

PSALTer results panel

$$S = \iiint \left(\frac{1}{6} \left(6 \mathcal{A}^{\alpha\beta\chi} \sigma_{\alpha\beta\chi} + 6 f^{\alpha\beta} \tau (\Delta + \mathcal{K})_{\alpha\beta} + 8 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\alpha\frac{1}{2}} \partial^{\theta} \mathcal{A}^{\alpha\beta\prime} - 4 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\alpha\theta\frac{1}{2}} \partial^{\theta} \mathcal{A}^{\alpha\beta\prime} + 4 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\frac{1}{2}\theta\alpha} \partial^{\theta} \mathcal{A}^{\alpha\beta\prime} - 2 r_{\frac{1}{2}} \partial_{\frac{1}{2}} \mathcal{A}_{\alpha\beta\theta} \partial^{\theta} \mathcal{A}^{\alpha\beta\prime} + \right. \right. \\ \left. \left. 2 r_{\frac{1}{2}} \partial_{\theta} \mathcal{A}_{\alpha\beta\frac{1}{2}} \partial^{\theta} \mathcal{A}^{\alpha\beta\prime} - 4 r_{\frac{1}{2}} \partial_{\theta} \mathcal{A}_{\alpha\frac{1}{2}\beta} \partial^{\theta} \mathcal{A}^{\alpha\beta\prime} + 4 t_{\frac{1}{2}} \mathcal{A}_{\frac{1}{2}\theta\alpha} \partial^{\theta} f^{\alpha\prime} + 2 t_{\frac{1}{2}} \partial_{\alpha} f_{\frac{1}{2}\theta} \partial^{\theta} f^{\alpha\prime} - t_{\frac{1}{2}} \partial_{\alpha} f_{\theta\frac{1}{2}} \partial^{\theta} f^{\alpha\prime} - \right. \right. \\ \left. \left. t_{\frac{1}{2}} \partial_{\frac{1}{2}} f_{\alpha\theta} \partial^{\theta} f^{\alpha\prime} + t_{\frac{1}{2}} \partial_{\theta} f_{\alpha\frac{1}{2}} \partial^{\theta} f^{\alpha\prime} - t_{\frac{1}{2}} \partial_{\theta} f_{\frac{1}{2}\alpha} \partial^{\theta} f^{\alpha\prime} - 4 t_{\frac{1}{2}} \mathcal{A}_{\alpha\theta\frac{1}{2}} \left(\mathcal{A}^{\alpha\prime\theta} + \partial^{\theta} f^{\alpha\prime} \right) + 2 t_{\frac{1}{2}} \mathcal{A}_{\alpha\frac{1}{2}\theta} \left(\mathcal{A}^{\alpha\prime\theta} + 2 \partial^{\theta} f^{\alpha\prime} \right) - \right. \right. \\ \left. \left. 12 r_{\frac{1}{4}} \partial_{\beta} \mathcal{A}_{\kappa\frac{1}{4}} \partial^{\kappa} \mathcal{A}^{\alpha\theta}_{\alpha} - 12 r_{\frac{1}{4}} \partial_{\alpha} \mathcal{A}^{\alpha\theta\kappa} \partial_{\lambda} \mathcal{A}_{\kappa\frac{1}{4}} + 24 r_{\frac{1}{4}} \partial^{\kappa} \mathcal{A}^{\alpha\theta}_{\alpha} \partial_{\lambda} \mathcal{A}_{\kappa\frac{1}{4}} - 24 r_{\frac{1}{3}} \partial_{\beta} \mathcal{A}_{\frac{1}{3}\lambda\alpha} \partial^{\lambda} \mathcal{A}^{\alpha\beta\prime} \right) \right) [t, x, y, z] dz dy dx dt$$

Wave operator

$\overset{0}{\underset{\cdot}{\mathcal{A}}}^{\parallel}$	$\overset{0}{\underset{\cdot}{f}}^{\parallel}$	$\overset{0}{\underset{\cdot}{f}}^{\perp}$	$\overset{0}{\underset{\cdot}{\mathcal{A}}}^{\parallel}$										
$\overset{0}{\underset{\cdot}{\mathcal{A}}}^{\parallel} \uparrow$	$-2\,k^2\left(r_{\frac{\cdot}{3}}-2\,r_{\frac{\cdot}{4}}\right)$	0	0	0									
$\overset{0}{\underset{\cdot}{f}}^{\parallel} \uparrow$	0	0	0	0									
$\overset{0}{\underset{\cdot}{f}}^{\perp} \uparrow$	0	0	0	0									
$\overset{0}{\underset{\cdot}{\mathcal{A}}}^{\parallel} \uparrow$	0	0	0	$k^2\,r_{\frac{\cdot}{2}}+t_{\frac{\cdot}{2}}$	$\overset{1}{\underset{\cdot}{\mathcal{A}}}^{\parallel}_{\alpha\beta}$	$\overset{1}{\underset{\cdot}{\mathcal{A}}}^{\perp}_{\alpha\beta}$	$\overset{1}{\underset{\cdot}{f}}^{\parallel}_{\alpha\beta}$	$\overset{1}{\underset{\cdot}{\mathcal{A}}}^{\parallel}_{\alpha}$	$\overset{1}{\underset{\cdot}{\mathcal{A}}}^{\perp}_{\alpha}$	$\overset{1}{\underset{\cdot}{f}}^{\parallel}_{\alpha}$	$\overset{1}{\underset{\cdot}{f}}^{\perp}_{\alpha}$		
$\overset{1}{\underset{\cdot}{\mathcal{A}}}^{\parallel} \uparrow^{\alpha\beta}$	$k^2\left(2\,r_{\frac{\cdot}{3}}-r_{\frac{\cdot}{4}}\right)+\frac{2\,t_{\frac{\cdot}{2}}}{3}$	$\frac{\sqrt{2}\,t_{\frac{\cdot}{2}}}{3}$	$\frac{1}{3}\,i\,\sqrt{2}\,k\,t_{\frac{\cdot}{2}}$	0	0	0	0						
$\overset{1}{\underset{\cdot}{\mathcal{A}}}^{\perp} \uparrow^{\alpha\beta}$	$\frac{\sqrt{2}\,t_{\frac{\cdot}{2}}}{3}$	$\frac{t_{\frac{\cdot}{2}}}{3}$	$\frac{i\,k\,t_{\frac{\cdot}{2}}}{3}$	0	0	0	0						
$\overset{1}{\underset{\cdot}{f}}^{\parallel} \uparrow^{\alpha\beta}$	$-\frac{1}{3}\,i\,\sqrt{2}\,k\,t_{\frac{\cdot}{2}}$	$-\frac{1}{3}\,i\,k\,t_{\frac{\cdot}{2}}$	$\frac{k^2\,t_{\frac{\cdot}{2}}}{3}$	0	0	0	0						
$\overset{1}{\underset{\cdot}{\mathcal{A}}}^{\parallel} \uparrow^{\alpha}$	0	0	0	0	0	0	0	0					
$\overset{1}{\underset{\cdot}{\mathcal{A}}}^{\perp} \uparrow^{\alpha}$	0	0	0	0	0	0	0	0					
$\overset{1}{\underset{\cdot}{f}}^{\parallel} \uparrow^{\alpha}$	0	0	0	0	0	0	0	0					
$\overset{1}{\underset{\cdot}{f}}^{\perp} \uparrow^{\alpha}$	0	0	0	0	0	0	0	0					
				$\overset{2}{\underset{\cdot}{\mathcal{A}}}^{\parallel}_{\alpha\beta}$	$\overset{2}{\underset{\cdot}{f}}^{\parallel}_{\alpha\beta}$	$\overset{2}{\underset{\cdot}{\mathcal{A}}}^{\parallel}_{\alpha\beta\chi}$							
				$\overset{2}{\underset{\cdot}{\mathcal{A}}}^{\parallel} \uparrow^{\alpha\beta}$	$k^2\left(-2\,r_{\frac{\cdot}{3}}+r_{\frac{\cdot}{4}}\right)$	0	0						
				$\overset{2}{\underset{\cdot}{f}}^{\parallel} \uparrow^{\alpha\beta}$	0	0	0						
				$\overset{2}{\underset{\cdot}{\mathcal{A}}}^{\parallel} \uparrow^{\alpha\beta\chi}$	0	0	0						

Saturated propagator

$\overset{0}{\underset{\cdot}{\sigma}}^{\parallel}$	$\overset{0}{\underset{\cdot}{\tau}}^{\parallel}$	$\overset{0}{\underset{\cdot}{\tau}}^{\perp}$	$\overset{0}{\underset{\cdot}{\sigma}}^{\parallel}$											
$\overset{0}{\underset{\cdot}{\sigma}}^{\parallel} \uparrow$	$\frac{1}{-2\,k^2\,r_{\frac{1}{3}}+4\,k^2\,r_{\frac{1}{4}}}$	0	0	0										
$\overset{0}{\underset{\cdot}{\tau}}^{\parallel} \uparrow$	0	0	0	0										
$\overset{0}{\underset{\cdot}{\tau}}^{\perp} \uparrow$	0	0	0	0										
$\overset{0}{\underset{\cdot}{\sigma}}^{\parallel} \uparrow$	0	0	0	$\frac{1}{k^2\,r_{\frac{1}{2}}+t_{\frac{1}{2}}}$	$\overset{1}{\underset{\cdot}{\sigma}}^{\parallel}_{\alpha\beta}$	$\overset{1}{\underset{\cdot}{\sigma}}^{\perp}_{\alpha\beta}$	$\overset{1}{\underset{\cdot}{\tau}}^{\parallel}_{\alpha\beta}$	$\overset{1}{\underset{\cdot}{\sigma}}^{\parallel}_{\alpha}$	$\overset{1}{\underset{\cdot}{\sigma}}^{\perp}_{\alpha}$	$\overset{1}{\underset{\cdot}{\tau}}^{\parallel}_{\alpha}$	$\overset{1}{\underset{\cdot}{\tau}}^{\perp}_{\alpha}$			
$\overset{1}{\underset{\cdot}{\sigma}}^{\parallel} \uparrow^{\alpha\beta}$	$\frac{1}{k^2\left(2\,r_{\frac{1}{3}}-r_{\frac{1}{4}}\right)}$	$-\frac{\sqrt{2}}{k^2\left(1+k^2\right)\left(2\,r_{\frac{1}{3}}-r_{\frac{1}{4}}\right)}$	$-\frac{i\,\sqrt{2}}{k\left(1+k^2\right)\left(2\,r_{\frac{1}{3}}-r_{\frac{1}{4}}\right)}$	0	0	0	0							
$\overset{1}{\underset{\cdot}{\sigma}}^{\perp} \uparrow^{\alpha\beta}$	$-\frac{\sqrt{2}}{k^2\left(1+k^2\right)\left(2\,r_{\frac{1}{3}}-r_{\frac{1}{4}}\right)}$	$\frac{k^2\left(6\,r_{\frac{1}{3}}-3\,r_{\frac{1}{4}}\right)+2\,t_{\frac{1}{2}}}{\left(k+k^3\right)^2\left(2\,r_{\frac{1}{3}}-r_{\frac{1}{4}}\right)t_{\frac{1}{2}}}$	$\frac{i\left(k^2\left(6\,r_{\frac{1}{3}}-3\,r_{\frac{1}{4}}\right)+2\,t_{\frac{1}{2}}\right)}{k\left(1+k^2\right)^2\left(2\,r_{\frac{1}{3}}-r_{\frac{1}{4}}\right)t_{\frac{1}{2}}}$	0	0	0	0							
$\overset{1}{\underset{\cdot}{\tau}}^{\parallel} \uparrow^{\alpha\beta}$	$\frac{i\,\sqrt{2}}{k\left(1+k^2\right)\left(2\,r_{\frac{1}{3}}-r_{\frac{1}{4}}\right)}$	$-\frac{i\left(k^2\left(6\,r_{\frac{1}{3}}-3\,r_{\frac{1}{4}}\right)+2\,t_{\frac{1}{2}}\right)}{k\left(1+k^2\right)^2\left(2\,r_{\frac{1}{3}}-r_{\frac{1}{4}}\right)t_{\frac{1}{2}}}$	$\frac{\frac{1}{r_{\frac{1}{4}}-\frac{1}{2}}+\frac{3\,k^2}{t_{\frac{1}{2}}}}{\left(1+k^2\right)^2}$	0	0	0	0							
$\overset{1}{\underset{\cdot}{\sigma}}^{\parallel} \uparrow^{\alpha}$	0	0	0	0	0	0	0	0						
$\overset{1}{\underset{\cdot}{\sigma}}^{\perp} \uparrow^{\alpha}$	0	0	0	0	0	0	0	0						
$\overset{1}{\underset{\cdot}{\tau}}^{\parallel} \uparrow^{\alpha}$	0	0	0	0	0	0	0	0						
$\overset{1}{\underset{\cdot}{\tau}}^{\perp} \uparrow^{\alpha}$	0	0	0	0	0	0	0	0						
				$\overset{2}{\underset{\cdot}{\sigma}}^{\parallel}_{\alpha\beta}$	$\overset{2}{\underset{\cdot}{\tau}}^{\parallel}_{\alpha\beta}$	$\overset{2}{\underset{\cdot}{\sigma}}^{\parallel}_{\alpha\beta\chi}$								
				$\overset{2}{\underset{\cdot}{\sigma}}^{\parallel} \uparrow^{\alpha\beta}$	$\frac{1}{k^2\left(-2\,r_{\frac{1}{3}}+r_{\frac{1}{4}}\right)}$	0	0							
				$\overset{2}{\underset{\cdot}{\tau}}^{\parallel} \uparrow^{\alpha\beta}$	0	0	0							
				$\overset{2}{\underset{\cdot}{\sigma}}^{\parallel} \uparrow^{\alpha\beta\chi}$	0	0	0							

Source constraints

Spin-parity form	Covariant form	Multiplicities
$\overset{0}{\underset{\cdot}{\tau}}^{\perp} == 0$	$\partial_{\beta} \partial_{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\alpha\beta} == 0$	1
$\overset{0}{\underset{\cdot}{\tau}}^{\parallel} == 0$	$\partial_{\beta} \partial_{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\alpha\beta} == \partial_{\beta} \partial^{\beta} \tau \left(\Delta + \mathcal{K} \right)^{\alpha}_{\alpha}$	1
$\overset{1}{\underset{\cdot}{\tau}}^{\perp\alpha} == 0$	$\partial_{\chi} \partial_{\beta} \partial^{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\beta\chi} == \partial_{\chi} \partial^{\chi} \partial_{\beta} \tau \left(\Delta + \mathcal{K} \right)^{\alpha\beta}$	3
$\overset{1}{\underset{\cdot}{\tau}}^{\parallel\alpha} == 0$	$\partial_{\chi} \partial_{\beta} \partial^{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\beta\chi} == \partial_{\chi} \partial^{\chi} \partial_{\beta} \tau \left(\Delta + \mathcal{K} \right)^{\beta\alpha}$	3
$\overset{1}{\underset{\cdot}{\sigma}}^{\perp\alpha} == 0$	$\partial_{\chi} \partial_{\beta} \sigma^{\beta\alpha\chi} == 0$	3
$\overset{1}{\underset{\cdot}{\sigma}}^{\parallel\alpha} == 0$	$\partial_{\delta} \partial^{\alpha} \sigma^{\chi}_{\chi}{}^{\delta} + \partial_{\delta} \partial^{\delta} \sigma^{\chi\alpha}_{\chi} == \partial_{\delta} \partial_{\chi} \sigma^{\chi\alpha\delta}$	3
$i k \overset{1}{\underset{\cdot}{\sigma}}^{\perp\alpha\beta} + \overset{1}{\underset{\cdot}{\tau}}^{\parallel\alpha\beta} == 0$	$\partial_{\chi} \partial^{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\beta\chi} + \partial_{\chi} \partial^{\beta} \tau \left(\Delta + \mathcal{K} \right)^{\chi\alpha} + \partial_{\chi} \partial^{\chi} \tau \left(\Delta + \mathcal{K} \right)^{\alpha\beta} + 2 \partial_{\delta} \partial_{\chi} \partial^{\alpha} \sigma^{\chi\beta\delta} + 2 \partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\chi\alpha\beta} ==$ $\partial_{\chi} \partial^{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\chi\beta} + \partial_{\chi} \partial^{\beta} \tau \left(\Delta + \mathcal{K} \right)^{\alpha\chi} + \partial_{\chi} \partial^{\chi} \tau \left(\Delta + \mathcal{K} \right)^{\beta\alpha} + 2 \partial_{\delta} \partial_{\chi} \partial^{\beta} \sigma^{\chi\alpha\delta}$	3
$\overset{2}{\underset{\cdot}{\sigma}}^{\parallel\alpha\beta\chi} == 0$	$3 \partial_{\epsilon} \partial_{\delta} \partial^{\chi} \partial^{\alpha} \sigma^{\delta\beta\epsilon} + 3 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\alpha} \sigma^{\delta\beta}_{\delta} + 2 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\beta} \sigma^{\alpha\chi\delta} + 4 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\beta} \sigma^{\chi\alpha\delta} + 2 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\beta} \sigma^{\delta\alpha\chi} + 2 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\chi} \sigma^{\beta\alpha\delta} +$ $4 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\chi} \sigma^{\delta\alpha\beta} + 2 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\delta} \sigma^{\alpha\beta\chi} + 3 \eta^{\beta\chi} \partial_{\phi} \partial^{\phi} \partial_{\epsilon} \partial^{\alpha} \sigma^{\delta}_{\delta}{}^{\epsilon} + 3 \eta^{\alpha\chi} \partial_{\phi} \partial^{\phi} \partial_{\epsilon} \partial_{\delta} \sigma^{\delta\beta\epsilon} + 3 \eta^{\beta\chi} \partial_{\phi} \partial^{\phi} \partial_{\epsilon} \partial^{\epsilon} \sigma^{\delta\alpha}_{\delta} ==$ $3 \partial_{\epsilon} \partial_{\delta} \partial^{\chi} \partial^{\beta} \sigma^{\delta\alpha\epsilon} + 3 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\beta} \sigma^{\delta\alpha}_{\delta} + 2 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\alpha} \sigma^{\beta\chi\delta} + 4 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\alpha} \sigma^{\chi\beta\delta} + 2 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\alpha} \sigma^{\delta\beta\chi} + 2 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\chi} \sigma^{\alpha\beta\delta} +$ $2 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\delta} \sigma^{\beta\alpha\chi} + 4 \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\delta} \sigma^{\chi\alpha\beta} + 3 \eta^{\alpha\chi} \partial_{\phi} \partial^{\phi} \partial_{\epsilon} \partial_{\delta} \sigma^{\delta}_{\delta}{}^{\epsilon} + 3 \eta^{\beta\chi} \partial_{\phi} \partial^{\phi} \partial_{\epsilon} \partial_{\delta} \sigma^{\delta\alpha\epsilon} + 3 \eta^{\alpha\chi} \partial_{\phi} \partial^{\phi} \partial_{\epsilon} \partial^{\epsilon} \sigma^{\delta\beta}_{\delta}$	5
$\overset{2}{\underset{\cdot}{\tau}}^{\parallel\alpha\beta} == 0$	$4 \partial_{\delta} \partial_{\chi} \partial^{\beta} \partial^{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\chi\delta} + 2 \partial_{\delta} \partial^{\delta} \partial^{\beta} \partial^{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\chi}_{\chi} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\chi} \tau \left(\Delta + \mathcal{K} \right)^{\alpha\beta} +$ $3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\chi} \tau \left(\Delta + \mathcal{K} \right)^{\beta\alpha} + 2 \eta^{\alpha\beta} \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial_{\chi} \tau \left(\Delta + \mathcal{K} \right)^{\chi\delta} == 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\beta\chi} +$ $3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\alpha} \tau \left(\Delta + \mathcal{K} \right)^{\chi\beta} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\beta} \tau \left(\Delta + \mathcal{K} \right)^{\alpha\chi} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\beta} \tau \left(\Delta + \mathcal{K} \right)^{\chi\alpha} + 2 \eta^{\alpha\beta} \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\delta} \tau \left(\Delta + \mathcal{K} \right)^{\chi}_{\chi}$	5
Total expected gauge generators:		27

Massive spectrum

Massive particle

Pole residue:	$-\frac{1}{r_{\frac{1}{2}}} > 0$
Square mass:	$-\frac{t_{\frac{1}{2}}}{r_{\frac{1}{2}}} > 0$
Spin:	0
Parity:	Odd

Massless spectrum

(No particles)

Unitarity conditions

$$r_{\frac{1}{2}} < 0 \ \&\& \ t_{\frac{1}{2}} > 0$$