PSALTer results panel

Wave operator and propagator

	$1^{+}\sigma^{\parallel}_{\alpha\beta}$	$1^{+}\sigma^{\perp}_{\alpha\beta}$	$1^{+}\tau^{\parallel}_{\alpha\beta}$	$1^{-}\sigma^{\parallel}_{\alpha}$	$1^{-}\sigma^{\perp}_{\alpha}$	$1^{-}\tau^{\parallel}_{\alpha}$	$1^{-}\tau^{\perp}_{\alpha}$
$1^{+}\sigma^{\parallel}\dagger^{\alpha\beta}$	0	$\frac{2\sqrt{2}}{\alpha_0+\alpha_0 k^2}$	$\frac{2 i\sqrt{2}\,k}{\alpha_0+\alpha_0 k^2}$	0	0	0	0
$1^{+}\sigma^{\perp}\dagger^{\alpha\beta}$	$\frac{2\sqrt{2}}{\alpha_0+\alpha_0 k^2}$	$-\frac{2(\alpha_0+2(\alpha_1-\alpha_2)k^2)}{\alpha_0^2(1+k^2)^2}$	$-\frac{2 i k(\alpha_0+2(\alpha_1-\alpha_2)k^2)}{\alpha_0^2(1+k^2)^2}$	0	0	0	0
$1^{+}\tau^{\parallel}\dagger^{\alpha\beta}$	$-\frac{2 i\sqrt{2}\,k}{\alpha_0+\alpha_0 k^2}$	$\frac{2 i k(\alpha_0+2(\alpha_1-\alpha_2)k^2)}{\alpha_0^2(1+k^2)^2}$	$-\frac{2k^2(\alpha_0+2(\alpha_1-\alpha_2)k^2)}{\alpha_0^2(1+k^2)^2}$	0	0	0	0
$1^{-}\sigma^{\parallel}\dagger^{\alpha}$	0	0	0 0		$-\frac{2\sqrt{2}}{\alpha_0+2\alpha_0 k^2}$	0	$-\frac{4 i k}{\alpha_0+2\alpha_0 k^2}$
$1^{-}\sigma^{\perp}\dagger^{\alpha}$	0	0	0	$-\frac{2\sqrt{2}}{\alpha_0+2\alpha_0 k^2}$	$-\frac{2(\alpha_0+4\alpha_1 k^2)}{(\alpha_0+2\alpha_0 k^2)^2}$	0	$-\frac{2 i\sqrt{2}\,k(\alpha_0+4\alpha_1 k^2)}{(\alpha_0+2\alpha_0 k^2)^2}$
$1^{-}\tau^{\parallel}\dagger^{\alpha}$	0	0	0 0		0	0	0
$1^{-}\tau^{\perp}\dagger^{\alpha}$	0	0	0	$\frac{4 i k}{\alpha_0+2\alpha_0 k^2}$	$\frac{2 i\sqrt{2}\,k(\alpha_0+4\alpha_1 k^2)}{(\alpha_0+2\alpha_0 k^2)^2}$	0	$-\frac{4k^2(\alpha_0+4\alpha_1 k^2)}{(\alpha_0+2\alpha_0 k^2)^2}$

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

	$0^{+}\mathcal{A}^{\parallel}$	$0^{+}f^{\parallel}$	$0^{+}f^{\perp}$	$0^{-}\mathcal{A}^{\parallel}$
$0^{+}\mathcal{A}^{\parallel}\dagger$	$\frac{1}{2}(\alpha_0+4(\alpha_1+\alpha_2+3\alpha_3)k^2)$	$-\frac{i\alpha_0 k}{\sqrt{2}}$	0	0
$0^{+}f^{\parallel}\dagger$	$\frac{i\alpha_0 k}{\sqrt{2}}$	0	0	0
$0^{+}f^{\perp}\dagger$	0 0	0		0
$0^{-}\mathcal{A}^{\parallel}\dagger$	0 0	0		$\frac{\alpha_0}{2}$

	$2^{+}\sigma^{\parallel}_{\alpha\beta}$	$2^{+}\tau^{\parallel}_{\alpha\beta}$	$2^{-}\sigma^{\parallel}_{\alpha\beta\chi}$
$2^{+}\sigma^{\parallel}\dagger^{\alpha\beta}$	0	$\frac{2 i\sqrt{2}}{\alpha_0 k}$	0
$2^{+}\tau^{\parallel}\dagger^{\alpha\beta}$	$-\frac{2 i\sqrt{2}}{\alpha_0 k}$	$\frac{2(\alpha_0-2(\alpha_1+\alpha_2)k^2)}{\alpha_0^2 k^2}$	0
$2^{-}\sigma^{\parallel}\dagger^{\alpha\beta\chi}$	0	0	$-\frac{4}{\alpha_0}$

$$
\begin{aligned}
\mathcal{S} == & \iiiint\Big(\mathcal{A}^{\alpha\beta\chi}\ \sigma_{\alpha\beta\chi} + f^{\alpha\beta}\ \tau(\Delta+\mathcal{K})_{\alpha\beta} - \frac{1}{2}\alpha_0 \\
& (\mathcal{A}_{\alpha\chi\beta}\,\mathcal{A}^{\alpha\beta\chi} + \\
& \mathcal{A}^{\alpha\beta}{}_{\alpha}\,\mathcal{A}_{\beta}{}^{\chi}{}_{\chi} + 2\ f^{\alpha\beta} \\
& \partial_\beta\mathcal{A}_{\alpha}{}^{\chi}{}_{\chi} - 2\,\partial_\beta\mathcal{A}^{\alpha\beta}{}_{\alpha} - \\
& 2\ f^{\alpha\beta}\,\partial_\chi\mathcal{A}_{\alpha}{}^{\chi}{}_{\beta} + \\
& 2\ f^{\alpha}{}_{\alpha}\,\partial_\chi\mathcal{A}^{\beta\chi}{}_{\beta}) - \\
& \alpha_1(\partial_\chi\mathcal{A}_{\beta}{}^{\delta}{}_{\delta}\,\partial^\chi\mathcal{A}^{\alpha\beta}{}_{\alpha} + \\
& (\partial_\alpha\mathcal{A}^{\alpha\beta\chi} - 2\,\partial^\chi\mathcal{A}^{\alpha\beta}{}_{\alpha}) \\
& \partial_\delta\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}) + \\
& 4\,\alpha_3\,\partial_\beta\mathcal{A}^{\alpha\beta}{}_{\alpha}\,\partial_\delta\mathcal{A}^{\chi\,\delta}{}_{\chi} - \\
& \alpha_2(\partial_\chi\mathcal{A}_{\delta}{}^{\zeta}{}_{\zeta}\,\partial^\delta\mathcal{A}^{\beta\chi}{}_{\beta} + \\
& (\partial_\beta\mathcal{A}^{\beta\chi\,\delta} - 2\,\partial^\delta\mathcal{A}^{\beta\chi}{}_{\beta}) \\
& \partial_\zeta\mathcal{A}_{\delta}{}^{\zeta}{}_{\chi}))[\\
& t, x, y, z]\, d z \\
& d y \\
& d x \\
& d t
\end{aligned}
$$

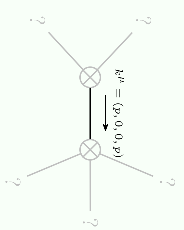
	$0^{+}\sigma^{\parallel}$	$0^{+}\tau^{\parallel}$	$0^{+}\tau^{\perp}$	$0^{-}\sigma^{\parallel}$
$0^{+}\sigma^{\parallel}\dagger$	0	$-\frac{i\sqrt{2}}{\alpha_0 k}$	0	0
$0^{+}\tau^{\parallel}\dagger$	$\frac{i\sqrt{2}}{\alpha_0 k}$	$-\frac{\alpha_0+4(\alpha_1+\alpha_2+3\alpha_3)k^2}{\alpha_0^2 k^2}$	0	0
$0^{+}\tau^{\perp}\dagger$	0	0	0	0
$0^{-}\sigma^{\parallel}\dagger$	0	0	0	$\frac{2}{\alpha_0}$

	$2^{+}\mathcal{A}^{\parallel}_{\alpha\beta}$	$2^{+}f^{\parallel}_{\alpha\beta}$	$2^{-}\mathcal{A}^{\parallel}_{\alpha\beta\chi}$
$2^{+}\mathcal{A}^{\parallel}\dagger^{\alpha\beta}$	$\frac{1}{4}(-\alpha_0+2(\alpha_1+\alpha_2)k^2)$	$\frac{i\alpha_0 k}{2\sqrt{2}}$	0
$2^{+}f^{\parallel}\dagger^{\alpha\beta}$	$-\frac{i\alpha_0 k}{2\sqrt{2}}$	0	0
$2^{-}\mathcal{A}^{\parallel}\dagger^{\alpha\beta\chi}$	0 0		$-\frac{\alpha_0}{4}$

	$1^{+}\mathcal{A}^{\parallel}_{\alpha\beta}$	$1^{+}\mathcal{A}^{\perp}_{\alpha\beta}$	$1^{+}f^{\parallel}_{\alpha\beta}$	$1^{-}\mathcal{A}^{\parallel}_{\alpha}$	$1^{-}\mathcal{A}^{\perp}_{\alpha}$	$1^{-}f^{\parallel}_{\alpha}$	$1^{-}f^{\perp}_{\alpha}$
$1^{+}\mathcal{A}^{\parallel}\dagger^{\alpha\beta}$	$\frac{1}{4}(\alpha_0+2(\alpha_1-\alpha_2)k^2)$	$\frac{\alpha_0}{2\sqrt{2}}$	$\frac{i\alpha_0 k}{2\sqrt{2}}$	0	0	0	0
$1^{+}\mathcal{A}^{\perp}\dagger^{\alpha\beta}$	$\frac{\alpha_0}{2\sqrt{2}}$	0	0	0	0	0	0
$1^{+}f^{\parallel}\dagger^{\alpha\beta}$	$-\frac{i\alpha_0 k}{2\sqrt{2}}$	0	0	0	0	0	0
$1^{-}\mathcal{A}^{\parallel}\dagger^{\alpha}$	0 0		0	$\frac{\alpha_0}{4}+\alpha_1 k^2$	$-\frac{\alpha_0}{2\sqrt{2}}$	0	$-\frac{1}{2} i\,\alpha_0 k$
$1^{-}\mathcal{A}^{\perp}\dagger^{\alpha}$	0 0	0		$-\frac{\alpha_0}{2\sqrt{2}}$	0	0	0
$1^{-}f^{\parallel}\dagger^{\alpha}$	0 0	0		0	0	0	0
$1^{-}f^{\perp}\dagger^{\alpha}$	0 0	0		$\frac{i\alpha_0 k}{2}$	0	0	0

Massive and massless spectra

Massless particle	
Pole residue:	$\frac{1}{\alpha_0} > 0$
Polarisations:	2



(No particles)

Unitarity conditions

$\alpha_0 > 0$