

PSALTer results panel

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$$\iiint\left(\frac{1}{6}\left(2t_1\mathcal{A}^{\alpha'}_{\alpha}\mathcal{A}_{\beta}^{\beta}+6\mathcal{A}^{\alpha\beta X}_{\alpha\beta X}+6f^{\alpha\beta}\text{tr}(\Delta\mathcal{A})_{\alpha\beta}-4t_1\mathcal{A}_{\alpha}^{\beta}\partial f^{\alpha'}_{\beta'}-24r_3\partial_{\beta}\mathcal{A}_{\beta'}^{\beta}\partial'\mathcal{A}^{\alpha\beta}_{\alpha}+4t_1\mathcal{A}_{\beta}^{\beta}\partial f^{\alpha}_{\alpha}-2t_1\partial f^{\beta}_{\beta}\partial'f^{\alpha}_{\alpha}-24r_3\partial_{\alpha}\mathcal{A}^{\alpha\beta'}\partial_{\beta}\mathcal{A}_{\beta'}^{\beta}+48r_3\partial'\mathcal{A}^{\alpha\beta}_{\alpha}\partial_{\beta}\mathcal{A}_{\beta'}^{\beta}-2t_1\partial f^{\alpha'}_{\alpha'}\partial_{\beta}f^{\beta}_{\beta}+4t_1\partial'f^{\alpha}_{\alpha}\partial_{\beta}f^{\beta}_{\beta}+8r_2\partial_{\beta}\mathcal{A}_{\alpha\beta}\partial^{\beta}\mathcal{A}^{\alpha\beta'}-4r_2\partial_{\beta}\mathcal{A}_{\alpha\beta'}\partial^{\beta}\mathcal{A}^{\alpha\beta'}+4r_2\partial_{\beta}\mathcal{A}_{\beta'}^{\beta}\partial^{\beta}\mathcal{A}^{\alpha\beta}_{\alpha}-24r_3\partial_{\beta}\mathcal{A}_{\beta'}^{\beta}\partial^{\beta}\mathcal{A}^{\alpha\beta'}-2r_2\partial_{\alpha}\mathcal{A}_{\alpha\beta}\partial^{\beta}\mathcal{A}^{\alpha\beta'}+2r_2\partial_{\beta}\mathcal{A}_{\alpha\beta'}\partial^{\beta}\mathcal{A}^{\alpha\beta'}-4r_2\partial_{\beta}\mathcal{A}_{\alpha\beta'}\partial^{\beta}\mathcal{A}^{\alpha\beta'}+4t_1\mathcal{A}_{\beta\alpha}\partial^{\beta}f^{\alpha'}_{\alpha'}+4t_2\mathcal{A}_{\beta\alpha}\partial^{\beta}f^{\alpha'}_{\alpha'}-4t_1\partial_{\alpha}f_{\beta}\partial^{\beta}f^{\alpha'}_{\alpha'}+2t_2\partial_{\alpha}f_{\beta}\partial^{\beta}f^{\alpha'}_{\alpha'}-4t_1\partial_{\alpha}f_{\beta}\partial^{\beta}f^{\alpha'}_{\alpha'}-t_2\partial_{\alpha}f_{\beta}\partial^{\beta}f^{\alpha'}_{\alpha'}+2t_1\partial_{\alpha}\partial_{\beta}\partial^{\beta}f^{\alpha'}_{\alpha'}-t_2\partial_{\alpha}\partial_{\beta}\partial^{\beta}f^{\alpha'}_{\alpha'}+4t_1\partial_{\beta}f_{\alpha}\partial^{\beta}f^{\alpha'}_{\alpha'}+2t_2\partial_{\beta}f_{\alpha}\partial^{\beta}f^{\alpha'}_{\alpha'}-t_2\partial_{\beta}f_{\alpha}\partial^{\beta}f^{\alpha'}_{\alpha'}+2\left(t_1+t_2\right)\mathcal{A}_{\alpha\beta}\left(\mathcal{A}^{\alpha'\beta}+2\partial^{\beta}f^{\alpha'}_{\alpha'}\right)+2\mathcal{A}_{\alpha\beta}\left(\left(t_1-2t_2\right)\mathcal{A}^{\alpha'\beta}+2\left(2t_1-t_2\right)\partial^{\beta}f^{\alpha'}_{\alpha'}\right)\right)\Bigg]k,x,y,z]dzdydxdt$$

Wave operator

$\partial^{\prime}\mathcal{A}^{\parallel}\uparrow$	$\partial^{\prime}f^{\parallel}\uparrow$	$\partial^{\prime}f^{\perp}\uparrow$	$\partial^{\prime}\mathcal{A}^{\perp}\uparrow$								
$\partial^{\prime}\mathcal{A}^{\parallel}\uparrow$	$6k^2r_3\frac{ikt_2}{6\sqrt{2}}$	0	0	$\mathcal{A}^{\parallel}_{\alpha\beta}$	$\mathcal{A}^{\perp}_{\alpha\beta}$	$f^{\parallel}_{\alpha\beta}$	$\mathcal{A}^{\parallel}_{\alpha}$	$\mathcal{A}^{\perp}_{\alpha}$	f^{\parallel}_{α}	f^{\perp}_{α}	
$\partial^{\prime}f^{\parallel}\uparrow$	$-\frac{ikt_2}{6\sqrt{2}}$	0	0	$\mathcal{A}^{\parallel}_{\alpha\beta}$	$\mathcal{A}^{\perp}_{\alpha\beta}$	$f^{\parallel}_{\alpha\beta}$	$\mathcal{A}^{\parallel}_{\alpha}$	$\mathcal{A}^{\perp}_{\alpha}$	f^{\parallel}_{α}	f^{\perp}_{α}	
$\partial^{\prime}f^{\perp}\uparrow$	0	0	0	$\mathcal{A}^{\parallel}_{\alpha\beta}$	$\mathcal{A}^{\perp}_{\alpha\beta}$	$f^{\parallel}_{\alpha\beta}$	$\mathcal{A}^{\parallel}_{\alpha}$	$\mathcal{A}^{\perp}_{\alpha}$	f^{\parallel}_{α}	f^{\perp}_{α}	
$\partial^{\prime}\mathcal{A}^{\perp}\uparrow$	0	0	0	$\mathcal{A}^{\parallel}_{\alpha\beta}$	$\mathcal{A}^{\perp}_{\alpha\beta}$	$f^{\parallel}_{\alpha\beta}$	$\mathcal{A}^{\parallel}_{\alpha}$	$\mathcal{A}^{\perp}_{\alpha}$	f^{\parallel}_{α}	f^{\perp}_{α}	
$\mathcal{A}^{\parallel}\uparrow^{\alpha\beta}$	$\frac{1}{6}\left(t_1+4t_2\right)$	$-\frac{t_1-2t_2}{3\sqrt{2}}$	$-\frac{ik\left(2t_1-3t_2\right)}{6\sqrt{2}}$	0	0	0	0	0	0	0	
$\mathcal{A}^{\perp}\uparrow^{\alpha\beta}$	$-\frac{t_1-2t_2}{3\sqrt{2}}$	$\frac{t_1+t_2}{3}$	$\frac{1}{6}ik\left(2t_1+3t_2\right)$	0	0	0	0	0	0	0	
$f^{\parallel}\uparrow^{\alpha\beta}$	$\frac{ik\left(2t_1-3t_2\right)}{6\sqrt{2}}$	$-\frac{1}{6}ik\left(2t_1+3t_2\right)$	$\frac{1}{3}k^2\left(t_1+t_2\right)$	0	0	0	0	0	0	0	
$\mathcal{A}^{\parallel}\uparrow^{\alpha}$	0	0	0	$\frac{t_1}{6}$	$\frac{t_1}{3\sqrt{2}}$	0	$\frac{ikt_2}{3}$				
$\mathcal{A}^{\perp}\uparrow^{\alpha}$	0	0	0	$\frac{t_1}{3\sqrt{2}}$	$\frac{t_1}{3}$	$-\frac{ikt_2}{3\sqrt{2}}$	$\frac{ik\left(4t_1+t_2\right)}{6\sqrt{2}}$				
$f^{\parallel}\uparrow^{\alpha}$	0	0	0	0	$\frac{ikt_2}{3\sqrt{2}}$	0	0				
$f^{\perp}\uparrow^{\alpha}$	0	0	0	$-\frac{1}{3}ik t_1$	$-\frac{ik\left(4t_1+t_2\right)}{6\sqrt{2}}$	0	$\frac{2k^2t_2}{3}$	$2^{\prime}\mathcal{A}^{\parallel}_{\alpha\beta}$	$2^{\prime}f^{\parallel}_{\alpha\beta}$	$2^{\prime}\mathcal{A}^{\parallel}_{\alpha\beta X}$	
				$2^{\prime}\mathcal{A}^{\parallel}\uparrow^{\alpha\beta}$	$\frac{t_1}{2}$	$-\frac{ik\left(6t_1-t_2\right)}{6\sqrt{2}}$	0				
				$2^{\prime}f^{\parallel}\uparrow^{\alpha\beta}$	$\frac{ik\left(6t_1-t_2\right)}{6\sqrt{2}}$	k^2t_1	0				
				$2^{\prime}\mathcal{A}^{\parallel}\uparrow^{\alpha\beta X}$	0	0	$\frac{t_1}{2}$				

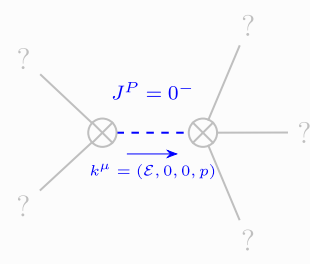
Saturated propagator

$\partial^{\prime}\sigma^{\parallel}\uparrow$	$\partial^{\prime}\mathcal{I}^{\parallel}\uparrow$	$\partial^{\prime}t^{\perp}\uparrow$	$\partial^{\prime}\sigma^{\perp}\uparrow$								
$\partial^{\prime}\sigma^{\parallel}\uparrow$	0	$\frac{6i\sqrt{2}}{kt_2}$	0	0	$\mathcal{I}^{\perp}_{\alpha\beta}$	$\sigma^{\perp}_{\alpha\beta}$	$\mathcal{I}^{\parallel}_{\alpha\beta}$	$\mathcal{I}^{\perp}_{\alpha}$	σ^{\perp}_{α}	$\mathcal{I}^{\parallel}_{\alpha}$	$\mathcal{I}^{\perp}_{\alpha}$
$\partial^{\prime}\mathcal{I}^{\parallel}\uparrow$	$-\frac{6i\sqrt{2}}{kt_2}$	$-\frac{432r_3}{t_2^2}$	0	0	$\mathcal{I}^{\perp}_{\alpha\beta}$	$\sigma^{\perp}_{\alpha\beta}$	$\mathcal{I}^{\parallel}_{\alpha\beta}$	$\mathcal{I}^{\perp}_{\alpha}$	σ^{\perp}_{α}	$\mathcal{I}^{\parallel}_{\alpha}$	$\mathcal{I}^{\perp}_{\alpha}$
$\partial^{\prime}t^{\perp}\uparrow$	0	0	0	0	$\mathcal{I}^{\perp}_{\alpha\beta}$	$\sigma^{\perp}_{\alpha\beta}$	$\mathcal{I}^{\parallel}_{\alpha\beta}$	$\mathcal{I}^{\perp}_{\alpha}$	σ^{\perp}_{α}	$\mathcal{I}^{\parallel}_{\alpha}$	$\mathcal{I}^{\perp}_{\alpha}$
$\partial^{\prime}\sigma^{\perp}\uparrow$	0	0	0	$\frac{1}{k^2t_2+t_2}$	$\mathcal{I}^{\perp}_{\alpha\beta}$	$\sigma^{\perp}_{\alpha\beta}$	$\mathcal{I}^{\parallel}_{\alpha\beta}$	$\mathcal{I}^{\perp}_{\alpha}$	σ^{\perp}_{α}	$\mathcal{I}^{\parallel}_{\alpha}$	$\mathcal{I}^{\perp}_{\alpha}$
$\mathcal{I}^{\perp}\uparrow^{\alpha\beta}$	$\frac{2}{3}\left(\frac{1}{t_2}+\frac{4}{4t_1+t_2}\right)$	$-\frac{\sqrt{2}\left(-4t_1+t_2\right)}{3t_2\left(4t_1+t_2\right)}$	$-\frac{2i\sqrt{2}}{4kt_1+kt_2}$	0	0	0	0	0	0	0	
$\mathcal{I}^{\perp}\sigma^{\perp}\uparrow^{\alpha\beta}$	$-\frac{\sqrt{2}\left(-4t_1+t_2\right)}{3t_2\left(4t_1+t_2\right)}$	$\frac{1}{3}\left(-\frac{8}{t_2}+\frac{1}{4t_1+t_2}\right)$	$\frac{4i\left(3t_1+t_2\right)}{kt_2\left(4t_1+t_2\right)}$	0	0	0	0	0	0	0	
$\mathcal{I}^{\perp}\mathcal{I}^{\parallel}\uparrow^{\alpha\beta}$	$\frac{2i\sqrt{2}}{4kt_1+kt_2}$	$-\frac{4i\left(3t_1+t_2\right)}{kt_2\left(4t_1+t_2\right)}$	$-\frac{12t_1}{k^2t_2\left(4t_1+t_2\right)}$	0	0	0	0	0	0	0	
$\mathcal{I}^{\perp}\sigma^{\parallel}\uparrow^{\alpha}$	0	0	0	$\frac{30\left(8t_1+5t_2\right)}{\left(5+16k^2\right)^2t_1t_2}$	$-\frac{12\sqrt{2}}{5t_2+16k^2t_2}$	$\frac{24i\left(\left(5+24k^2\right)t_1+5k^2t_2\right)}{k\left(5+16k^2\right)^2t_1t_2}$	$\frac{12i\left(\left(-5+16k^2\right)t_1+20k^2t_2\right)}{k\left(5+16k^2\right)^2t_1t_2}$				
$\mathcal{I}^{\perp}\sigma^{\perp}\uparrow^{\alpha}$	0	0	0	$-\frac{12\sqrt{2}}{5t_2+16k^2t_2}$	0	$-\frac{12i\sqrt{2}\left(1+4k^2\right)}{k\left(5+16k^2\right)^2t_1t_2}$	$\frac{6i\sqrt{2}}{5kt_2+16k^3t_2}$				
$\mathcal{I}^{\perp}\mathcal{I}^{\parallel}\uparrow^{\alpha}$	0	0	0	$-\frac{24i\left(\left(5+24k^2\right)t_1+5k^2t_2\right)}{k\left(5+16k^2\right)^2t_1t_2}$	$\frac{12i\sqrt{2}\left(1+4k^2\right)}{k\left(5+16k^2\right)^2t_1t_2}$	$\frac{96\left(\left(2+8k^2\right)t_1+k^2t_2\right)}{\left(5+16k^2\right)^3t_1t_2}$	$\frac{48\left(\left(3+16k^2\right)t_1+4k^2t_2\right)}{\left(5+16k^2\right)^3t_1t_2}$				
$\mathcal{I}^{\perp}t^{\perp}\uparrow^{\alpha}$	0	0	0	$-\frac{12i\left(\left(-5+16k^2\right)t_1+20k^2t_2\right)}{k\left(5+16k^2\right)^2t_1t_2}$	$-\frac{6i\sqrt{2}}{5kt_2+16k^3t_2}$	$\frac{48\left(\left(3+16k^2\right)t_1+4k^2t_2\right)}{\left(5+16k^2\right)^3t_1t_2}$	$-\frac{192\left(t_1-2k^2t_2\right)}{\left(5+16k^2\right)^3t_1t_2}$	$2^{\prime}\sigma^{\parallel}_{\alpha\beta}$	$2^{\prime}t^{\parallel}_{\alpha\beta}$	$2^{\prime}\sigma^{\parallel}_{\alpha\beta X}$	
				$2^{\prime}\sigma^{\parallel}\uparrow^{\alpha\beta}$	$\frac{72t_1}{12t_1t_2-t_2^2}$	$\frac{6i\sqrt{2}\left(6t_1-t_2\right)}{k\left(12t_1-t_2\right)t_2}$	0				
				$2^{\prime}t^{\parallel}\uparrow^{\alpha\beta}$	$\frac{6i\sqrt{2}\left(6t_1-t_2\right)}{k\left(12t_1-t_2\right)t_2}$	$\frac{36t_1}{k^2t_2\left(-12t_1+t_2\right)}$	0				
				$2^{\prime}\sigma^{\parallel}\uparrow^{\alpha\beta X}$	0	0	$\frac{2}{t_1}$				

Source constraints

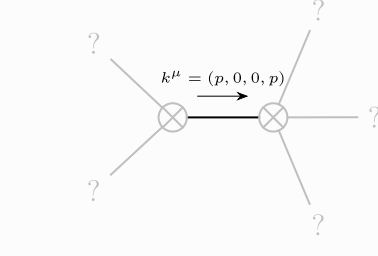
Spin-parity form	Covariant form	Multiplicities
$\partial^{\prime}t^{\perp} = 0$	$\partial_{\beta}\partial_{\alpha}\text{tr}(\Delta\mathcal{A})^{\alpha\beta} = 0$	1
$4ik\mathcal{I}^{\perp}\sigma^{\parallel\alpha} + \mathcal{I}^{\perp}\mathcal{I}^{\alpha} + 2\mathcal{I}^{\perp}t^{\alpha} = 0$	$2\partial_{\alpha}\partial^{\beta}\partial_{\beta\text{r}}(\Delta\mathcal{A})^{\alpha\beta} + \partial_{\alpha}\partial^{\beta}\partial_{\beta\text{r}}(\Delta\mathcal{A})^{\beta\alpha} + 4\partial_{\beta}\partial^{\delta}\partial_{\delta}\partial_{\beta}\sigma^{\beta\alpha X} = 3\partial_{\beta}\partial_{\beta}\partial^{\alpha}\text{tr}(\Delta\mathcal{A})^{\beta X} + 4\left(\partial_{\beta}\partial^{\delta}\partial_{\delta}\partial^{\alpha}\sigma^{\beta}_{\beta}{}^X + \partial_{\beta}\partial^{\delta}\partial_{\delta}\partial^{\alpha}\sigma^{\beta\alpha}_{\beta}\right)$	3
Total expected gauge generators:		4

Massive spectrum

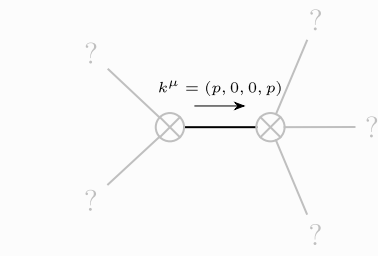


Massive particle	
Pole residue:	$-\frac{1}{f_2^2} > 0$
Square mass:	$-\frac{t_2}{f_2^2} > 0$
Spin:	0
Parity:	Odd

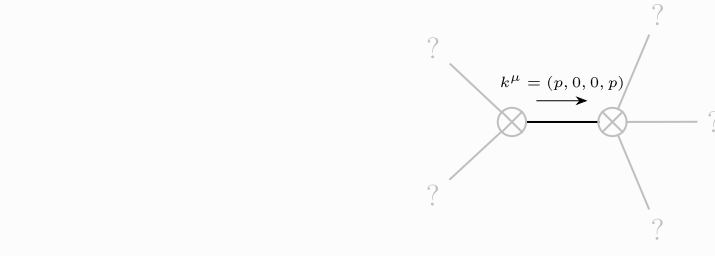
Massless spectrum



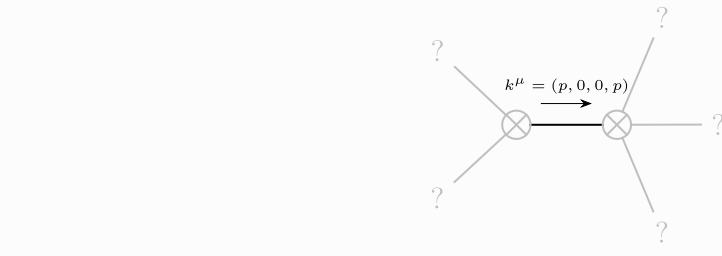
Massless particle	
Pole residue:	$-\frac{(15t_1^2+8t_1t_2+2t_2^2)p^2}{t_1t_2(4t_1+t_2)} > 0$
Polarisations:	1



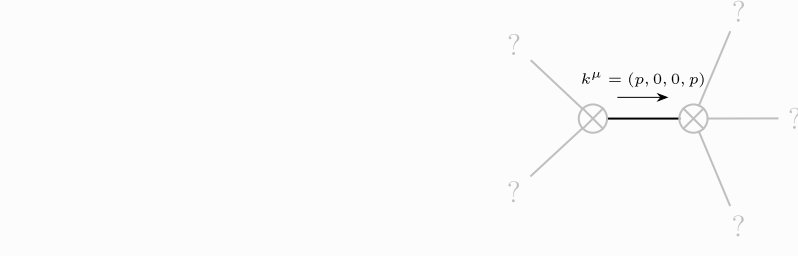
Massless particle	
Pole residue:	$\frac{(81t_1^2-24t_1t_2+2t_2^2)p^2}{t_1(12t_1+t_2)t_2} > 0$
Polarisations:	1



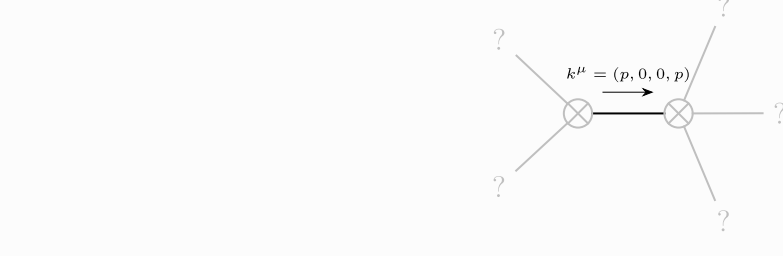
Massless particle	
Pole residue:	$\frac{(48t_1^2(6t_1+5t_2)+\sqrt{(36t_1^2+12t_1t_2+5t_2^2)}(145152t_1^4+768t_1^3t_2+2980t_1^2t_2^2-604t_1t_2^3+37t_2^4))p^2}{t_1(12t_1+t_2)t_2(4t_1+t_2)} > 0$
Polarisations:	2



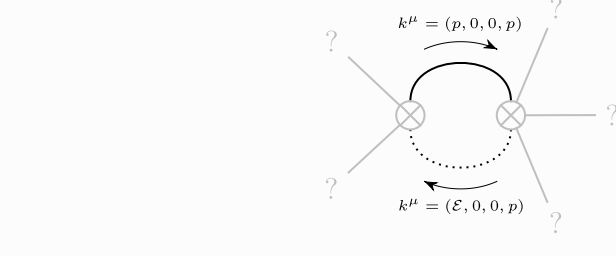
Massless particle	
Pole residue:	$\frac{(48t_1^2(6t_1+5t_2)+\sqrt{(36t_1^2+12t_1t_2+5t_2^2)}(145152t_1^4+768t_1^3t_2+2980t_1^2t_2^2-604t_1t_2^3+37t_2^4))p^2}{t_1(12t_1+t_2)t_2(4t_1+t_2)} > 0$
Polarisations:	2



Massless particle	
Pole residue:	$-\frac{(-(4t_1+t_2)(1008t_1^2-264t_1t_2+23t_2^2))+\sqrt{(4t_1+t_2)^2(148176t_1^4-134064t_1^3t_2+41268t_1^2t_2^2-4848t_1t_2^3+193t_2^4))p^2}{t_1(12t_1+t_2)t_2(4t_1+t_2)} > 0$
Polarisations:	1



Massless particle	
Pole residue:	$\frac{((4t_1+t_2)(1008t_1^2-264t_1t_2+23t_2^2))+\sqrt{(4t_1+t_2)^2(148176t_1^4-134064t_1^3t_2+41268t_1^2t_2^2-4848t_1t_2^3+193t_2^4))p^2}{t_1(12t_1+t_2)t_2(4t_1+t_2)} > 0$
Polarisations:	1



Quartic pole	
Pole residue:	$0 < -\frac{(8t_1+t_2)(36t_1^2+12t_1t_2+5t_2^2)p^4}{t_1(12t_1+t_2)t_2(4t_1+t_2)} \& -\frac{(8t_1+t_2)(36t_1^2+12t_1t_2+5t_2^2)p^4}{t_1(12t_1+t_2)t_2(4t_1+t_2)} > 0$
Polarisations:	2

Gauge symmetries

(Not yet implemented in PSALTer)

Unitarity conditions

(Unitarity is demonstrably impossible)

Validity assumptions

(Not yet implemented in PSALTer)