

PSALTer results panel

$$S==\iiint\left(\frac{1}{6}\left(2t_{\textcolor{violet}{1}}\mathcal{A}^{\alpha\textcolor{violet}{i}}_{\textcolor{violet}{\alpha}}\mathcal{A}_{\textcolor{violet}{i}\textcolor{violet}{\theta}}^{\textcolor{violet}{\theta}}+6\mathcal{A}^{\alpha\beta\chi}_{\textcolor{violet}{\sigma}\textcolor{violet}{\alpha\beta\chi}}f^{\alpha\beta}\tau\left(\Delta+\mathcal{K}\right)_{\alpha\beta}-4t_{\textcolor{violet}{1}}\mathcal{A}_{\textcolor{violet}{\alpha}}^{\textcolor{violet}{\theta}}\partial_{\textcolor{violet}{i}}f^{\alpha\textcolor{violet}{i}}-6r_{\textcolor{violet}{1}}\partial_{\beta}\mathcal{A}_{\textcolor{violet}{i}\textcolor{violet}{\theta}}^{\textcolor{violet}{\theta}}\partial'\mathcal{A}^{\alpha\beta}_{\textcolor{violet}{\alpha}}+6r_{\textcolor{violet}{1}}\partial_{\textcolor{violet}{\beta}}\mathcal{A}_{\textcolor{violet}{\theta}}^{\textcolor{violet}{\theta}}\partial'\mathcal{A}^{\alpha\beta}_{\textcolor{violet}{\alpha}}+4t_{\textcolor{violet}{1}}\mathcal{A}_{\textcolor{violet}{i}\textcolor{violet}{\theta}}^{\textcolor{violet}{\theta}}\partial'f^{\alpha}_{\textcolor{violet}{\alpha}}-2t_{\textcolor{violet}{1}}\partial_{\textcolor{violet}{i}}f_{\textcolor{violet}{\theta}}^{\textcolor{violet}{\theta}}\partial'f^{\alpha}_{\textcolor{violet}{\alpha}}+6r_{\textcolor{violet}{1}}\partial_{\alpha}\mathcal{A}^{\alpha\beta\textcolor{violet}{i}}\partial_{\textcolor{violet}{\theta}}\mathcal{A}_{\textcolor{violet}{\beta}\textcolor{violet}{i}}^{\textcolor{violet}{\theta}}-12r_{\textcolor{violet}{1}}\partial'\mathcal{A}^{\alpha\beta}_{\textcolor{violet}{\alpha}}\partial_{\textcolor{violet}{\theta}}\mathcal{A}_{\textcolor{violet}{\beta}\textcolor{violet}{i}}^{\textcolor{violet}{\theta}}-6r_{\textcolor{violet}{1}}\partial_{\alpha}\mathcal{A}^{\alpha\beta\textcolor{violet}{i}}\partial_{\textcolor{violet}{\theta}}\mathcal{A}_{\textcolor{violet}{i}\textcolor{violet}{\beta}}^{\textcolor{violet}{\theta}}+12r_{\textcolor{violet}{1}}\partial'\mathcal{A}^{\alpha\beta}_{\textcolor{violet}{\alpha}}\partial_{\textcolor{violet}{\theta}}\mathcal{A}_{\textcolor{violet}{i}\textcolor{violet}{\beta}}^{\textcolor{violet}{\theta}}-2t_{\textcolor{violet}{1}}\partial_{\textcolor{violet}{i}}f^{\alpha\textcolor{violet}{i}}\partial_{\textcolor{violet}{\theta}}f_{\textcolor{violet}{\alpha}}^{\textcolor{violet}{\theta}}+4t_{\textcolor{violet}{1}}\partial'f^{\alpha}_{\textcolor{violet}{\alpha}}\partial_{\textcolor{violet}{\theta}}f_{\textcolor{violet}{i}}^{\textcolor{violet}{\theta}}-8r_{\textcolor{violet}{1}}\partial_{\beta}\mathcal{A}_{\alpha\textcolor{violet}{i}\textcolor{violet}{\theta}}\partial^{\textcolor{violet}{\theta}}\mathcal{A}^{\alpha\beta\textcolor{violet}{i}}+4r_{\textcolor{violet}{1}}\partial_{\beta}\mathcal{A}_{\alpha\textcolor{violet}{i}\textcolor{violet}{\theta}}\partial^{\textcolor{violet}{\theta}}\mathcal{A}^{\alpha\beta\textcolor{violet}{i}}-16r_{\textcolor{violet}{1}}\partial_{\beta}\mathcal{A}_{\textcolor{violet}{i}\textcolor{violet}{\theta}\alpha}\partial^{\textcolor{violet}{\theta}}\mathcal{A}^{\alpha\beta\textcolor{violet}{i}}-4r_{\textcolor{violet}{1}}\partial_{\textcolor{violet}{i}}\mathcal{A}_{\alpha\beta\textcolor{violet}{\theta}}\partial^{\textcolor{violet}{\theta}}\mathcal{A}^{\alpha\beta\textcolor{violet}{i}}+4r_{\textcolor{violet}{1}}\partial_{\textcolor{violet}{\theta}}\mathcal{A}_{\alpha\beta\textcolor{violet}{i}}\partial^{\textcolor{violet}{\theta}}\mathcal{A}^{\alpha\beta\textcolor{violet}{i}}+4r_{\textcolor{violet}{1}}\partial_{\textcolor{violet}{\theta}}\mathcal{A}_{\alpha\textcolor{violet}{i}\textcolor{violet}{\beta}}\partial^{\textcolor{violet}{\theta}}\mathcal{A}^{\alpha\beta\textcolor{violet}{i}}-6t_{\textcolor{violet}{1}}\partial_{\alpha}f_{\textcolor{violet}{i}\textcolor{violet}{\theta}}\partial^{\textcolor{violet}{\theta}}f^{\alpha\textcolor{violet}{i}}-3t_{\textcolor{violet}{1}}\partial_{\alpha}f_{\textcolor{violet}{i}\textcolor{violet}{\theta}}\partial^{\textcolor{violet}{\theta}}f^{\alpha\textcolor{violet}{i}}+3t_{\textcolor{violet}{1}}\partial_{\textcolor{violet}{i}}f_{\alpha\textcolor{violet}{\theta}}\partial^{\textcolor{violet}{\theta}}f^{\alpha\textcolor{violet}{i}}+3t_{\textcolor{violet}{1}}\partial_{\textcolor{violet}{\theta}}f_{\alpha\textcolor{violet}{i}}\partial^{\textcolor{violet}{\theta}}f^{\alpha\textcolor{violet}{i}}+3t_{\textcolor{violet}{1}}\partial_{\textcolor{violet}{\theta}}f_{\textcolor{violet}{i}\alpha}\partial^{\textcolor{violet}{\theta}}f^{\alpha\textcolor{violet}{i}}+6t_{\textcolor{violet}{1}}\mathcal{A}_{\alpha\textcolor{violet}{i}\textcolor{violet}{\theta}}\left(\mathcal{A}^{\alpha\textcolor{violet}{i}\textcolor{violet}{\theta}}+2\partial^{\textcolor{violet}{\theta}}f^{\alpha\textcolor{violet}{i}}\right)\right)[t,x,y,z]dzdydxdt$$

Wave operator

$0^+\mathcal{A}^{\parallel}$	0^+f^{\parallel}	0^+f^{\perp}	$0^-\mathcal{A}^{\parallel}$									
$0^+\mathcal{A}^{\parallel}\dagger$	0	0	0	0								
$0^+f^{\parallel}\dagger$	0	0	0	0								
$0^+f^{\perp}\dagger$	0	0	0	0								
$0^-\mathcal{A}^{\parallel}\dagger$	0	0	0	$-\frac{t_{\textcolor{violet}{1}}}{1}$	$1^+\mathcal{A}^{\parallel}_{\alpha\beta}$	$1^+\mathcal{A}^{\perp}_{\alpha\beta}$	$1^+f^{\parallel}_{\alpha\beta}$	$1^-\mathcal{A}^{\parallel}_{\alpha}$	$1^-\mathcal{A}^{\perp}_{\alpha}$	$1^-f^{\parallel}_{\alpha}$	$1^-f^{\perp}_{\alpha}$	
					$1^+\mathcal{A}^{\parallel}\dagger^{\alpha\beta}$	$1^+\mathcal{A}^{\perp}\dagger^{\alpha\beta}$	$1^+f^{\parallel}\dagger^{\alpha\beta}$	$1^-\mathcal{A}^{\parallel}\dagger^{\alpha}$	$1^-\mathcal{A}^{\perp}\dagger^{\alpha}$	$1^-f^{\parallel}\dagger^{\alpha}$	$1^-f^{\perp}\dagger^{\alpha}$	
					$k^2r_{\textcolor{violet}{1}}-\frac{t_{\textcolor{violet}{1}}}{2}$	$-\frac{t_{\textcolor{violet}{1}}}{\sqrt{2}}$	$-\frac{ikt_{\textcolor{violet}{1}}}{\sqrt{2}}$	0	0	0	0	
					$-\frac{t_{\textcolor{violet}{1}}}{\sqrt{2}}$	0	0	0	0	0	0	
					$\frac{ikt_{\textcolor{violet}{1}}}{\sqrt{2}}$	0	0	0	0	0	0	
					0	0	0	$\frac{t_{\textcolor{violet}{1}}}{6}$	$\frac{t_{\textcolor{violet}{1}}}{3\sqrt{2}}$	0	$\frac{ikt_{\textcolor{violet}{1}}}{3}$	
					0	0	0	$\frac{t_{\textcolor{violet}{1}}}{3\sqrt{2}}$	$\frac{t_{\textcolor{violet}{1}}}{3}$	0	$\frac{1}{3}i\sqrt{2}kt_{\textcolor{violet}{1}}$	
					0	0	0	0	0	0	0	
					0	0	0	$-\frac{1}{3}ikt_{\textcolor{violet}{1}}$	$-\frac{1}{3}i\sqrt{2}kt_{\textcolor{violet}{1}}$	0	$\frac{2k^2t_{\textcolor{violet}{1}}}{3}$	
					$2^+\mathcal{A}^{\parallel}_{\alpha\beta}$	$2^+f^{\parallel}_{\alpha\beta}$	$2^-\mathcal{A}^{\parallel}_{\alpha\beta\chi}$					
					$2^+\mathcal{A}^{\parallel}\dagger^{\alpha\beta}$	$2^+f^{\parallel}\dagger^{\alpha\beta}$	$2^-\mathcal{A}^{\parallel}\dagger^{\alpha\beta\chi}$					
					$\frac{t_{\textcolor{violet}{1}}}{2}$	$-\frac{ikt_{\textcolor{violet}{1}}}{\sqrt{2}}$	0					
					$\frac{ikt_{\textcolor{violet}{1}}}{\sqrt{2}}$	$k^2t_{\textcolor{violet}{1}}$	0					
					0	0	$k^2r_{\textcolor{violet}{1}}+\frac{t_{\textcolor{violet}{1}}}{2}$					

Saturated propagator

$0^+ \sigma^{\parallel}$	$0^+ \tau^{\parallel}$	$0^+ \tau^{\perp}$	$0^- \sigma^{\parallel}$								
$0^+ \sigma^{\parallel} \dagger$	0	0	0	0	$1^+ \sigma^{\parallel}_{\alpha\beta}$	$1^+ \sigma^{\perp}_{\alpha\beta}$	$1^+ \tau^{\parallel}_{\alpha\beta}$	$1^- \sigma^{\parallel}_{\alpha}$	$1^- \sigma^{\perp}_{\alpha}$	$1^- \tau^{\parallel}_{\alpha}$	$1^- \tau^{\perp}_{\alpha}$
$0^+ \tau^{\parallel} \dagger$	0	0	0	0							
$0^+ \tau^{\perp} \dagger$	0	0	0	0							
$0^- \sigma^{\parallel} \dagger$	0	0	0	$-\frac{1}{t_1}$	$1^+ \sigma^{\parallel} \dagger^{\alpha\beta}$	$1^+ \sigma^{\perp} \dagger^{\alpha\beta}$	$1^+ \tau^{\parallel} \dagger^{\alpha\beta}$	$1^- \sigma^{\parallel} \dagger^{\alpha}$	$1^- \sigma^{\perp} \dagger^{\alpha}$	$1^- \tau^{\parallel} \dagger^{\alpha}$	$1^- \tau^{\perp} \dagger^{\alpha}$
					0	$-\frac{\sqrt{2}}{t_1+k^2 t_1}$	$-\frac{i\sqrt{2}k}{t_1+k^2 t_1}$	0	0	0	0
					$-\frac{\sqrt{2}}{t_1+k^2 t_1}$	$\frac{-2k^2 r_1+t_1}{(1+k^2)^2 t_1^2}$	$-\frac{i(2k^3 r_1-k t_1)}{(1+k^2)^2 t_1^2}$	0	0	0	0
					$\frac{i\sqrt{2}k}{t_1+k^2 t_1}$	$\frac{i(2k^3 r_1-k t_1)}{(1+k^2)^2 t_1^2}$	$\frac{-2k^4 r_1+k^2 t_1}{(1+k^2)^2 t_1^2}$	0	0	0	0
					$1^- \sigma^{\parallel} \dagger^{\alpha}$	0	0	$\frac{6}{(3+4k^2)^2 t_1}$	$\frac{6\sqrt{2}}{(3+4k^2)^2 t_1}$	0	$\frac{12ik}{(3+4k^2)^2 t_1}$
					$1^- \sigma^{\perp} \dagger^{\alpha}$	0	0	$\frac{6\sqrt{2}}{(3+4k^2)^2 t_1}$	$\frac{12}{(3+4k^2)^2 t_1}$	0	$\frac{12i\sqrt{2}k}{(3+4k^2)^2 t_1}$
					$1^- \tau^{\parallel} \dagger^{\alpha}$	0	0	0	0	0	0
					$1^- \tau^{\perp} \dagger^{\alpha}$	0	0	$-\frac{12ik}{(3+4k^2)^2 t_1}$	$-\frac{12i\sqrt{2}k}{(3+4k^2)^2 t_1}$	0	$\frac{24k^2}{(3+4k^2)^2 t_1}$
								$2^+ \sigma^{\parallel}_{\alpha\beta}$	$2^+ \tau^{\parallel}_{\alpha\beta}$	$2^- \sigma^{\parallel}_{\alpha\beta\chi}$	
								$2^+ \sigma^{\parallel} \dagger^{\alpha\beta}$	$\frac{2}{(1+2k^2)^2 t_1}$	$-\frac{2i\sqrt{2}k}{(1+2k^2)^2 t_1}$	0
								$2^+ \tau^{\parallel} \dagger^{\alpha\beta}$	$\frac{2i\sqrt{2}k}{(1+2k^2)^2 t_1}$	$\frac{4k^2}{(1+2k^2)^2 t_1}$	0
								$2^- \sigma^{\parallel} \dagger^{\alpha\beta\chi}$	0	0	$\frac{2}{2k^2 r_1+t_1}$

Source constraints

Spin-parity form	Covariant form	Multiplicities
$0^+\sigma^{\parallel}==0$	$\partial_{\beta}\sigma^{\alpha\textcolor{violet}{\beta}}_{\textcolor{violet}{\alpha}}==0$	1
$0^+\tau^{\parallel}==0$	$\partial_{\beta}\partial_{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\alpha\beta}==\partial_{\beta}\partial^{\beta}\tau\left(\Delta+\mathcal{K}\right)^{\alpha}_{\textcolor{violet}{\alpha}}$	1
$0^+\tau^{\perp}==0$	$\partial_{\beta}\partial_{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\alpha\beta}==0$	1
$2ik\textcolor{violet}{1}^-\sigma^{\parallel\alpha}+\textcolor{violet}{1}^-\tau^{\perp\alpha}==0$	$\partial_{\chi}\partial_{\beta}\partial^{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\beta\chi}+2\left(\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial^{\alpha}\sigma^{\beta\textcolor{violet}{\chi}}_{\textcolor{violet}{\beta}}-\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial_{\beta}\sigma^{\beta\alpha\chi}+\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial^{\alpha}\sigma^{\beta\alpha}_{\textcolor{violet}{\beta}}\right)==\partial_{\chi}\partial^{\chi}\partial_{\beta}\tau\left(\Delta+\mathcal{K}\right)^{\alpha\beta}$	3
$\textcolor{violet}{1}^-\tau^{\parallel\alpha}==0$	$\partial_{\chi}\partial_{\beta}\partial^{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\beta\chi}==\partial_{\chi}\partial^{\chi}\partial_{\beta}\tau\left(\Delta+\mathcal{K}\right)^{\beta\alpha}$	3
$\textcolor{violet}{1}^-\sigma^{\parallel\alpha}==\textcolor{violet}{1}^-\sigma^{\perp\alpha}$	$\partial_{\chi}\partial^{\alpha}\sigma^{\beta\textcolor{violet}{\chi}}_{\textcolor{violet}{\beta}}+\partial_{\chi}\partial^{\chi}\sigma^{\beta\alpha}_{\textcolor{violet}{\beta}}==0$	3
$i k\textcolor{violet}{1}^+\sigma^{\perp\alpha\beta}+\textcolor{violet}{1}^+\tau^{\parallel\alpha\beta}==0$	$\partial_{\chi}\partial^{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\beta\chi}+\partial_{\chi}\partial^{\beta}\tau\left(\Delta+\mathcal{K}\right)^{\chi\alpha}+\partial_{\chi}\partial^{\chi}\tau\left(\Delta+\mathcal{K}\right)^{\alpha\beta}+2\partial_{\delta}\partial_{\chi}\partial^{\alpha}\sigma^{\chi\beta\delta}+2\partial_{\delta}\partial^{\delta}\partial_{\chi}\sigma^{\chi\alpha\beta}==\partial_{\chi}\partial^{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\chi\beta}+\partial_{\chi}\partial^{\beta}\tau\left(\Delta+\mathcal{K}\right)^{\alpha\chi}+\partial_{\chi}\partial^{\chi}\tau\left(\Delta+\mathcal{K}\right)^{\beta\alpha}+2\partial_{\delta}\partial_{\chi}\partial^{\beta}\sigma^{\chi\alpha\delta}$	3
$-2ik\textcolor{violet}{2}^+\sigma^{\parallel\alpha\beta}+\textcolor{violet}{2}^+\tau^{\parallel\alpha\beta}==0$	$-i\left(4\partial_{\delta}\partial_{\chi}\partial^{\beta}\partial^{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\chi\delta}+2\partial_{\delta}\partial^{\delta}\partial^{\beta}\partial^{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\chi}_{\textcolor{violet}{\chi}}-3\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial^{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\beta\chi}-3\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial^{\alpha}\tau\left(\Delta+\mathcal{K}\right)^{\chi\beta}-3\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial^{\beta}\tau\left(\Delta+\mathcal{K}\right)^{\alpha\chi}-3\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial^{\beta}\tau\left(\Delta+\mathcal{K}\right)^{\chi\alpha}+3\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial^{\chi}\tau\left(\Delta+\mathcal{K}\right)^{\alpha\beta}+3\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial^{\chi}\tau\left(\Delta+\mathcal{K}\right)^{\beta\alpha}+4i k^{\chi}\partial_{\epsilon}\partial_{\chi}\partial^{\beta}\partial^{\alpha}\sigma^{\delta}_{\textcolor{violet}{\delta}}{}^{\epsilon}-6i k^{\chi}\partial_{\epsilon}\partial_{\delta}\partial_{\chi}\partial^{\alpha}\sigma^{\delta\beta\epsilon}-6i k^{\chi}\partial_{\epsilon}\partial_{\delta}\partial_{\chi}\partial^{\beta}\sigma^{\delta\alpha\epsilon}+6i k^{\chi}\partial_{\epsilon}\partial^{\epsilon}\partial_{\delta}\partial_{\chi}\sigma^{\alpha\beta\delta}+6i k^{\chi}\partial_{\epsilon}\partial^{\epsilon}\partial_{\delta}\partial_{\chi}\sigma^{\beta\alpha\delta}+2\eta^{\alpha\beta}\partial_{\epsilon}\partial^{\epsilon}\partial_{\delta}\partial_{\chi}\tau\left(\Delta+\mathcal{K}\right)^{\chi\delta}-2\eta^{\alpha\beta}\partial_{\epsilon}\partial^{\epsilon}\partial_{\delta}\partial^{\delta}\tau\left(\Delta+\mathcal{K}\right)^{\chi}_{\textcolor{violet}{\chi}}-4i\eta^{\alpha\beta}k^{\chi}\partial_{\phi}\partial^{\phi}\partial_{\epsilon}\partial_{\chi}\sigma^{\delta}_{\textcolor{violet}{\delta}}{}^{\epsilon}\right)==0$	5
Total expected gauge generators:		20

Massive spectrum

Massive particle

Pole residue:	$-\frac{1}{r_{\textcolor{violet}{1}}}>0$
Square mass:	$-\frac{\textcolor{violet}{t}_{\textcolor{violet}{1}}}{2r_{\textcolor{violet}{1}}}>0$
Spin:	2
Parity:	Odd

Massless spectrum

(No particles)

Unitarity conditions

$r_{\textcolor{violet}{1}}<0\ \&\&\textcolor{violet}{t}_{\textcolor{violet}{1}}>0$