

PSALTer results panel

$$S == \int \int \int \int \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} - 24 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\tau}^{\theta} \partial^{\prime} \mathcal{A}^{\alpha \beta}_{\alpha} - 24 r_{\frac{1}{2}} \partial_{\alpha} \mathcal{A}^{\alpha \beta \prime} \partial_{\theta} \mathcal{A}_{\beta}^{\theta} + 48 r_{\frac{1}{2}} \partial^{\prime} \mathcal{A}^{\alpha \beta}_{\alpha} \partial_{\theta} \mathcal{A}_{\beta}^{\theta} + 8 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\alpha \prime \theta} \partial^{\theta} \mathcal{A}^{\alpha \beta \prime} - 4 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\alpha \theta \prime} \partial^{\theta} \mathcal{A}^{\alpha \beta \prime} + 4 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\theta \alpha} \partial^{\theta} \mathcal{A}^{\alpha \beta \prime} - 24 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\theta \alpha} \partial^{\theta} \mathcal{A}^{\alpha \beta \prime} - 2 r_{\frac{1}{2}} \partial_{\beta} \mathcal{A}_{\alpha \beta \theta} \partial^{\theta} \mathcal{A}^{\alpha \beta \prime} + 2 r_{\frac{1}{2}} \partial_{\theta} \mathcal{A}_{\alpha \beta \prime} \partial^{\theta} \mathcal{A}^{\alpha \beta \prime} - 4 r_{\frac{1}{2}} \partial_{\theta} \mathcal{A}_{\alpha \prime \beta} \partial^{\theta} \mathcal{A}^{\alpha \beta \prime} + 4 t_{\frac{1}{2}} \mathcal{A}_{\theta \alpha} \partial^{\theta} f^{\alpha \prime} + 2 t_{\frac{1}{2}} \partial_{\alpha} f_{\theta} \partial^{\theta} f^{\alpha \prime} - t_{\frac{1}{2}} \partial_{\alpha} f_{\theta \prime} \partial^{\theta} f^{\alpha \prime} - t_{\frac{1}{2}} \partial_{\theta} f_{\alpha} \partial^{\theta} f^{\alpha \prime} + t_{\frac{1}{2}} \partial_{\theta} f_{\alpha \prime} \partial^{\theta} f^{\alpha \prime} - t_{\frac{1}{2}} \partial_{\theta} f_{\alpha \prime} \partial^{\theta} f^{\alpha \prime} - 4 t_{\frac{1}{2}} \mathcal{A}_{\alpha \theta \prime} \left(\mathcal{A}^{\alpha \prime \theta} + \partial^{\theta} f^{\alpha \prime} \right) + 2 t_{\frac{1}{2}} \mathcal{A}_{\alpha \prime \theta} \left(\mathcal{A}^{\alpha \prime \theta} + 2 \partial^{\theta} f^{\alpha \prime} \right) \right) \Big| [t, x, y, z] dz dy dx dt$$

Wave operator

$\overset{0}{\cdot}\mathcal{A}^{\parallel}$	$\overset{0}{\cdot}f^{\parallel}$	$\overset{0}{\cdot}f^{\perp}$	$\overset{0}{\cdot}\mathcal{A}^{\perp}$											
$\overset{0}{\cdot}\mathcal{A}^{\parallel} \uparrow$	$6 k^2 r_{\frac{1}{2}}$	0	0	0										
$\overset{0}{\cdot}f^{\parallel} \uparrow$	0	0	0	0										
$\overset{0}{\cdot}f^{\perp} \uparrow$	0	0	0	0										
$\overset{0}{\cdot}\mathcal{A}^{\perp} \uparrow$	0	0	0	$k^2 r_{\frac{1}{2}} + t_{\frac{1}{2}}$	$\overset{1}{\cdot}\mathcal{A}^{\parallel}_{\alpha\beta}$	$\overset{1}{\cdot}\mathcal{A}^{\perp}_{\alpha\beta}$	$\overset{1}{\cdot}f^{\parallel}_{\alpha\beta}$	$\overset{1}{\cdot}\mathcal{A}^{\parallel}_{\alpha}$	$\overset{1}{\cdot}\mathcal{A}^{\perp}_{\alpha}$	$\overset{1}{\cdot}f^{\parallel}_{\alpha}$	$\overset{1}{\cdot}f^{\perp}_{\alpha}$			
$\overset{1}{\cdot}\mathcal{A}^{\parallel} \uparrow^{\alpha\beta}$					$\frac{2 t_{\frac{1}{2}}}{3}$	$\frac{\sqrt{2} t_{\frac{1}{2}}}{3}$	$\frac{1}{3} i \sqrt{2} k t_{\frac{1}{2}}$	0	0	0	0			
$\overset{1}{\cdot}\mathcal{A}^{\perp} \uparrow^{\alpha\beta}$					$\frac{\sqrt{2} t_{\frac{1}{2}}}{3}$	$\frac{t_{\frac{1}{2}}}{3}$	$\frac{i k t_{\frac{1}{2}}}{3}$	0	0	0	0			
$\overset{1}{\cdot}f^{\parallel} \uparrow^{\alpha\beta}$					$-\frac{1}{3} i \sqrt{2} k t_{\frac{1}{2}}$	$-\frac{1}{3} i k t_{\frac{1}{2}}$	$\frac{k^2 t_{\frac{1}{2}}}{3}$	0	0	0	0			
$\overset{1}{\cdot}\mathcal{A}^{\parallel} \uparrow^{\alpha}$					0	0	0	0	0	0	0			
$\overset{1}{\cdot}\mathcal{A}^{\perp} \uparrow^{\alpha}$					0	0	0	0	0	0	0			
$\overset{1}{\cdot}f^{\parallel} \uparrow^{\alpha}$					0	0	0	0	0	0	0			
$\overset{1}{\cdot}f^{\perp} \uparrow^{\alpha}$					0	0	0	0	0	0	0	$\overset{2}{\cdot}\mathcal{A}^{\parallel}_{\alpha\beta}$	$\overset{2}{\cdot}f^{\parallel}_{\alpha\beta}$	
												$\overset{2}{\cdot}\mathcal{A}^{\parallel} \uparrow^{\alpha\beta}$	0	0
												$\overset{2}{\cdot}f^{\parallel} \uparrow^{\alpha\beta}$	0	0
												$\overset{2}{\cdot}\mathcal{A}^{\parallel} \uparrow^{\alpha\beta\chi}$	0	0

Saturated propagator

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

Source constraints

Spin-parity form	Covariant form	Multiplicities
$\overset{0}{\cdot}\tau^{\perp} == 0$	$\partial_{\beta} \partial_{\alpha \tau} (\Delta + \mathcal{K})^{\alpha \beta} == 0$	1
$\overset{0}{\cdot}\tau^{\parallel} == 0$	$\partial_{\beta} \partial_{\alpha \tau} (\Delta + \mathcal{K})^{\alpha \beta} == \partial_{\beta} \partial^{\beta}_{\tau} (\Delta + \mathcal{K})^{\alpha}_{\alpha}$	1
$\overset{1}{\cdot}\tau^{\perp \alpha} == 0$	$\partial_{\chi} \partial_{\beta} \partial^{\alpha}_{\tau} (\Delta + \mathcal{K})^{\beta \chi} == \partial_{\chi} \partial^{\chi} \partial_{\beta \tau} (\Delta + \mathcal{K})^{\alpha \beta}$	3
$\overset{1}{\cdot}\tau^{\parallel \alpha} == 0$	$\partial_{\chi} \partial_{\beta} \partial^{\alpha}_{\tau} (\Delta + \mathcal{K})^{\beta \chi} == \partial_{\chi} \partial^{\chi} \partial_{\beta \tau} (\Delta + \mathcal{K})^{\beta \alpha}$	3
$\overset{1}{\cdot}\sigma^{\perp \alpha} == 0$	$\partial_{\chi} \partial_{\beta} \sigma^{\beta \alpha \chi} == 0$	3
$\overset{1}{\cdot}\sigma^{\parallel \alpha} == 0$	$\partial_{\delta} \partial^{\alpha} \sigma^{\chi}_{\chi}{}^{\delta} + \partial_{\delta} \partial^{\delta} \sigma^{\chi \alpha}_{\chi} == \partial_{\delta} \partial_{\chi} \sigma^{\chi \alpha \delta}$	3
$i k \overset{1}{\cdot}\sigma^{\parallel \alpha \beta} + \overset{1}{\cdot}\tau^{\parallel \alpha \beta} == 0$	$\partial_{\chi} \partial^{\alpha}_{\tau} (\Delta + \mathcal{K})^{\beta \chi} + \partial_{\chi} \partial^{\beta}_{\tau} (\Delta + \mathcal{K})^{\chi \alpha} + \partial_{\chi} \partial^{\chi}_{\tau} (\Delta + \mathcal{K})^{\alpha \beta} + \partial_{\delta} \partial_{\chi} \partial^{\beta} \sigma^{\chi \alpha \delta} + \partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\alpha \beta \chi} == \partial_{\chi} \partial^{\alpha}_{\tau} (\Delta + \mathcal{K})^{\chi \beta} + \partial_{\chi} \partial^{\beta}_{\tau} (\Delta + \mathcal{K})^{\alpha \chi} + \partial_{\chi} \partial^{\chi}_{\tau} (\Delta + \mathcal{K})^{\beta \alpha} + \partial_{\delta} \partial_{\chi} \partial^{\alpha} \sigma^{\chi \beta \delta} + \partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\beta \alpha \chi}$	3
$\overset{1}{\cdot}\sigma^{\parallel \alpha \beta} == \overset{1}{\cdot}\sigma^{\perp \alpha \beta}$	$3 \partial_{\delta} \partial_{\chi} \partial^{\alpha} \sigma^{\chi \beta \delta} + \partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\beta \alpha \chi} + 2 \partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\chi \alpha \delta} == 3 \partial_{\delta} \partial_{\chi} \partial^{\beta} \sigma^{\chi \alpha \delta} + \partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\alpha \beta \chi}$	3
$\overset{2}{\cdot}\sigma^{\parallel \alpha \beta \chi} == 0$	$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^{\delta} \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^{\chi} \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^{\delta} \sigma^{\delta \beta}_{\delta}$	5
$\overset{2}{\cdot}\tau^{\parallel \alpha \beta} == 0$	$4 \partial_{\delta} \partial_{\chi} \partial^{\beta} \partial^{\alpha}_{\tau} (\Delta + \mathcal{K})^{\chi \delta} + 2 \partial_{\delta} \partial^{\delta} \partial^{\beta} \partial^{\alpha}_{\tau} (\Delta + \mathcal{K})^{\chi}_{\chi} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\chi}_{\tau} (\Delta + \mathcal{K})^{\alpha \beta} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\chi}_{\tau} (\Delta + \mathcal{K})^{\beta \alpha} + 2 \eta^{\alpha \beta} \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial_{\chi \tau} (\Delta + \mathcal{K})^{\chi \delta} == 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\alpha}_{\tau} (\Delta + \mathcal{K})^{\beta \chi} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\alpha}_{\tau} (\Delta + \mathcal{K})^{\chi \beta} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\beta}_{\tau} (\Delta + \mathcal{K})^{\alpha \chi} + 3 \partial_{\delta} \partial^{\delta} \partial_{\chi} \partial^{\beta}_{\tau} (\Delta + \mathcal{K})^{\chi \alpha} + 2 \eta^{\alpha \beta} \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \partial^{\delta}_{\tau} (\Delta + \mathcal{K})^{\chi}_{\chi}$	5
$\overset{2}{\cdot}\sigma^{\parallel \alpha \beta} == 0$	$3 \partial_{\delta} \partial_{\chi} \partial^{\alpha} \sigma^{\chi \beta \delta} + 3 \partial_{\delta} \partial_{\chi} \partial^{\beta} \sigma^{\chi \alpha \delta} + 2 \eta^{\alpha \beta} \partial_{\epsilon} \partial^{\epsilon} \partial_{\delta} \sigma^{\chi}_{\chi}{}^{\delta} == 2 \partial_{\delta} \partial^{\beta} \partial^{\alpha} \sigma^{\chi}_{\chi}{}^{\delta} + 3 \left(\partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\alpha \beta \chi} + \partial_{\delta} \partial^{\delta} \partial_{\chi} \sigma^{\beta \alpha \chi} \right)$	5
Total expected gauge generators:		35

Massive spectrum

?

?

?

?

?

$J^P = 0^-$

$k^{\mu} = (\mathcal{E}, 0, 0, p)$

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

(There are no massless particles)

Gauge symmetries

(Not yet implemented in PSALTer)

Unitarity conditions

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

Validity assumptions

(Not yet implemented in PSALTer)