## **PSALTer results panel**

## Wave operator and propagator

	$\overset{1,^+}{\cdot}\sigma^{\parallel}{}_{\alpha\beta}$	$\overset{1^+}{\cdot}\sigma^{\!$	$1^+_{7} {}^{\parallel}{}_{\alpha\beta}$	$1^{-}\sigma^{\parallel}{}_{lpha}$	$\frac{1}{\epsilon}\sigma^{\iota}{}_{\alpha}$	1 <sub>T</sub>   <sub>a</sub> 1 <sub>T</sub> <sub>a</sub>	
$1^+ \sigma^{\parallel} + \alpha^{\alpha\beta}$	8(2 β,-β,) 	$2 \sqrt{2} (4 \beta_1^{-6} \beta_2^{+} + (M_{Pl}^2))$	$2i\sqrt{2}k(4\beta_{1}-6\beta_{2}+(M_{Pl}^{2}))$	0	0		
-, <i>U</i> " T	$\overline{16(\beta_{1}^{2}-\beta_{2}^{2})(2\beta_{1}^{2}+\beta_{2}^{2})+4(\alpha_{2}^{2}-\alpha_{3}^{2}+4\alpha_{4}^{2}-4\alpha_{6}^{2})(2\beta_{1}^{2}-\beta_{2}^{2})k^{2}-4\beta_{1}^{2}(M_{Pl}^{2})+10\beta_{2}^{2}(M_{Pl}^{2})-(M_{Pl}^{2})^{2}}$	$(1+k^2)(16(\beta_1^{}-\beta_2^{})(2\beta_1^{}+\beta_2^{})+4(\alpha_2^{}-\alpha_3^{}+4\alpha_4^{}-4\alpha_6^{})(2\beta_1^{}-\beta_2^{})k^2-4\beta_1^{}(M_{Pl}^2)+10\beta_2^{}(M_{Pl}^2)-(M_{Pl}^2)^2$	$(1+k^2)(16(\beta_1^{-}\beta_2^{-})(2\beta_1^{-}+\beta_2^{-})+4(\alpha_2^{-}\alpha_3^{-}+4\alpha_4^{-}\alpha_6^{-})(2\beta_1^{-}\beta_2^{-})k^2-4\beta_1^{-}(M_{Pl}^2)+10\beta_2^{-}(M_{Pl}^2)-(M_{Pl}^2)^2)$	U	U	Ü	
$1.^+\sigma^{\perp}\uparrow^{\alpha\beta}$	$2\sqrt{2}(4\beta_{1}-6\beta_{2}+(M_{Pl}^{2}))$	$2(12 \beta_{1}^{-1} 10 \beta_{2}^{-1} + 2(\alpha_{1}^{-\alpha_{1}} + 4 \alpha_{1}^{-4} 4 \alpha_{1}^{-6}) k^{2} + (M_{Pl}^{2}))$	$\frac{2i  k(12  \beta_1 \cdot 10  \beta_2 \cdot + 2(  \alpha_2 \cdot \alpha_3 + 4  \alpha_4 \cdot 4  \alpha_5)  k^2 + (M_{\text{Pl}}^2))}{100000000000000000000000000000000000$	0	0	0	
	$(1+k^2)(-16(\beta_1^{}-\beta_2^{})(2\beta_1^{}+\beta_2^{})-4(\alpha_2^{}-\alpha_3^{}+4\alpha_4^{}-4\alpha_6^{})(2\beta_1^{}-\beta_2^{})k^2+4\beta_1^{}(M_{Pl}^2)-10\beta_2^{}(M_{Pl}^2)+(M_{Pl}^2)^2)$	$(1+k^2)^2 (16(\frac{1}{2},\frac{1}{2})(2\frac{1}{2},\frac{1}{2})+4(\frac{1}{2},\frac{1}{2},\frac{1}{4},\frac{1}{4},\frac{1}{4},\frac{1}{6})(2\frac{1}{2},\frac{1}{2},\frac{1}{2})k^2-4\frac{1}{2}(M_{Pl}^2)+10\frac{1}{2}(M_{Pl}^2)^2(M_{Pl}^2)^2$	$(1+k^2)^2 (16(\beta_1 - \beta_2)(2\beta_1 + \beta_2) + 4(\alpha_2 - \alpha_3 + 4\alpha_4 - 4\alpha_6)(2\beta_1 - \beta_2)k^2 - 4\beta_1 (M_{Pl}^2) + 10\beta_2 (M_{Pl}^2) - (M_{Pl}^2)^2)$				
$1.^+\tau^{\parallel} + \alpha^{\alpha\beta}$	$2i\sqrt{2}k(4\beta_1-6\beta_2+(M_{\rm Pl}^2))$	$\frac{2i k(12 \beta_1 - 10 \beta_2 + 2(\alpha_1 - \alpha_1 + 4 \alpha_1 - 4 \alpha_1) k^2 + (M_P)^2))}{(1 + \nu^2)^2 (-16(\beta_1 - \beta_1)(2\beta_1 + \beta_1)(2\beta_1 - \alpha_1)(2\beta_1 - \alpha_1) k^2 + 4 \alpha_1 (M_P)^2) + (M_P)^2 + (M_P)^$	$\frac{2k^2(12\beta10\beta.+2(\alpha\alpha.+4\alpha4\alpha.)k^2+(M_{Pl}^2))}{(1+k^2)^2(16(\beta\alpha.)(2\beta4\beta)k^2+(M_{Pl}^2-2)^2(M_{Pl}^2-2)^2)}$	0	0	0	
·	$\overbrace{(1+k^2)(-16(\beta_1^{}+\beta_2^{})(2\beta_1^{}+\beta_2^{})-4(\alpha_2^{}+\alpha_3^{}+4\alpha_4^{}+4\alpha_6^{})(2\beta_1^{}+\beta_2^{})}^{(2\beta_1^{}+\beta_2^{})}k^2+4\beta_1^{}\underbrace{(M_{Pl}^2)-10\beta_2^{}(M_{Pl}^2)+(M_{Pl}^2)^2}_{}$	$\frac{(1+k^2)^2 \cdot (-16(\beta_1 - \beta_2)(2\beta_1 + \beta_2) - 4(\alpha_2 - \alpha_3 + 4\alpha_4 - 4\alpha_6)(2\beta_1 - \beta_2)k^2 + 4\beta_1 \cdot (M_{\rm Pl}^2) - 10\beta_2 \cdot (M_{\rm Pl}^2) + (M_{\rm Pl}^2)^2}{(M_{\rm Pl}^2)^2 \cdot (-16(\beta_1 - \beta_2)(2\beta_1 + \beta_2) - 4(\alpha_2 - \alpha_3 + 4\alpha_4 - 4\alpha_6)(2\beta_1 - \beta_2)k^2 + 4\beta_1 \cdot (M_{\rm Pl}^2) - 10\beta_2 \cdot (M_{\rm Pl}^2) + (M_{\rm Pl}^2)^2}$	$) \left[ \frac{(1+k^2)^2 \left(16(\beta_1^2 - \beta_2^2)(2\beta_1^2 + \beta_2^2) + 4(\alpha_2^2 - \alpha_3^2 + 4\alpha_4^2 - 4\alpha_6^2)(2\beta_1^2 - \beta_2^2) k^2 - 4\beta_1^2 \left(\mathcal{M}_{\text{Pl}}^2\right) + 10\beta_2^2 \left(\mathcal{M}_{\text{Pl}}^2\right) - \left(\mathcal{M}_{\text{Pl}}^2\right)^2}{(1+k^2)^2 \left(16(\beta_1^2 - \beta_2^2)(2\beta_1^2 + \beta_2^2) + 4(\alpha_2^2 - \alpha_3^2 + 4\alpha_4^2 - 4\alpha_6^2)(2\beta_1^2 - \beta_2^2) k^2 - 4\beta_1^2 \left(\mathcal{M}_{\text{Pl}}^2\right) + 10\beta_2^2 \left(\mathcal{M}_{\text{Pl}}^2\right) - \left(\mathcal{M}_{\text{Pl}}^2\right)^2\right) + 10\beta_2^2 \left(\mathcal{M}_{\text{Pl}}^2\right) + 10\beta_2^2 \left(M$	40	50 130	20	
$^{1}\sigma^{\parallel}$ † $^{\alpha}$	0	0	0	$\frac{4(2\beta_1+\beta_2+\beta_3)}{3}$ $\frac{2(2\beta_1+\beta_2)(2\beta_1+\beta_2+\beta_3)}{2(2\beta_1+\beta_2)(2\beta_1+\beta_2+\beta_3+\beta_3)(2\beta_1+\beta_2+\beta_3+\beta_3)(2\beta_1+\beta_2+\beta_3+\beta_3)(2\beta_1+\beta_2+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3+\beta_3)(2\beta_1+\beta_3+\beta_3+\beta_3+\beta_3+\beta_3+\beta_3+\beta_3+\beta_3+\beta_3+\beta_3$	$\frac{2\sqrt{2}(2\beta_{+}+(Mp^{2}))}{(1+2\gamma^{2})(2(2\beta_{+}+\beta_{+})(2\beta_{+}+\beta_{+}+\beta_{+})+2(2\beta_{+}+\beta_{+}+\beta_{+})(2\beta_{+}+\beta_{+}+\beta_{+})+2(2\beta_{+}+\beta_{+}+\beta_{+})+2(2\beta_{+}+\beta_{+}+\beta_{+})+2(2\beta_{+}+\beta_{+}+\beta_{+})+2(2\beta_{+}+\beta_{+}+\beta_{+})+2(2\beta_{+}+\beta_$	$0 = \frac{4i k(2 \beta_3 + (M_{\rm Pl}^2))}{(1 + 2 k^2)(2(2 \beta_3 + \beta_4))(2 \beta_4 + \beta_4 + \beta_4)(2 \beta_4 + \beta_4)(2 \beta_4 + \beta_4)k^2 + (2 \beta_4 + \beta_4 + \beta_4)(2 \beta_4 + \beta_4)k^2 + (2 \beta_4 + \beta_4 + \beta_4)(2 \beta_4 + \beta_4)k^2 + (2 \beta_4 + \beta_4 + \beta_4)(2 \beta_4 + \beta_4)k^2 + (2 \beta_4 + \beta_4 + \beta_4)(2 \beta_4 + \beta_4)k^2 + (2 \beta_4 + \beta_4 + \beta_4)(2 \beta_4 + \beta_4)k^2 + (2 \beta_4 + \beta_4)(2 \beta_4 + \beta_4)k^2 + (2 \beta_4 + \beta_4)(2 \beta_4 + \beta_4)(2 \beta_4 + \beta_4)k^2 + (2 \beta_4 + \beta_4)(2 \beta_4 + \beta_4)($	
-				$2(2 \beta_1 + \beta_2)(2 \beta_1 + \beta_2 + 3 \beta_3) + 2(2 \alpha_2 + 4 \alpha_4 + \alpha_3)(2 \beta_1 + \beta_2 + \beta_3)k^2 + (2 \beta_1 + \beta_2 - 3 \beta_3)(M_{Pl}^2) - (M_{Pl}^2)^2$ $2(\sqrt{3}(2 \beta_1 + \beta_2 + \beta_3)k^2 + (2 \beta_1 + \beta_2 - 3 \beta_3)(M_{Pl}^2) - (M_{Pl}^2)^2$	$(1+2k^2)(2(2\beta_1+\beta_2)(2\beta_1+\beta_2+3\beta_3)+2(2\alpha_2+4\alpha_4+\alpha_5)(2\beta_1+\beta_2+\beta_3)k^2+(2\beta_1+\beta_2-3\beta_3)(M_{Pl}^2)-(M_{Pl}^2)^2)$	$(1+2k^2)(2(2\beta_1+\beta_2)(2\beta_1+\beta_2+3\beta_3)+2(2\alpha_2+4\alpha_4+\alpha_3)(2\beta_1+\beta_2+\beta_3)k^2+(2\beta_1+\beta_2-3\beta_3)(M_{\text{Pl}}^2)-(M_{\text{Pl}}^2)^2)$	
$\frac{1}{2}\sigma^{\perp} + \frac{\alpha}{2}$	0	0	0	$\frac{2 \sqrt{2} (2 \beta_3 + (M_P)^2)}{(1 + 2 \kappa^2) (2 (2 \beta_1 + \beta_2) (2 \beta_1 + \beta_2 + 3 \beta_3) + 2 (2 \alpha_2 + 4 \alpha_4 + \alpha_5) (2 \beta_1 + \beta_2 + \beta_3) \kappa^2 + (2 \beta_1 + \beta_2 - 3 \beta_3) (M_P)^2) - (M_P)^2)}$	$\frac{2(4 \ \beta_1 + 2 \ \beta_2 + 4 \ \beta_3 + 2(2 \ \alpha_2 + 4 \ \alpha_4 + \alpha_5) k^2 + (M_{Pl}^2))}{(1 + 2 \ k^2)^2 (2(2 \ \beta_1 + \beta_2)(2 \ \beta_1 + \beta_2 + 3 \ \beta_3) + 2(2 \ \alpha_2 + 4 \ \alpha_4 + \alpha_5)(2 \ \beta_1 + \beta_2 + \beta_3) k^2 + (2 \ \beta_1 + \beta_2 - 3 \ \beta_3)(M_{Pl}^2) - (M_{Pl}^2)^2)}$	$0  \frac{2 i \sqrt{2} k (4 \beta_{1} + 2 \beta_{2} + 4 \beta_{3} + 2 (2 \alpha_{2} + 4 \alpha_{4} + \alpha_{5}) k^{2} + (M \rho_{1}^{2}))}{(1 + 2 k^{2})^{2} (2 (2 \beta_{1} + \beta_{2}) (2 \beta_{1} + \beta_{2} + 3 \beta_{3}) + 2 (2 \alpha_{2} + 4 \alpha_{4} + \alpha_{5}) (2 \beta_{1} + \beta_{2} + \beta_{3}) k^{2} + (2 \beta_{1} + \beta_{2} - 3 \beta_{3}) (M \rho_{1}^{2}) - (M \rho_{2}^{2})^{2})}$	
1·-   ±α	0	0	0	1 2 1 2 3 2 4 5 1 2 3 1 2 3 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	1 2 1 2 3 2 4 5 1 2 3 0 1 7 7	1 2 1 2 3 2 4 5 1 2 3 1 2 3	
<sup>1</sup> τ <sup>  </sup> † <sup>α</sup>	U	U	U	11 1/2 o 1/44.21)	U	U	
$^{1}$ $\tau^{\perp}$ $\dagger^{\alpha}$	0	0	0	$\frac{4 i k(2 \beta_3^+ + (M_{\text{Pl}}^2))}{(1 + 2 k^2) (-2 (2 \beta_1 + \beta_1))(2 \beta_1 + \beta_2 + \beta_3 \beta_2) - 2 (2 \alpha_1 + 4 \alpha_1 + \alpha_1)(2 \beta_1 + \beta_2 \beta_1) k^2 - (2 \beta_1 + \beta_2 - 3 \beta_1) (M_{\text{Pl}}^2) + (M_{\text{Pl}}^2)^2)}{(1 + 2 k^2) (-2 (\beta_1 + \beta_2))(2 \beta_1 + \beta_2 + \beta_2 \beta_2) (M_{\text{Pl}}^2) + (M_{\text{Pl}}^2)^2)}$	$\frac{2 i \sqrt{2} k (4 \beta_{1} + 2 \beta_{2} + 4 \beta_{3} + 2 (2 \alpha_{2} + 4 \alpha_{4} + \alpha_{5}) k^{2} + (M_{P} ^{2}))}{(1 + 2 k^{2})^{2} (-2 (2 \beta_{1} + \beta_{2}) (2 \beta_{1} + \beta_{2} + 3 \beta_{3}) - 2 (2 \alpha_{2} + 4 \alpha_{4} + \alpha_{5}) (2 \beta_{1} + \beta_{2} + \beta_{3}) k^{2} - (2 \beta_{1} + \beta_{2} - 3 \beta_{3}) (M_{P} ^{2}) + (M_{P} ^{2})^{2})}$	$0  \frac{4k^2(4\beta_1+2\beta_2+4\beta_3+2(2\alpha_2+4\alpha_4+\alpha_5)k^2+(\mathcal{M}_{\text{Pl}}^2))}{(1+2k^2)^2(2(2\beta_1+\beta_2)(2\beta_1+\beta_2+3\beta_3)+2(2\alpha_2+4\alpha_4+\alpha_5)(2\beta_1+\beta_2+\beta_3)k^2+(2\beta_1+\beta_2-3\beta_3)(\mathcal{M}_{\text{Pl}}^2)-(\mathcal{M}_{\text{Pl}}^2)^2)}$	
	1+	11-1	Louis Tel Tel			1 2 1 2 3 2 4 5 1 2 3 1 2 3 1	
ı	40.50 (44.2) (44.		$\mathcal{A}^{\perp}_{\alpha}$ $\mathcal{A}^{\dagger}_{f}$ $\mathcal{A}^{\dagger}_{a}$		°; <b>∕</b> 81	\( \sigma \)	
$^{1.^{+}}_{\cdot}\mathcal{H}^{\parallel}\dagger^{^{\alpha\beta}}$	$\frac{1}{4}\left(12\beta_{1}-10\beta_{2}+2(\alpha_{2}-\alpha_{3}+4\alpha_{4}-4\alpha_{6})k^{2}+(\mathcal{M}_{Pl}^{2})\right)\left \frac{4\beta_{1}-6\beta_{2}+(\mathcal{M}_{Pl}^{2})}{2\sqrt{2}}\right ^{\frac{1}{2}k(4)}$	$\frac{\beta_1 - 6 \frac{\beta_2 + (M_{\text{Pl}}^4)}{2\sqrt{2}}}{2\sqrt{2}} \qquad 0$	$0   0   0   0^{-9} \mathcal{A}^{\parallel} + \frac{1}{2} \frac{(2\beta_1 + \beta_2 + 3\beta_3 + 2)(6\alpha_1 + \beta_2 + 3\beta_3 + 2)}{(2\beta_1 + \beta_2 + 3\beta_3 + 2)(6\alpha_1 + \beta_2 + \beta_3 + 2)}$	$+2 \frac{\alpha_{1}+2}{2} \frac{\alpha_{1}+2}{3} \frac{\alpha_{1}+\alpha_{2}+2}{4} \frac{\alpha_{1}+2}{5} \frac{(1+2)(1+2)}{6} \left[-\frac{1 \cdot k(2 \frac{\beta_{1}+\beta_{2}+3 \frac{\beta_{1}+(M_{[0]}^{+})}{2}}{\sqrt{2}}}{\sqrt{2}}\right] = 0$	0		
1+	- 1-		0+4+	$\frac{(2\beta_{1} + \beta_{2} + 3\beta_{3} + (M_{Pl}^{2}))}{\sqrt{2}} \qquad (2\beta_{1} + \beta_{2} + 3\beta_{3}) k^{2} \qquad 0$	0	A B	
$^{1^{+}}\mathcal{A}^{\perp}\dagger^{^{lpha ho}}$	$\frac{4\beta_{1}^{-6}\beta_{2}^{+(M_{\mathbb{P}} ^{2})}}{2\sqrt{2}} \qquad \qquad 2\beta_{1}^{-}\beta_{2}^{-} \qquad \qquad i  ($	$2\beta_1 - \beta_2 k$ 0	0 0 0 -7"1	$\sqrt{2}$ 1 2 3	.5	, Q	
$^{1^+}f^{\parallel}$ † $^{lphaeta}$	$-\frac{i k(4 \beta_1 - 6 \beta_2 + (M_{Pl}^2))}{2 \sqrt{2}} -i (2 \beta_1 - \beta_2) k $ (2	$(\beta_1 - \beta_2) k^2$ 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0		β. β. γ. +	
. ,	2 √2		0. <i>A</i>    †	0 0 $\frac{1}{2} (8 \beta_1)$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6. (	
$^{1}\mathcal{H}^{\parallel}$ † $^{lpha}$	0 0	$\beta_1 + \frac{1}{4} (2\beta_2 + 4\beta_3 + 2(2\alpha_2 + 4\alpha_1 + \alpha_5)k^2 + (M_{Pl}^2))$	$\frac{1}{2} \frac{1}{\sqrt{2}} \left( \frac{1}{2} i \ k(2 \beta_3 + (M_{Pl}^2)) \right)$			3 5 5 7 6 (C)	
1			1/20 +0 +0 \			24 × 20° f	
¹: <i>'F</i> (± †"	0 0	$-\frac{2\beta_3^{+(\mathcal{M}_{Pl}^2)}}{2\sqrt{2}} \qquad \qquad \frac{1}{2} (2\beta_3^2)$	$(1+\beta_2+\beta_3)$ 0 $(1+\beta_2+\beta_3)$		x 1	* + + 2	
$^{1}f^{\parallel}\uparrow^{\alpha}$	0 0	0	0 0 0		+2 \(\alpha\)	$\frac{1}{2}\int_{-1}^{2} \frac{1}{x} \left( \frac{1}{x} \right)^{2} dx$	
$^1f^{\perp} \dagger^{\alpha}$	0 0	0 $\frac{1}{2}i k(2\beta_2 + (M_{\rm Pl}^2))$ $\frac{i(2)}{2}$	$\frac{\beta_1 + \beta_2 + \beta_3)k}{\sqrt{2}}$ 0 $(2\beta_1 + \beta_2 + \beta_3)k^2$		1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9 6 4 9 4 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
.,		- 3	$\sqrt{2}$ 1 2 3		2 0 % 60 mg	)( A	
O'-dl O'-tl O'-tl O'-tl O'-dl Spin-parity form Covariant form Multiplicities							
0,+ σ <sup>  </sup> †	$\frac{1}{(6\alpha_1 + 2\alpha_2 + 2\alpha_3 + 2\alpha_4 + \alpha_5 + 2\alpha_6)k^2 + \frac{1}{2}(M_{Pl}^2)(-1 - \frac{(M_{Pl}^2)}{2\beta_1 + \beta_2 + 3\beta_3})} - \frac{1}{k(-2(6\alpha_1 + 2\alpha_2 + 2\alpha_5) + \alpha_5 + \alpha_5)}$	$ \begin{array}{c c} i\sqrt{2}(2\beta_{1}+\beta_{2}+3\beta_{3}+(M_{\text{Pl}}^{2})) \\ 1 & 2 & 3 \\ 2 & +2\alpha_{2}+\alpha_{3}+2\alpha_{3}/2\beta_{4}+\beta_{4}+3\beta_{3}/2^{2}+(2\beta_{3}+\beta_{4}+3\beta_{3})(M_{\text{Pl}}^{2})+(M_{\text{Pl}}^{2})^{2} \end{array} $	$0^+ \tau^+ == 0 \qquad \qquad \partial_{\beta} \partial_{\alpha} \tau \left( \Delta + \mathcal{K} \right)^{\alpha \beta} == 0$	1	9,74 6,0 9,74 8,74 9,74 9,74 9,74	0, t 00 00 M	
		$a_1 + 2a_1 + a_2 + 2a_1(2\beta_1 + \beta_1 + 3\beta_3)k^2 + (2\beta_1 + \beta_2 + 3\beta_3)(M_{Pl}^2) + (M_{Pl}^2)^2$ $a_1 + a_2 + a_3 + (2\beta_1 + 2\alpha_1 + 2\alpha_2 + 2\alpha_3 + 2\alpha_3 + 2\alpha_3)k^2 + (M_{Pl}^2)$	$2i k! \sigma^{\perp \alpha} + 1 \tau^{\perp \alpha} = 0  \partial_{\chi} \partial_{\beta} \partial^{\alpha} \tau (\Delta + \mathcal{K})^{\beta \chi} = \partial_{\chi} \partial_{\lambda} \partial_{\beta} \tau (\Delta + \mathcal{K})^{\alpha \beta} + 2i \partial_{\lambda} \partial_{\beta} \tau (\Delta + \mathcal{K})^{\alpha \beta} + 2i \partial_{\lambda} \partial_{\lambda} \nabla \partial$	$2 \; \partial_{\sigma}\partial^{\delta}\partial_{\chi}\partial_{\beta}\sigma^{etalpha\chi}$ 3		2 + + 20 × 1 × 1 × 1 × 1	
$0.^+ \tau^{\parallel} + \frac{1}{k(0)}$		$ \frac{-\beta_2 + 3\beta_3 + 2(6\alpha_1 + 2\alpha_2 + 2\alpha_3 + 2\alpha_4 + \alpha_5 + 2\alpha_6)k^2 + (M_{Pl}^2)}{\alpha_3 + 2\alpha_4 + \alpha_5 + 2\alpha_6)(2\beta_1 + \beta_2 + 3\beta_3)k^2 + (2\beta_1 + \beta_2 + 3\beta_3)(M_{Pl}^2) + (M_{Pl}^2)^2)}                                $	$1_{\tau^{\parallel^{\alpha}}} == 0 \qquad \qquad \partial_{\chi} \partial_{\beta} \partial^{\alpha} \tau \left( \Delta + \mathcal{K} \right)^{\beta \chi} == \partial_{\chi} \partial^{\chi} \partial_{\beta} \tau \left( \Delta + \mathcal{K} \right)^{\beta \alpha}$	3	$\mathcal{A}_{\partial_{\Omega_i}}$	+	
0+++	0	0 0	$i k 1^{+} \sigma^{\perp \alpha \beta} + 1^{+} \tau^{\parallel \alpha \beta} = 0 \partial_{\chi} \partial^{\alpha} \tau (\Delta + \mathcal{K})^{\beta \chi} + \partial_{\chi} \partial^{\beta} \tau (\Delta + \mathcal{K})^{\chi \alpha} +$	3	J(,,	~~~ ~ *	
0- 11.	0	2	$\partial_{\alpha}\partial^{\chi} \tau (\Lambda + \mathcal{K})^{\alpha\beta} + 2 \partial_{\alpha}\partial_{\alpha}\partial^{\alpha} \sigma^{\chi} \partial^{\delta} + 2 \partial_{\alpha}\partial_{\alpha}\partial^{\alpha} \sigma^{\chi} \partial^{\delta} + 2 \partial_{\alpha}\partial_{\alpha}\partial^{\alpha} \partial^{\alpha} \partial^{\alpha}$	$\partial_{\alpha}\partial^{\delta}\partial_{\nu}\sigma^{\chi\alpha\beta}$ ==	Ť	†2	
Υ <i>σ</i> ' †	U	0 $8\beta_1 - 8\beta_2 + 4\alpha_4 k^2 - 2$	$\frac{\alpha_{\hat{s}} k^2 + (M \rho l^2)}{\partial_{\chi} \partial^{\alpha} \tau \left(\Delta + \mathcal{K}\right)^{\chi} \beta + \partial_{\chi} \partial^{\beta} \tau \left(\Delta + \mathcal{K}\right)^{\alpha \chi} + \partial_{\chi} \delta^{\alpha} \tau \left(\Delta + \mathcal$		2. <sup>+</sup> $\sigma^{\parallel}_{\alpha\beta}$ 2. <sup>+</sup> $\tau^{\parallel}_{\alpha\beta}$	<sup>2.</sup> σ <sup>∥</sup> αβχ	
	$^{2^{+}}\mathcal{A}^{\parallel}{}_{\alpha\beta}$ $^{2^{+}}f^{\parallel}{}_{\alpha\beta}$	$^{2}\mathcal{H}^{\parallel}{}_{lphaeta\chi}$	Total expected gauge generators:	10	8 $2i\sqrt{2}(4\beta.+2\beta(M_{Pl}^{2}))$	ωρχ	
$^{2^{+}}\mathcal{A}^{\parallel}$ + $^{\alpha\beta}$	$\beta_{1} + \frac{1}{2} (\beta_{2} + (\alpha_{1} + \alpha_{2} + 4 \alpha_{1} + 4 \alpha_{2} + 2 \alpha_{1} + 4 \alpha_{1}) k^{2}) - \frac{(M_{Pl}^{2})}{4} - \frac{i k(4\beta_{1} + 2\beta_{2} - (M_{Pl}^{2}))}{2 \sqrt{2}}$	0			$\frac{4\alpha_{4}+2\alpha_{5}+4\alpha_{6})k^{2}+(M_{Pl}^{2})(2-\frac{(M_{Pl}^{2})}{2\beta_{1}+\beta_{2}})}{4(\alpha_{2}+\alpha_{3}+4\alpha_{4}+2\alpha_{5}+4\alpha_{6})(2\beta_{1}+\beta_{2})k^{3}+2(2\beta_{1}+\beta_{2})k(M_{Pl}^{2})}$	0   0	
					$2i\sqrt{2}(4\beta_{1}+2\beta_{2}-(M_{Pl}^{2})) \qquad 8\beta_{1}+4\beta_{2}+4(\alpha_{2}+\alpha_{3}+4\alpha_{4}+2\alpha_{5}+4\alpha_{6})k^{2}-2(M_{Pl}^{2})$		
$^{2^{+}}f^{\parallel}$ † $^{\alpha\beta}$	$\frac{i k(4 \beta_1 + 2 \beta_2 - (M_{\mathbb{P}})^2)}{2 \sqrt{2}} \qquad (2 \beta_1 + \beta_2) k^2$	0			$+4\alpha_{6}(2\beta_{1}+\beta_{2})k^{3}+2(2\beta_{1}+\beta_{2})k(M_{Pl}^{2})+k(M_{Pl}^{2})^{2}$ $+2\alpha_{6}(2\beta_{1}+\beta_{2})k^{3}+2(2\beta_{1}+\beta_{2})k(M_{Pl}^{2})+k(M_{Pl}^{2})^{2}$ $+2\alpha_{6}(2\beta_{1}+\beta_{2})k^{3}+2(2\beta_{1}+\beta_{2})k(M_{Pl}^{2})+k(M_{Pl}^{2})^{2}$ $+2\alpha_{6}(2\beta_{1}+\beta_{2})k^{3}+2(2\beta_{1}+\beta_{2})k(M_{Pl}^{2})+k(M_{Pl}^{2})^{2}$		
$^{2}\mathcal{A}^{\parallel}$ † $^{\alpha\beta\chi}$		$\frac{1}{4} (4 \beta_1 + 2 \beta_2 + 2(4 \alpha_4 + \alpha_5) k^2 - (M_{Pl}^2))$		?· σ <sup>∥</sup> † <sup>αβχ</sup>	0 0	$\frac{4}{4 \cdot 6 + 2 \cdot 6 + 2(4 \cdot \alpha + \alpha) \cdot k^2 - (M \cdot n^2)}$	
	-	* 1 2 4 5				$4\beta_{1} + 2\beta_{2} + 2(4\alpha_{4} + \alpha_{5})k^{2} - (M\rho_{1}^{2})$	
Massive and massless spectra							
riassive and massicss spectra							
	?		?	?		?	
	? $J^P = 1^-$		? $J^P = 1+$	? $J^P = 0^+$		? $P = 2+$	
	?		?	?		$J^P = 2^+$	
	$k^{\mu} = (\mathcal{E}, 0, 0, p)$		$k^{\mu} = \overbrace{(\mathcal{E}, 0, 0, p)}$	$k^{\mu} = (\mathcal{E}, 0, 0, p)$		$k^{\mu} = (\mathcal{E}, 0, 0, p)$	
$? \qquad \qquad ? \qquad \qquad \qquad \qquad \qquad ? \qquad \qquad \qquad \qquad \qquad ? \qquad \qquad$							
	Magina		Macriyo particle	Manaire		Macriya particle	
Massive particle Massive particle Massive particle							
Pole residue: \(8 \(\alpha  \beta  \beta							
	$4 \alpha. \beta. \beta. \beta. 3 - 64 \beta. \beta. \beta16 \beta.^2 \beta. +6 \alpha. \beta.^2 -24 \beta. \beta.$	$\frac{1}{3}^2 - 12 \frac{\beta_1}{2} \frac{\beta_3}{3}^2 - 8 \frac{\beta_1}{1}^2 (M_{Pl}^2) - \frac{\alpha_1}{3} (48 \frac{\beta_1}{1}^2 - 8)$	$\beta_{1} \beta_{2} + 44 \beta_{1}^{2} + 8 \beta_{1} (M_{Pl}^{2}) - 12 \beta_{2} (M_{Pl}^{2}) + (M_{Pl}^{2})^{2}) +$	$2\alpha. \beta. +6\alpha. \beta. +6\alpha. \beta. +3\alpha. \beta. +6\alpha. \beta. +2\alpha. 3$	$(M_{Pl}^2) + 2 \underset{4}{\alpha} (M_{Pl}^2) + 2(-8 \underset{6}{\alpha} \underset{1}{\beta} - 4 \underset{6}{\alpha}.$	$\beta_{2}^{1} + 2 \alpha_{6}^{1} (M_{Pl}^{2}) + 2 \beta_{1}^{1} (M_{Pl}^{2}) + \beta_{2}^{1} (M_{Pl}^{2}) +$	
	$8 \beta_{1} \beta_{2} (M_{Pl}^{2}) - 2 \beta_{2}^{2} (M_{Pl}^{2}) + 4 \alpha_{5} \beta_{3} (M_{Pl}^{2}) + 8 \beta_{1} \beta_{3} (M_{Pl}^{2}) + 4 \beta_{2} \beta_{3} (M_{Pl}^{2}) +$		80 $\beta_1 \beta_2 + 44 \beta_2^2 + 8 \beta_1 (M_{Pl}^2) - 12 \beta_2 (M_{Pl}^2) + (M_{Pl}^2)^2$	$\alpha_{.5}^{.}(M_{Pl}^{2}) + 2 \alpha_{.6}^{.}(M_{Pl}^{2}) + 2 \beta_{.1}^{.}(M_{Pl}^{2}) + \beta_{.2}^{.}(M_{Pl}^{2}) +$		$2 \beta_{1} + (M_{Pl}^{2}) + \alpha_{1} (-8 \beta_{1} - 4 \beta_{2} + 2 (M_{Pl}^{2}))))/$	
	$6\beta_{3}^{12}(M_{Pl}^{2}) + \alpha_{5}(M_{Pl}^{2})^{2} + 4\beta_{1}(M_{Pl}^{2})^{2} + 2\beta_{2}(M_{Fl}^{2})^{2}$		80 $\beta_1^2 \beta_2^2 + 44 \beta_2^2 + 8 \beta_1^2 (M_{Pl}^2) - 12 \beta_2^2 (M_{Pl}^2) + (M_{Pl}^2)^2)$	$6\alpha_{1}(2\beta_{1}+\beta_{2}+3\beta_{3}+(M_{Pl}^{2}))+2\alpha_{2}(2\beta_{1}+\beta_{2}+3\beta_{3}+(M_{Pl}^{2}))$	-	$\alpha_{5} + 4 \alpha_{6})(2 \beta_{1} + \beta_{2})(M_{Pl}^{2})) > 0$	
	$2\alpha_{2}(8\beta_{1}^{2}+2\beta_{2}^{2}+4\beta_{2}\beta_{3}+6\beta_{3}^{2}+8\beta_{1}(\beta_{2}+\beta_{3})$	0 1	$2 \beta_{1}^{2} - 16 \beta_{2}^{2} + 10 \beta_{2} (M_{Pl}^{2}) - (M_{Pl}^{2})^{2} - 4 \beta_{1} (4 \beta_{2} + (M_{Pl}^{2}))))/$	$((6\alpha_{1} + 2\alpha_{2} + 2\alpha_{3} + 2\alpha_{4} + \alpha_{5} + 2\alpha_{6})(2\beta_{1} + \beta_{2} + 3\beta_{3})$			
					$\frac{(M_{\text{Pl}}^2)) > 0}{4(\alpha_2 + \alpha_3 + 4\alpha_4 + 2\alpha_5 + 4\alpha_6)(2\beta_1)}$ Square mass: $\frac{(M_{\text{Pl}}^2)(-4\beta_1 - 2\beta_2 + (M_{\text{Pl}}^2))}{4(\alpha_2 + \alpha_3 + 4\alpha_4 + 2\alpha_5 + 4\alpha_6)(2\beta_1)}$	$\frac{+\beta_{2}}{2}$ > 0	
	$4\alpha_{1}(8\beta_{1}^{2}+2\beta_{2}^{2}+4\beta_{2}\beta_{3}+6\beta_{3}^{2}+8\beta_{1}(\beta_{1}+\beta_{3})$			Square mass: $\frac{(\mathcal{M}_{\mathbb{P}} ^{2})(2\ \beta_{1}^{}+\beta_{2}^{}+3\ \beta_{3}^{}+(\mathcal{M}_{\mathbb{P}} ^{2}))}{2(6\ \alpha_{1}^{}+2\ \alpha_{2}^{}+2\ \alpha_{3}^{}+2\ \alpha_{4}^{}+\alpha_{5}^{}+2\ \alpha_{6}^{})(2\ \beta_{1}^{}+\beta_{2}^{}+3\ \beta_{3}^{})}>0$	Spin: 2		
	$((2\alpha. + 4\alpha. + \alpha.)(2\beta. + \beta. + \beta.)(2\alpha. \beta 8\beta.^2 + \alpha. \beta.$	$(8\alpha, \beta, -8\alpha)$	$\beta_{1} + 32 \alpha_{1} \beta_{1} - 32 \alpha_{1} \beta_{1} - 32 \beta_{1}^{2} - 4 \alpha_{2} \beta_{2} + 4 \alpha_{3} \beta_{1} - 16 \alpha_{1} \beta_{1} + 4 \beta_{2} \beta_{2} + 4 \beta_{1} \beta_{2} + 4 \beta_{2} \beta_{1} + 4 \beta_{2} \beta_{2} + 4 \beta_{1} \beta_{2} + 4 \beta_{2} \beta_{2} + 4 $	Spin: 0	Parity: Even		
	$\alpha. \beta12 \beta. \beta6 \beta. \beta. +2 \alpha. (2 \beta. + \beta. + \beta.) + 5 3 1 2 3 3 2 2 1 2 3 3 3 3 3 3 3 3 3 3 3$		+16 $\beta_1$ , $\beta_2$ +16 $\beta_2$ . 2 +4 $\beta_1$ ( $M_{Pl}^2$ )-10 $\beta_2$ ( $M_{Pl}^2$ ) + ( $M_{Pl}^2$ )) > 0	Parity: Even	Sp Sq Po	P Sp Sq Po	
	$2\beta_{1}(\mathcal{M}_{Pl}^{2})-\beta_{2}(\mathcal{M}_{Pl}^{2})+3\beta_{3}(\mathcal{M}_{Pl}^{2})+(\mathcal{M}_{Pl}^{2})^{2})))>0$ Squar		$+(M_{\rm Pl})^2 + 4\beta_1(4\beta_2 + (M_{\rm Pl})) > 0$		lere:	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
Square	mass: $-\frac{(4\beta_1+2\beta_2-(M_{\mathbb{P}} ^2))(2\beta_1+\beta_2+3\beta_3+(M_{\mathbb{P}} ^2))}{(2\beta_1+\beta_2+3\beta_3+(M_{\mathbb{P}} ^2))} > 0$	Square mass: 4(a2-a3+4a4	-4 a <sub>.0</sub> (2 β <sub>1</sub> -β <sub>2</sub> )		sidue ma	$k^{\mu} = (p, 0, 0, p)$ re max  residue  Ma $k^{\mu} = (p, 0, 0, p)$ ?	
Square	2/2 - 14 - 1 - 1/2 0 10 10 1	Spin 11				77 00 (0)	

## **Unitarity conditions**

 $\frac{1}{2(2 \underset{2}{\alpha}.+4 \underset{4}{\alpha}.+\alpha_{.})(2 \underset{1}{\beta}.+\beta_{.}+\beta_{.})} > 0$ 

(Timeout after 10 seconds)