)^2} & 0 & \frac{i\sqrt{2}\,k}{\beta_{1}(1+2\,k^2)^2} \\
{}^{1^-}\tau^{\parallel}\dagger^{\alpha} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
{}^{1^-}\tau^{\perp}\dagger^{\alpha} & 0 & 0 & 0 & 0 & -\frac{i\sqrt{2}\,k}{\beta_{1}(1+2\,k^2)^2} & 0 & \frac{2\,k^2}{\beta_{1}(1+2\,k^2)^2}
\end{array}$$

$$\begin{array}{c|ccc}
 & {}^{2^+}\sigma^{\parallel}{}_{\alpha\beta} & {}^{2^+}\tau^{\parallel}{}_{\alpha\beta} & {}^{2^-}\sigma^{\parallel}{}_{\alpha\beta\chi} \\ \hline
{}^{2^+}\sigma^{\parallel}\dagger^{\alpha\beta} & \frac{1}{2\,\alpha_{1}k^2} & \frac{i}{2\sqrt{2}\,\alpha_{1}k^3} & 0 \\
{}^{2^+}\tau^{\parallel}\dagger^{\alpha\beta} & -\frac{i}{2\sqrt{2}\,\alpha_{1}k^3} & \frac{\beta_{1}+2\,\alpha_{1}k^2}{4\,\alpha_{1}\beta_{1}k^4} & 0 \\
{}^{2^-}\sigma^{\parallel}\dagger^{\alpha\beta\chi} & 0 & 0 & \frac{1}{\beta_{1}+2\,\alpha_{1}k^2}
\end{array}$$

Source constraints

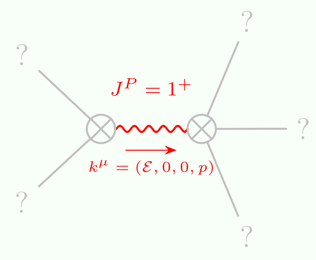
Spin-parity form	Covariant form	Multiplicities
${}^{0^+}\tau^{\perp} == 0$	$\partial_{\beta}\partial_{\alpha}\tau(\Delta+\mathcal{K})^{\alpha\beta} == 0$	1
${}^{1^-}\tau^{\parallel\alpha} == 0$	$\partial_{\chi}\partial_{\beta}\partial^{\alpha}\tau(\Delta+\mathcal{K})^{\beta\chi} == \partial_{\chi}\partial^{\chi}\partial_{\beta}\tau(\Delta+\mathcal{K})^{\beta\alpha}$	3
$2\,i\,k\ {}^{1^-}\sigma^{\perp\alpha} + {}^{1^-}\tau^{\perp\alpha} == 0$	$\partial_{\chi}\partial_{\beta}\partial^{\alpha}\tau(\Delta+\mathcal{K})^{\beta\chi} == \partial_{\chi}\partial^{\chi}\partial_{\beta}\tau(\Delta+\mathcal{K})^{\alpha\beta} + 2\,\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial_{\beta}\sigma^{\beta\alpha\chi}$	3
$i\,k\ {}^{1^+}\sigma^{\perp\alpha\beta} + {}^{1^+}\tau^{\parallel\alpha\beta} == 0$	$\partial_{\chi}\partial^{\alpha}\tau(\Delta+\mathcal{K})^{\beta\chi} + \partial_{\chi}\partial^{\beta}\tau(\Delta+\mathcal{K})^{\chi\alpha} + \partial_{\chi}\partial^{\chi}\tau(\Delta+\mathcal{K})^{\alpha\beta} + 2\,\partial_{\delta}\partial_{\chi}\partial^{\alpha}\sigma^{\chi\beta\delta} + 2\,\partial_{\delta}\partial^{\delta}\partial_{\chi}\sigma^{\chi\alpha\beta} ==$ $\partial_{\chi}\partial^{\alpha}\tau(\Delta+\mathcal{K})^{\chi\beta} + \partial_{\chi}\partial^{\beta}\tau(\Delta+\mathcal{K})^{\alpha\chi} + \partial_{\chi}\partial^{\chi}\tau(\Delta+\mathcal{K})^{\beta\alpha} + 2\,\partial_{\delta}\partial_{\chi}\partial^{\beta}\sigma^{\chi\alpha\delta}$	3
Total expected gauge generators:		10

Massive spectrum



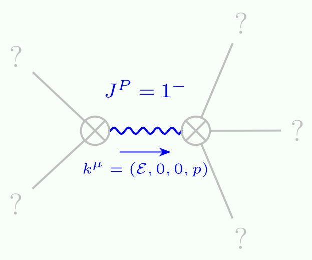
Massive particle

Pole residue:	$-\frac{1}{2\,\alpha_{1}} > 0$
Square mass:	$-\frac{2\,\beta_{1}}{\alpha_{1}} > 0$
Spin:	0
Parity:	Odd



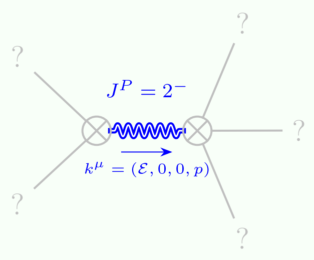
Massive particle

Pole residue:	$\frac{3\,\alpha_{1}-2\,\beta_{1}}{4\,\alpha_{1}^2-4\,\alpha_{1}\beta_{1}} > 0$
Square mass:	$-\frac{\beta_{1}}{\alpha_{1}} > 0$
Spin:	1
Parity:	Even



Massive particle

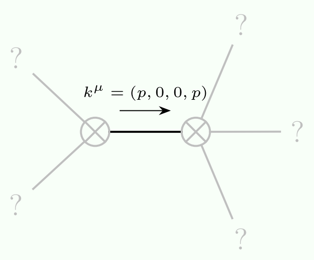
Pole residue:	$-\frac{1}{2\,\alpha_{1}} > 0$
Square mass:	$-\frac{\beta_{1}}{2\,\alpha_{1}} > 0$
Spin:	1
Parity:	Odd



Massive particle

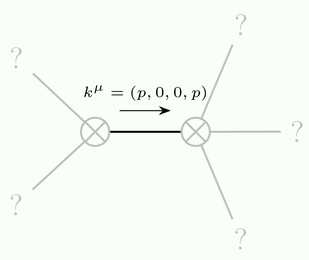
Pole residue:	$-\frac{1}{2\,\alpha_{1}} > 0$
Square mass:	$-\frac{\beta_{1}}{2\,\alpha_{1}} > 0$
Spin:	2
Parity:	Odd

Massless spectrum



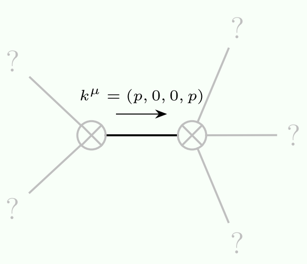
Massless particle

Pole residue:	$\frac{7}{\alpha_{1}} + \frac{2\,p^2}{\beta_{1}} + \frac{4\,\alpha_{1}p^4}{\beta_{1}^2} > 0$
Polarisations:	2



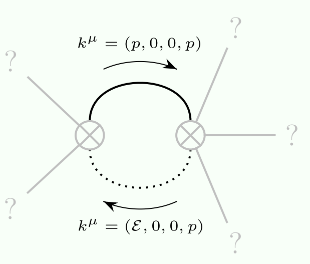
Massless particle

Pole residue:	$-\frac{1}{\alpha_{1}\beta_{1}^2}\left(\beta_{1}^2 + 28\,\alpha_{1}\beta_{1}p^2 + 3\sqrt{\left(\beta_{1}^2\left(9\,\beta_{1}^2 - 8\,\alpha_{1}\beta_{1}p^2 + 144\,\alpha_{1}^2p^4\right)\right)}\right) > 0$
Polarisations:	3



Massless particle

Pole residue:	$\frac{1}{\alpha_{1}\beta_{1}^2}\left(-\beta_{1}\left(\beta_{1} + 28\,\alpha_{1}p^2\right) + 3\sqrt{\left(\beta_{1}^2\left(9\,\beta_{1}^2 - 8\,\alpha_{1}\beta_{1}p^2 + 144\,\alpha_{1}^2p^4\right)\right)}\right) > 0$
Polarisations:	3



Quartic pole

Pole residue:	$0 < \frac{p^2}{\alpha_{1}}$ && $\frac{p^2}{\alpha_{1}} > 0$
Polarisations:	3

Unitarity conditions

(Demonstrably impossible)