PSALTer results panel

Wave operator and propagator

	${}^{1^+}\mathcal{A}_s{}^{\perp}{}_{\alpha\beta}$	${}^{1^-}h^{\perp}{}_{\alpha}$	${}^{1^-}\mathcal{A}_s{}^{\perp t}{}_{\alpha}$	${}^{1^-}\mathcal{A}_s{}^{\parallel t}{}_{\alpha}$	${}^{1^-}\mathcal{A}_s{}^{\perp h}{}_{\alpha}$	${}^{1^-}\mathcal{A}_s{}^{\parallel h}{}_{\alpha}$
${}^{1^+}\mathcal{A}_s{}^{\perp}\dagger^{\alpha\beta}$	$\frac{1}{4}(a_0+k^2(h_{10}-h_9))$	0	0	0	0	0
${}^{1^-}h^{\perp}\dagger^{\alpha}$	0 0		$-\frac{i a_0 k}{4\sqrt{6}}$	$\frac{1}{4} i \sqrt{\frac{5}{6}} a_0 k$	$\frac{i a_0 k}{8\sqrt{3}}$	$-\frac{i a_0 k}{4\sqrt{6}}$
${}^{1^-}\mathcal{A}_s{}^{\perp t}\dagger^{\alpha}$	0	$\frac{i a_0 k}{4\sqrt{6}}$	$\frac{1}{6}(-2a_0-k^2(h_{11}+h_7+h_9))$	$\frac{1}{6}\sqrt{5}(a_0+k^2(h_{10}+h_{12}+h_8))$	$\frac{a_0+2k^2(h_{11}+h_7+h_9)}{12\sqrt{2}}$	$\frac{1}{12}(a_0+k^2(4h_{10}+h_{12}-2h_8))$
${}^{1^-}\mathcal{A}_s{}^{\parallel t}\dagger^{\alpha}$	0	$-\frac{1}{4} i \sqrt{\frac{5}{6}} a_0 k$	$\frac{1}{6}\sqrt{5}(a_0+k^2(h_{10}+h_{12}+h_8))$	$\frac{1}{6}(2a_0-5k^2(h_{11}+h_7+h_9))$	$\frac{1}{12}\sqrt{\frac{5}{2}}(a_0-2k^2(h_{10}+h_{12}+h_8))$	$\frac{1}{12}\sqrt{5}(a_0-k^2(h_{11}-2h_7+4h_9))$
${}^{1^-}\mathcal{A}_s{}^{\perp h}\dagger^{\alpha}$	0	$-\frac{i a_0 k}{8\sqrt{3}}$	$\frac{a_0+2k^2(h_{11}+h_7+h_9)}{12\sqrt{2}}$	$\frac{1}{12}\sqrt{\frac{5}{2}}(a_0-2k^2(h_{10}+h_{12}+h_8))$	$\frac{1}{12}(a_0-k^2(h_{11}+h_7+h_9))$	$\frac{-4a_0-k^2(4h_{10}+h_{12}-2h_8)}{12\sqrt{2}}$
${}^{1^-}\mathcal{A}_s{}^{\parallel h}\dagger^{\alpha}$	0	$\frac{i a_0 k}{4\sqrt{6}}$	$\frac{1}{12}(a_0+k^2(4h_{10}+h_{12}-2h_8))$	$\frac{1}{12}\sqrt{5}(a_0-k^2(h_{11}-2h_7+4h_9))$	$\frac{-4a_0-k^2(4h_{10}+h_{12}-2h_8)}{12\sqrt{2}}$	$\frac{1}{12}(-a_0+2k^2(2h_{11}-h_7-4h_9))$

Spin-parity form		Covariant form	Multiplicities
$k\,{}^{0^+}\mathcal{W}_s{}^{\perp t}+2\,i\,{}^{0^+}\mathcal{T}^{\perp}==0$	2	$\partial_\beta\partial_\alpha\mathcal{T}^{\alpha\beta}==\partial_\chi\partial_\beta\partial_\alpha\mathcal{W}^{\alpha\beta\chi}$	1
$2k\,{}^{1^-}\mathcal{W}_s{}^{\perp h\alpha}+k\,{}^{1^-}\mathcal{W}_s{}^{\perp t\alpha}+6\,i\,{}^{1^-}\mathcal{T}^{\perp\alpha}==0$	2	$\partial_\chi\partial_\beta\partial^\alpha\mathcal{T}^{\beta\chi}+\partial_\delta\partial^\delta\partial_\chi\partial_\beta\mathcal{W}^{\beta\alpha\chi}==2\,\partial_\chi\partial^\chi\partial_\beta\mathcal{T}^{\alpha\beta}+\partial_\delta\partial_\chi\partial_\beta\partial^\alpha\mathcal{W}^{\beta\chi\delta}$	3
Total expected gauge generators:			4

	${}^{3^-}\mathcal{W}_s{}^{\parallel}{}_{\alpha\beta\chi}$
${}^{3^-}\mathcal{W}_s{}^{\parallel}\dagger^{\alpha\beta\chi}$	$-\frac{2}{a_0}$

	${}^{3^-}\mathcal{A}_s{}^{\parallel}{}_{\alpha\beta\chi}$
${}^{3^-}\mathcal{A}_s{}^{\parallel}\dagger^{\alpha\beta\chi}$	$-\frac{a_0}{2}$

$$\mathcal{S}==\iiiint\Big(\tfrac{1}{4}\big(-2a_0\mathcal{A}_{\alpha\chi\beta}\mathcal{A}^{\alpha\beta\chi}+2a_0\mathcal{A}^{\alpha}{}_{\alpha}{}^{\beta}\mathcal{A}^{\chi}{}_{\beta\chi}+4\mathcal{A}^{\alpha\beta\chi}\mathcal{W}_{\alpha\beta\chi}+4\mathcal{T}^{\alpha\beta}h_{\alpha\beta}+2a_0h^{\alpha\beta}\partial_\beta\mathcal{A}_{\alpha}{}^{\chi}{}_{\chi}-2a_0h^{\alpha\beta}\partial_\chi\mathcal{A}_{\alpha\beta}{}^{\chi}-a_0h^{\alpha}{}_{\alpha}\partial_\chi\mathcal{A}^{\beta}{}_{\beta}{}^{\chi}+a_0h^{\alpha}{}_{\alpha}\partial_\chi\mathcal{A}^{\beta\chi}{}_{\beta}-2h_8\partial_\beta\mathcal{A}_{\chi}{}^{\delta}{}_{\delta}\partial^\chi\mathcal{A}^{\alpha}{}_{\alpha}{}^{\beta}-2h_{12}\partial_\beta\mathcal{A}^{\delta}{}_{\chi\delta}\partial^\chi\mathcal{A}^{\alpha}{}_{\alpha}{}^{\beta}-2h_7\partial_\chi\mathcal{A}_{\beta}{}^{\delta}{}_{\delta}\partial^\chi\mathcal{A}^{\alpha}{}_{\alpha}{}^{\beta}-2h_{11}\partial_\chi\mathcal{A}^{\delta}{}_{\beta\delta}\partial^\chi\mathcal{A}^{\alpha}{}_{\alpha}{}^{\beta}-2h_{10}\partial_\beta\mathcal{A}^{\delta}{}_{\chi\delta}\partial^\chi\mathcal{A}^{\alpha\beta}{}_{\alpha}-2h_9\partial_\chi\mathcal{A}^{\delta}{}_{\beta\delta}\partial^\chi\mathcal{A}^{\alpha\beta}{}_{\alpha}-2h_7\partial_\beta\mathcal{A}^{\alpha\beta\chi}\partial_\delta\mathcal{A}_{\alpha\chi}{}^{\delta}-2h_8\partial_\beta\mathcal{A}^{\alpha\beta\chi}\partial_\delta\mathcal{A}_{\alpha}{}^{\delta}{}_{\chi}-2h_{10}\partial_\alpha\mathcal{A}^{\alpha\beta\chi}\partial_\delta\mathcal{A}_{\beta\chi}{}^{\delta}+2h_{12}\partial^\chi\mathcal{A}^{\alpha}{}_{\alpha}{}^{\beta}\partial_\delta\mathcal{A}_{\beta\chi}{}^{\delta}+4h_{10}\partial^\chi\mathcal{A}^{\alpha\beta}{}_{\alpha}\partial_\delta\mathcal{A}_{\beta\chi}{}^{\delta}-2h_{11}\partial_\alpha\mathcal{A}^{\alpha\beta\chi}\partial_\delta\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}-2h_{12}\partial_\alpha\mathcal{A}^{\alpha\beta\chi}\partial_\delta\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}+4h_7\partial^\chi\mathcal{A}^{\alpha}{}_{\alpha}{}^{\beta}\partial_\delta\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}+4h_8\partial^\chi\mathcal{A}^{\alpha}{}_{\alpha}{}^{\beta}\partial_\delta\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}+2h_{11}\partial^\chi\mathcal{A}^{\alpha\beta}{}_{\alpha}\partial_\delta\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}+2h_{12}\partial^\chi\mathcal{A}^{\alpha\beta}{}_{\alpha}\partial_\delta\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}-2h_9\partial_\alpha\mathcal{A}^{\alpha\beta\chi}\partial_\delta\mathcal{A}_{\chi\beta}{}^{\delta}+2h_{11}\partial^\chi\mathcal{A}^{\alpha}{}_{\alpha}{}^{\beta}\partial_\delta\mathcal{A}_{\chi}{}^{\delta}{}_{\beta}+4h_9\partial^\chi\mathcal{A}^{\alpha\beta}{}_{\alpha}\partial_\delta\mathcal{A}_{\chi}{}^{\delta}{}_{\beta}\big)\Big)[t,x,y,z]\,dz\,dy\,dx\,dt$$

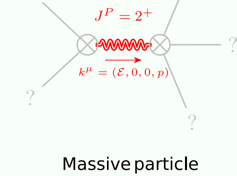
	${}^{0^+}\mathcal{T}^{\perp}$	${}^{0^+}\mathcal{T}^{\parallel}$	${}^{0^+}\mathcal{W}_s{}^{\perp t}$	${}^{0^+}\mathcal{W}_s{}^{\parallel}$	${}^{0^+}\mathcal{W}_s{}^{\perp h}$
${}^{0^+}\mathcal{T}^{\perp}\dagger$	$\frac{4k^2(-a_0+2k^2(7h_{10}+3(h_{11}+h_{12}+h_7+h_8)+7h_9))}{3a_0^2(4+k^2)^2}$	$\frac{8k^2(2h_{10}-h_{11}-h_{12}+2h_9)}{\sqrt{3}a_0^2(4+k^2)}$	$-\frac{8ik(a_0-2k^2(7h_{10}+3(h_{11}+h_{12}+h_7+h_8)+7h_9))}{3a_0^2(4+k^2)^2}$	$\frac{10ik}{3a_0(4+k^2)}$	$\frac{4i\sqrt{2}k}{3a_0(4+k^2)}$
${}^{0^+}\mathcal{T}^{\parallel}\dagger$	$\frac{8k^2(2h_{10}-h_{11}-h_{12}+2h_9)}{\sqrt{3}a_0^2(4+k^2)}$	$\frac{4(a_0+2k^2(h_{10}-h_{11}-h_{12}+h_7+h_8+h_9))}{a_0^2k^2}$	$\frac{16ik(2h_{10}-h_{11}-h_{12}+2h_9)}{\sqrt{3}a_0^2(4+k^2)}$	$-\frac{2i}{\sqrt{3}a_0k}$	$\frac{4i\sqrt{\frac{2}{3}}}{a_0k}$
${}^{0^+}\mathcal{W}_s{}^{\perp t}\dagger$	$\frac{8ik(a_0-2k^2(7h_{10}+3(h_{11}+h_{12}+h_7+h_8)+7h_9))}{3a_0^2(4+k^2)^2}$	$-\frac{16ik(2h_{10}-h_{11}-h_{12}+2h_9)}{\sqrt{3}a_0^2(4+k^2)}$	$\frac{16(-a_0+2k^2(7h_{10}+3(h_{11}+h_{12}+h_7+h_8)+7h_9))}{3a_0^2(4+k^2)^2}$	$\frac{20}{3a_0(4+k^2)}$	$\frac{8\sqrt{2}}{3a_0(4+k^2)}$
${}^{0^+}\mathcal{W}_s{}^{\parallel}\dagger$	$-\frac{10ik}{12a_0+3a_0k^2}$	$\frac{2i}{\sqrt{3}a_0k}$	$\frac{20}{12a_0+3a_0k^2}$	0	0
${}^{0^+}\mathcal{W}_s{}^{\perp h}\dagger$	$-\frac{4i\sqrt{2}k}{12a_0+3a_0k^2}$	$-\frac{4i\sqrt{\frac{2}{3}}}{a_0k}$	$\frac{8\sqrt{2}}{12a_0+3a_0k^2}$	0	0

	${}^{0^+}h^{\perp}$	${}^{0^+}h^{\parallel}$	${}^{0^+}\mathcal{A}_s{}^{\perp t}$	${}^{0^+}\mathcal{A}_s{}^{\parallel}$	${}^{0^+}\mathcal{A}_s{}^{\perp h}$
${}^{0^+}h^{\perp}\dagger$	0	0 0		$\frac{i a_0 k}{4}$	$\frac{i a_0 k}{8\sqrt{2}}$
${}^{0^+}h^{\parallel}\dagger$	0	0 0		$-\frac{i a_0 k}{4\sqrt{3}}$	$\frac{5 i a_0 k}{8\sqrt{6}}$
${}^{0^+}\mathcal{A}_s{}^{\perp t}\dagger$	0	0 0		$\frac{a_0}{2}$	$\frac{a_0}{4\sqrt{2}}$
${}^{0^+}\mathcal{A}_s{}^{\parallel}\dagger$	$-\frac{1}{4} i a_0 k$	$\frac{i a_0 k}{4\sqrt{3}}$	$-\frac{a_0}{2}$	$-\frac{2}{3}k^2(h_{10}+h_{11}+h_{12}+h_7+h_8+h_9)$	$\frac{3a_0+2k^2(-5h_{10}-2h_{11}-2h_{12}+h_7+h_8-5h_9)}{12\sqrt{2}}$
${}^{0^+}\mathcal{A}_s{}^{\perp h}\dagger$	$-\frac{i a_0 k}{8\sqrt{2}}$	$-\frac{5 i a_0 k}{8\sqrt{6}}$	$\frac{a_0}{4\sqrt{2}}$	$\frac{3a_0+2k^2(-5h_{10}-2h_{11}-2h_{12}+h_7+h_8-5h_9)}{12\sqrt{2}}$	$\frac{1}{12}(-3a_0-k^2(13h_{10}-8h_{11}-8h_{12}+7(h_7+h_8)+13h_9))$

	${}^{2^+}\mathcal{T}^{\parallel}{}_{\alpha\beta}$	${}^{2^+}\mathcal{W}_s{}^{\parallel}{}_{\alpha\beta}$	${}^{2^+}\mathcal{W}_s{}^{\perp}{}_{\alpha\beta}$	${}^{2^-}\mathcal{W}_s{}^{\parallel}{}_{\alpha\beta\chi}$
${}^{2^+}\mathcal{T}^{\parallel}\dagger^{\alpha\beta}$	$\frac{-8a_0^2+8a_0k^2(-h_{11}-h_{12}+h_7+h_8)-2k^4((h_{11}+h_{12})^2-4(h_7+h_8)(h_{10}+h_9))}{a_0^2k^2(a_0+k^2(h_{10}+h_9))}$	$\frac{4i(a_0+k^2(-h_{10}+h_{11}+h_{12}-h_9))}{\sqrt{3}a_0k(a_0+k^2(h_{10}+h_9))}$	$-\frac{2i\sqrt{\frac{2}{3}}(4a_0+k^2(2h_{10}+h_{11}+h_{12}+2h_9))}{a_0k(a_0+k^2(h_{10}+h_9))}$	0
${}^{2^+}\mathcal{W}_s{}^{\parallel}\dagger^{\alpha\beta}$	$-\frac{4i(a_0+k^2(-h_{10}+h_{11}+h_{12}-h_9))}{\sqrt{3}a_0k(a_0+k^2(h_{10}+h_9))}$	$-\frac{8}{3(a_0+k^2(h_{10}+h_9))}$	$\frac{4\sqrt{2}}{3(a_0+k^2(h_{10}+h_9))}$	0
${}^{2^+}\mathcal{W}_s{}^{\perp}\dagger^{\alpha\beta}$	$\frac{2i\sqrt{\frac{2}{3}}(4a_0+k^2(2h_{10}+h_{11}+h_{12}+2h_9))}{a_0k(a_0+k^2(h_{10}+h_9))}$	$\frac{4\sqrt{2}}{3(a_0+k^2(h_{10}+h_9))}$	$-\frac{4}{3(a_0+k^2(h_{10}+h_9))}$	0
${}^{2^-}\mathcal{W}_s{}^{\parallel}\dagger^{\alpha\beta\chi}$	0	0	0	$\frac{4}{a_0}$

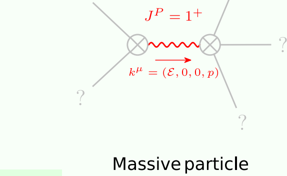
	${}^{2^+}h^{\parallel}{}_{\alpha\beta}$	${}^{2^+}\mathcal{A}_s{}^{\parallel}{}_{\alpha\beta}$	${}^{2^+}\mathcal{A}_s{}^{\perp}{}_{\alpha\beta}$	${}^{2^-}\mathcal{A}_s{}^{\parallel}{}_{\alpha\beta\chi}$
${}^{2^+}h^{\parallel}\dagger^{\alpha\beta}$	0	$-\frac{i a_0 k}{4\sqrt{3}}$	$-\frac{i a_0 k}{2\sqrt{6}}$	0
${}^{2^+}\mathcal{A}_s{}^{\parallel}\dagger^{\alpha\beta}$	$\frac{i a_0 k}{4\sqrt{3}}$	$\frac{1}{6}(-3a_0-k^2(h_{10}+h_{11}+h_{12}+h_7+h_8+h_9))$	$\frac{k^2(2h_{10}-h_{11}-h_{12}-4(h_7+h_8)+2h_9)}{12\sqrt{2}}$	0
${}^{2^+}\mathcal{A}_s{}^{\perp}\dagger^{\alpha\beta}$	$\frac{i a_0 k}{2\sqrt{6}}$	$\frac{k^2(2h_{10}-h_{11}-h_{12}-4(h_7+h_8)+2h_9)}{12\sqrt{2}}$	$\frac{1}{12}(3a_0-k^2(h_{10}-2h_{11}-2h_{12}+4(h_7+h_8)+h_9))$	0
${}^{2^-}\mathcal{A}_s{}^{\parallel}\dagger^{\alpha\beta\chi}$	0	0	0	$\frac{a_0}{4}$

Massive and massless spectra



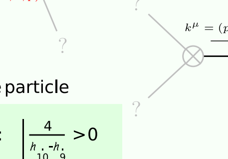
Massive particle

Pole residue:	$\frac{2((-2h_{10}+h_{11}+h_{12}-2h_9)^2-2a_0(h_{10}+h_9))}{a_0(h_{10}+h_9)^2}>0$
Square mass:	$-\frac{a_0}{h_{10}+h_9}>0$
Spin:	2
Parity:	Even



Massive particle

Pole residue:	$\frac{4}{h_{10}-h_9}>0$
Square mass:	$-\frac{a_0}{h_{10}-h_9}>0$
Spin:	1
Parity:	Even



Massless particle

Pole residue:	$-\frac{1}{a_0}>0$
Polarisations:	2

Unitarity conditions

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