

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\theta} \partial^{\theta} \mathcal{A}^{\alpha\beta'} - 4 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\alpha\theta} \partial^{\theta} \mathcal{A}^{\alpha\beta'} + 4 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\theta\alpha} \partial^{\theta} \mathcal{A}^{\alpha\beta'} - \right. \right. \\ \left. \left. 2 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\alpha\theta} \partial^{\theta} \mathcal{A}^{\alpha\beta'} + 2 r_{\frac{1}{2}} \partial_{\theta} \mathcal{A}_{\alpha\beta} \partial^{\theta} \mathcal{A}^{\alpha\beta'} - 4 r_{\frac{1}{2}} \partial_{\theta} \mathcal{A}_{\alpha\beta} \partial^{\theta} \mathcal{A}^{\alpha\beta'} + 6 r_{\frac{1}{5}} \partial_{\beta} \mathcal{A}_{\theta}^{\kappa} \partial^{\theta} \mathcal{A}_{\alpha}^{\alpha'} - 6 r_{\frac{1}{5}} \partial_{\theta} \mathcal{A}_{\beta}^{\kappa} \partial^{\theta} \mathcal{A}_{\alpha}^{\alpha'} + 4 t_{\frac{1}{2}} \mathcal{A}_{\theta\alpha} \partial^{\theta} f^{\alpha'} + 2 t_{\frac{1}{2}} \partial_{\alpha} f_{\theta} \partial^{\theta} f^{\alpha'} - t_{\frac{1}{2}} \partial_{\alpha} f_{\theta} \partial^{\theta} f^{\alpha'} - t_{\frac{1}{2}} \partial_{\beta} f_{\alpha\theta} \partial^{\theta} f^{\alpha'} + t_{\frac{1}{2}} \partial_{\theta} f_{\alpha} \partial^{\theta} f^{\alpha'} - \right. \\ \left. t_{\frac{1}{2}} \partial_{\theta} f_{\alpha} \partial^{\theta} f^{\alpha'} - 4 t_{\frac{1}{2}} \mathcal{A}_{\alpha\theta} \left(\mathcal{A}^{\alpha'\theta} + \partial^{\theta} f^{\alpha'} \right) + 2 t_{\frac{1}{2}} \mathcal{A}_{\alpha\theta} \left(\mathcal{A}^{\alpha'\theta} + 2 \partial^{\theta} f^{\alpha'} \right) - 6 r_{\frac{1}{5}} \partial_{\alpha} \mathcal{A}^{\alpha'\theta} \partial_{\kappa} \mathcal{A}_{\theta}^{\kappa} + \right. \\ \left. 12 r_{\frac{1}{5}} \partial^{\theta} \mathcal{A}_{\alpha}^{\alpha'} \partial_{\kappa} \mathcal{A}_{\theta}^{\kappa} + 6 r_{\frac{1}{5}} \partial_{\alpha} \mathcal{A}^{\alpha'\theta} \partial_{\kappa} \mathcal{A}_{\theta}^{\kappa} - 12 r_{\frac{1}{5}} \partial^{\theta} \mathcal{A}_{\alpha}^{\alpha'} \partial_{\kappa} \mathcal{A}_{\theta}^{\kappa} \right) \Big| [t, x, y, z] dz dy dx dt$$

Wave operator

$\begin{smallmatrix} \Theta^+ \mathcal{A}^{\parallel} & \Theta^+ f^{\parallel} & \Theta^+ f^{\perp} & \Theta^- \mathcal{A}^{\parallel} \end{smallmatrix}$		$\begin{smallmatrix} 1^+ \mathcal{A}^{\parallel}_{\alpha\beta} & 1^+ \mathcal{A}^{\perp}_{\alpha\beta} & 1^+ f^{\parallel}_{\alpha\beta} & 1^- \mathcal{A}^{\parallel}_{\alpha} & 1^- \mathcal{A}^{\perp}_{\alpha} & 1^- f^{\parallel}_{\alpha} & 1^- f^{\perp}_{\alpha} \end{smallmatrix}$	
$\begin{smallmatrix} \Theta^+ \mathcal{A}^{\parallel} \uparrow \\ \Theta^+ f^{\parallel} \uparrow \\ \Theta^+ f^{\perp} \uparrow \\ \Theta^- \mathcal{A}^{\parallel} \uparrow \end{smallmatrix}$	$\begin{smallmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{smallmatrix}$	$\begin{smallmatrix} k^2 r_{\frac{1}{2}} + t_{\frac{1}{2}} \\ k^2 r_{\frac{1}{5}} + \frac{2 t_{\frac{1}{2}}}{3} & \frac{\sqrt{2} t_{\frac{1}{2}}}{3} & \frac{1}{3} i \sqrt{2} k t_{\frac{1}{2}} \end{smallmatrix}$	$\begin{smallmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{smallmatrix}$
$\begin{smallmatrix} 1^+ \mathcal{A}^{\parallel} \uparrow^{\alpha\beta} \\ 1^+ \mathcal{A}^{\perp} \uparrow^{\alpha\beta} \\ 1^+ f^{\parallel} \uparrow^{\alpha\beta} \end{smallmatrix}$	$\begin{smallmatrix} \frac{\sqrt{2} t_{\frac{1}{2}}}{3} & \frac{t_{\frac{1}{2}}}{3} & \frac{i k t_{\frac{1}{2}}}{3} \\ -\frac{1}{3} i \sqrt{2} k t_{\frac{1}{2}} & -\frac{1}{3} i k t_{\frac{1}{2}} & \frac{k^2 t_{\frac{1}{2}}}{3} \end{smallmatrix}$	$\begin{smallmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{smallmatrix}$	
$\begin{smallmatrix} 1^- \mathcal{A}^{\parallel} \uparrow^{\alpha} \\ 1^- \mathcal{A}^{\perp} \uparrow^{\alpha} \\ 1^- f^{\parallel} \uparrow^{\alpha} \\ 1^- f^{\perp} \uparrow^{\alpha} \end{smallmatrix}$	$\begin{smallmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{smallmatrix}$	$\begin{smallmatrix} k^2 r_{\frac{1}{5}} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{smallmatrix}$	$\begin{smallmatrix} 2^+ \mathcal{A}^{\parallel}_{\alpha\beta} & 2^+ f^{\parallel}_{\alpha\beta} & 2^- \mathcal{A}^{\parallel}_{\alpha\beta\chi} \end{smallmatrix}$
		$\begin{smallmatrix} 2^+ \mathcal{A}^{\parallel} \uparrow^{\alpha\beta} \\ 2^+ f^{\parallel} \uparrow^{\alpha\beta} \\ 2^- \mathcal{A}^{\parallel} \uparrow^{\alpha\beta\chi} \end{smallmatrix}$	$\begin{smallmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{smallmatrix}$

Saturated propagator

$\begin{smallmatrix} \Theta^+ \sigma^{\parallel} & \Theta^+ \tau^{\parallel} & \Theta^+ \tau^{\perp} & \Theta^- \sigma^{\parallel} \end{smallmatrix}$		$\begin{smallmatrix} 1^+ \sigma^{\parallel}_{\alpha\beta} & 1^+ \sigma^{\perp}_{\alpha\beta} & 1^+ \tau^{\parallel}_{\alpha\beta} & 1^- \sigma^{\parallel}_{\alpha} & 1^- \sigma^{\perp}_{\alpha} & 1^- \tau^{\parallel}_{\alpha} & 1^- \tau^{\perp}_{\alpha} \end{smallmatrix}$						
$\begin{smallmatrix} \Theta^+ \sigma^{\parallel} \uparrow \\ \Theta^+ \tau^{\parallel} \uparrow \\ \Theta^+ \tau^{\perp} \uparrow \\ \Theta^- \sigma^{\parallel} \uparrow \end{smallmatrix}$	$\begin{smallmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{smallmatrix}$	$\begin{smallmatrix} \frac{1}{k^2 r_{\frac{1}{2}} + t_{\frac{1}{2}}} \\ \frac{1}{k^2 r_{\frac{1}{5}} + k^4 r_{\frac{1}{5}}} & -\frac{\sqrt{2}}{k^2 r_{\frac{1}{5}} + k^4 r_{\frac{1}{5}}} & -\frac{i \sqrt{2}}{k r_{\frac{1}{5}} + k^3 r_{\frac{1}{5}}} \end{smallmatrix}$	$\begin{smallmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{smallmatrix}$					
$1^+ \sigma^{\parallel} \uparrow^{\alpha\beta}$	$\frac{1}{k^2 r_{\frac{1}{5}}}$	$-\frac{\sqrt{2}}{k^2 r_{\frac{1}{5}} + k^4 r_{\frac{1}{5}}}$	$-\frac{i \sqrt{2}}{k r_{\frac{1}{5}} + k^3 r_{\frac{1}{5}}}$	0	0	0	0	
$1^+ \sigma^{\perp} \uparrow^{\alpha\beta}$	$-\frac{\sqrt{2}}{k^2 r_{\frac{1}{5}} + k^4 r_{\frac{1}{5}}}$	$\frac{3 k^2 r_{\frac{1}{5}} + 2 t_{\frac{1}{2}}}{(k + k^3)^2 r_{\frac{1}{5}} t_{\frac{1}{2}}}$	$\frac{i \left(3 k^2 r_{\frac{1}{5}} + 2 t_{\frac{1}{2}} \right)}{k (1 + k^2)^2 r_{\frac{1}{5}} t_{\frac{1}{2}}}$	0	0	0	0	
$1^+ \tau^{\parallel} \uparrow^{\alpha\beta}$	$\frac{i \sqrt{2}}{k r_{\frac{1}{5}} + k^3 r_{\frac{1}{5}}}$	$-\frac{i \left(3 k^2 r_{\frac{1}{5}} + 2 t_{\frac{1}{2}} \right)}{k (1 + k^2)^2 r_{\frac{1}{5}} t_{\frac{1}{2}}}$	$\frac{3 k^2 r_{\frac{1}{5}} + 2 t_{\frac{1}{2}}}{(1 + k^2)^2 r_{\frac{1}{5}} t_{\frac{1}{2}}}$	0	0	0	0	
$1^- \sigma^{\parallel} \uparrow^{\alpha}$	0	0	0	$\frac{1}{k^2 r_{\frac{1}{5}}}$	0	0	0	
$1^- \sigma^{\perp} \uparrow^{\alpha}$	0	0	0	0	0	0	0	
$1^- \tau^{\parallel} \uparrow^{\alpha}$	0	0	0	0	0	0	0	
$1^- \tau^{\perp} \uparrow^{\alpha}$	0	0	0	0	0	0	0	$\begin{smallmatrix} 2^+ \sigma^{\parallel}_{\alpha\beta} & 2^+ \tau^{\parallel}_{\alpha\beta} & 2^- \sigma^{\parallel}_{\alpha\beta\chi} \end{smallmatrix}$
				$2^+ \sigma^{\parallel} \uparrow^{\alpha\beta}$	0	0	0	
				$2^+ \tau^{\parallel} \uparrow^{\alpha\beta}$	0	0	0	
				$2^- \sigma^{\parallel} \uparrow^{\alpha\beta\chi}$	0	0	0	

Source constraints

Spin-parity form	Covariant form	Multiplicities
$\Theta^+ \tau^{\perp} == 0$	$\partial_{\beta} \partial_{\alpha} \tau (\Delta + \mathcal{K})^{\alpha\beta} == 0$	1
$\Theta^+ \tau^{\parallel} == 0$	$\partial_{\beta} \partial_{\alpha} \tau (\Delta + \mathcal{K})^{\alpha\beta} == \partial_{\beta} \partial^{\beta} \tau (\Delta + \mathcal{K})^{\alpha}_{\alpha}$	1
$\Theta^+ \sigma^{\parallel} == 0$	$\partial_{\beta} \sigma^{\alpha}_{\alpha}{}^{\beta} == 0$	1
$1^- \tau^{\perp \alpha} == 0$	$\partial_{\chi} \partial_{\beta} \partial^{\alpha} \tau (\Delta + \mathcal{K})^{\beta\chi} == \partial_{\chi} \partial^{\chi} \partial_{\beta} \tau (\Delta + \mathcal{K})^{\alpha\beta}$	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
$1^- \sigma^{\perp \alpha} == 0$	$\partial_{\chi} \partial_{\beta} \sigma^{\beta\alpha\chi} == 0$	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
$2^- \sigma^{\parallel \alpha\beta\chi} == 0$	$3 \partial_{\epsilon} \partial_{\delta} \partial^{\chi} \partial^{\alpha} \sigma^{\delta\beta\epsilon} + 3 \partial_{\epsilon} \partial^{\epsilon} \partial^{\chi} \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^{\chi} \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^{\beta} \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
$2^+ \tau^{\parallel \alpha\beta} == 0$	$4 \partial_{\delta} \partial_{\chi} \partial^{\beta} \partial^{\alpha} \tau (\Delta + \mathcal{K})^{\chi\delta} + 2 \partial_{\delta} \partial^{\delta} \partial^{\beta} \partial^{\alpha} \tau (\Delta + \mathcal{K})^{\chi}_{\chi} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\chi} \tau (\Delta + \mathcal{K})^{\alpha\beta} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\chi} \tau (\Delta + \mathcal{K})^{\beta\alpha} + 2 \eta^{\alpha\beta} \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial_{\chi} \tau (\Delta + \mathcal{K})^{\chi\delta} == 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\alpha} \tau (\Delta + \mathcal{K})^{\beta\chi} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\alpha} \tau (\Delta + \mathcal{K})^{\chi\beta} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\beta} \tau (\Delta + \mathcal{K})^{\alpha\chi} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\beta} \tau (\Delta + \mathcal{K})^{\chi\alpha} + 2 \eta^{\alpha\beta} \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\delta} \tau (\Delta + \mathcal{K})^{\chi}_{\chi}$	5
$2^+ \sigma^{\parallel \alpha\beta} == 0$	$3 \partial_{\delta} \partial_{\chi} \partial^{\alpha} \sigma^{\chi\beta\delta} + 3 \partial_{\delta} \partial_{\chi} \partial^{\beta} \sigma^{\chi\alpha\delta} + 2 \eta^{\alpha\beta} \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \sigma^{\chi}_{\chi}{}^{\delta} == 2 \partial_{\delta} \partial^{\beta} \partial^{\alpha} \sigma^{\chi}_{\chi}{}^{\delta} + 3 (\partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\alpha\beta\chi} + \partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\beta\alpha\chi})$	5
Total expected gauge generators:		30

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

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