PSALTer results panel

Wave operator and propagator

	$1^+\mathcal{A}^{\parallel}_{\alpha\beta}$	$1^+\mathcal{A}^{\perp}_{\alpha\beta}$	$1^+f^{\parallel}_{\alpha\beta}$	$1^-\mathcal{B}_{\alpha}$	$1^-\mathcal{A}^{\parallel}_{\alpha}$	$1^-\mathcal{A}^{\perp}_{\alpha}$	$1^-f^{\parallel}_{\alpha}$	$1^-f^{\perp}_{\alpha}$
$1^+\mathcal{A}^{\parallel}\dagger^{\alpha\beta}$	$\frac{1}{6}(-6\lambda+6k^2(2r_3+r_5)+t_1+4t_2)$	$-\frac{6\lambda+t_1-2t_2}{3\sqrt{2}}$	$-\frac{i k(6\lambda+t_1-2t_2)}{3\sqrt{2}}$	0	0	0 0		0
$1^+\mathcal{A}^{\perp}\dagger^{\alpha\beta}$	$-\frac{6\lambda+t_1-2t_2}{3\sqrt{2}}$	$\frac{t_1+t_2}{3}$	$\frac{1}{3} i k(t_1+t_2)$	0	0	0 0		0
$1^+f^{\parallel}\dagger^{\alpha\beta}$	$\frac{i k(6\lambda+t_1-2t_2)}{3\sqrt{2}}$	$-\frac{1}{3} i k(t_1+t_2)$	$\frac{1}{3}k^2(t_1+t_2)$	0	0	0 0		0
$1^-\mathcal{B}\dagger^{\alpha}$	0	0	0	0	0	0 0		0
$1^-\mathcal{A}^{\parallel}\dagger^{\alpha}$	0	0	0	0	$\frac{1}{18}(-6\lambda+v+3t_1+2k^2(9(r_1+r_4+r_5)+2\xi))$	$\frac{24\lambda-v+6t_1-4k^2\xi}{18\sqrt{2}}$	0	$-\frac{1}{18} i k(-24\lambda+v-6t_1+4k^2\xi)$
$1^-\mathcal{A}^{\perp}\dagger^{\alpha}$	0	0	0	0	$\frac{24\lambda-v+6t_1-4k^2\xi}{18\sqrt{2}}$	$\frac{1}{36}(12\lambda+v+12t_1+4k^2\xi)$	0	$\frac{i k(12\lambda+v+12t_1+4k^2\xi)}{18\sqrt{2}}$
$1^-f^{\parallel}\dagger^{\alpha}$	0	0	0	0	0	0 0		0
$1^-f^{\perp}\dagger^{\alpha}$	0	0	0	0	$\frac{1}{18} i k(-24\lambda+v-6t_1+4k^2\xi)$	$-\frac{i k(12\lambda+v+12t_1+4k^2\xi)}{18\sqrt{2}}$	0	$\frac{1}{18}k^2(12\lambda+v+12t_1+4k^2\xi)$

	$0^+\mathcal{B}$	$0^+\phi$	$0^+\mathcal{A}^{\parallel}$	$0^+f^{\parallel}$	$0^+f^{\perp}$	$0^-\mathcal{A}^{\parallel}$
$0^+\mathcal{B}\dagger$	0		0 0	0	0	0
$0^+\phi\dagger$	0		0 0	0	0	0
$0^+\mathcal{A}^{\parallel}\dagger$	0	0	$-\lambda+\frac{v}{12}+2k^2(r_1-r_3+2r_4)$	$\frac{i k(12\lambda-v)}{6\sqrt{2}}$	0	0
$0^+f^{\parallel}\dagger$	0	0	$-\frac{i k(12\lambda-v)}{6\sqrt{2}}$	$\frac{k^2 v}{6}$	0	0
$0^+f^{\perp}\dagger$	0		0 0	0	0	0
$0^-\mathcal{A}^{\parallel}\dagger$	0		0 0	0 0		$-2\lambda+k^2r_2+t_2$

$$
\begin{aligned}
S == \iiiint\Big(\tfrac{1}{18}\big(&18\,\phi\,\rho+18\,\sigma^{\alpha\beta\chi}\,\mathcal{A}_{\alpha\beta\chi}+36\lambda\,\mathcal{A}_{\alpha\chi\beta}\mathcal{A}^{\alpha\beta\chi}+6t_1\mathcal{A}_{\alpha\chi\beta}\mathcal{A}^{\alpha\beta\chi}-12t_2\mathcal{A}_{\alpha\chi\beta}\mathcal{A}^{\alpha\beta\chi}+24\lambda\,\mathcal{A}^{\alpha\beta}{}_{\alpha}\mathcal{A}_{\beta}{}^{\chi}{}_{\chi}-v\,\mathcal{A}^{\alpha\beta}{}_{\alpha}\\
&\mathcal{A}_{\beta}{}^{\chi}{}_{\chi}+6t_1\mathcal{A}^{\alpha\beta}{}_{\alpha}\mathcal{A}_{\beta}{}^{\chi}{}_{\chi}+18\,\tau^{\alpha\beta}f_{\alpha\beta}+18\,\mathcal{J}^{\alpha}\mathcal{B}_{\alpha}+36\lambda\,f^{\alpha\beta}\partial_{\beta}\mathcal{A}_{\alpha}{}^{\chi}{}_{\chi}-36\lambda\,\partial_{\beta}\mathcal{A}^{\alpha\beta}{}_{\alpha}-\\
&12\lambda\,\mathcal{A}_{\alpha}{}^{\chi}{}_{\chi}\partial_{\beta}f^{\alpha\beta}+2v\,\mathcal{A}_{\alpha}{}^{\chi}{}_{\chi}\partial_{\beta}f^{\alpha\beta}-12t_1\mathcal{A}_{\alpha}{}^{\chi}{}_{\chi}\partial_{\beta}f^{\alpha\beta}+12\lambda\,\mathcal{A}_{\beta}{}^{\chi}{}_{\chi}\partial^{\beta}f^{\alpha}{}_{\alpha}-2v\,\mathcal{A}_{\beta}{}^{\chi}{}_{\chi}\partial^{\beta}f^{\alpha}{}_{\alpha}+\\
&12t_1\mathcal{A}_{\beta}{}^{\chi}{}_{\chi}\partial^{\beta}f^{\alpha}{}_{\alpha}-6\lambda\,\partial_{\beta}f^{\chi}{}_{\chi}\partial^{\beta}f^{\alpha}{}_{\alpha}+v\,\partial_{\beta}f^{\chi}{}_{\chi}\partial^{\beta}f^{\alpha}{}_{\alpha}-6t_1\partial_{\beta}f^{\chi}{}_{\chi}\partial^{\beta}f^{\alpha}{}_{\alpha}-36\lambda\,f^{\alpha\beta}\partial_{\chi}\mathcal{A}_{\alpha}{}^{\chi}{}_{\beta}+\\
&8\xi\,\partial_{\beta}\partial^{\chi}f^{\alpha\beta}\partial_{\chi}\mathcal{A}_{\alpha}{}^{\delta}{}_{\delta}+36\lambda\,f^{\alpha}{}_{\alpha}\partial_{\chi}\mathcal{A}^{\beta\chi}{}_{\beta}-6\lambda\,\partial_{\beta}f^{\alpha\beta}\partial_{\chi}f_{\alpha}{}^{\chi}+v\,\partial_{\beta}f^{\alpha\beta}\partial_{\chi}f_{\alpha}{}^{\chi}-6t_1\partial_{\beta}f^{\alpha\beta}\partial_{\chi}f_{\alpha}{}^{\chi}+\\
&12\lambda\,\partial^{\beta}f^{\alpha}{}_{\alpha}\partial_{\chi}f_{\beta}{}^{\chi}-2v\,\partial^{\beta}f^{\alpha}{}_{\alpha}\partial_{\chi}f_{\beta}{}^{\chi}+12t_1\partial^{\beta}f^{\alpha}{}_{\alpha}\partial_{\chi}f_{\beta}{}^{\chi}-18r_4\partial_{\beta}\mathcal{A}_{\chi}{}^{\delta}{}_{\delta}\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}+\\
&18r_5\partial_{\beta}\mathcal{A}_{\chi}{}^{\delta}{}_{\delta}\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}+4\xi\,\partial_{\beta}\mathcal{A}_{\chi}{}^{\delta}{}_{\delta}\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}-18r_4\partial_{\chi}\mathcal{A}_{\beta}{}^{\delta}{}_{\delta}\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}-18r_5\partial_{\chi}\mathcal{A}_{\beta}{}^{\delta}{}_{\delta}\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}-\\
&4\xi\,\partial_{\chi}\mathcal{A}_{\beta}{}^{\delta}{}_{\delta}\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}+36\lambda\,\mathcal{A}_{\alpha\chi\beta}\partial^{\chi}f^{\alpha\beta}+24t_1\mathcal{A}_{\alpha\chi\beta}\partial^{\chi}f^{\alpha\beta}-12t_2\mathcal{A}_{\alpha\chi\beta}\partial^{\chi}f^{\alpha\beta}+\\
&12t_1\mathcal{A}_{\beta\chi\alpha}\partial^{\chi}f^{\alpha\beta}+12t_2\mathcal{A}_{\beta\chi\alpha}\partial^{\chi}f^{\alpha\beta}-18\lambda\,\partial_{\alpha}f_{\beta\chi}\partial^{\chi}f^{\alpha\beta}-12t_1\partial_{\alpha}f_{\beta\chi}\partial^{\chi}f^{\alpha\beta}+6t_2\partial_{\alpha}f_{\beta\chi}\partial^{\chi}f^{\alpha\beta}-\\
&9\lambda\,\partial_{\alpha}f_{\chi\beta}\partial^{\chi}f^{\alpha\beta}-12t_1\partial_{\alpha}f_{\chi\beta}\partial^{\chi}f^{\alpha\beta}-3t_2\partial_{\alpha}f_{\chi\beta}\partial^{\chi}f^{\alpha\beta}+9\lambda\,\partial_{\beta}f_{\alpha\chi}\partial^{\chi}f^{\alpha\beta}+6t_1\partial_{\beta}f_{\alpha\chi}\partial^{\chi}f^{\alpha\beta}-\\
&3t_2\partial_{\beta}f_{\alpha\chi}\partial^{\chi}f^{\alpha\beta}+9\lambda\,\partial_{\chi}f_{\alpha\beta}\partial^{\chi}f^{\alpha\beta}+12t_1\partial_{\chi}f_{\alpha\beta}\partial^{\chi}f^{\alpha\beta}+3t_2\partial_{\chi}f_{\alpha\beta}\partial^{\chi}f^{\alpha\beta}+9\lambda\,\partial_{\chi}f_{\beta\alpha}\partial^{\chi}f^{\alpha\beta}+\\
&6t_1\partial_{\chi}f_{\beta\alpha}\partial^{\chi}f^{\alpha\beta}-3t_2\partial_{\chi}f_{\beta\alpha}\partial^{\chi}f^{\alpha\beta}+6(t_1+t_2)\mathcal{A}_{\alpha\beta\chi}(\mathcal{A}^{\alpha\beta\chi}+2\partial^{\chi}f^{\alpha\beta})-8\xi\,\partial_{\alpha}\mathcal{A}_{\chi}{}^{\delta}{}_{\delta}\partial^{\chi}\partial_{\beta}f^{\alpha\beta}-\\
&18r_4\partial_{\alpha}\mathcal{A}^{\alpha\beta\chi}\partial_{\delta}\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}-18r_5\partial_{\alpha}\mathcal{A}^{\alpha\beta\chi}\partial_{\delta}\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}+36r_4\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}\partial_{\delta}\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}+36r_5\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}\partial_{\delta}\mathcal{A}_{\beta}{}^{\delta}{}_{\chi}-\\
&18r_4\partial_{\alpha}\mathcal{A}^{\alpha\beta\chi}\partial_{\delta}\mathcal{A}_{\chi}{}^{\delta}{}_{\beta}+18r_5\partial_{\alpha}\mathcal{A}^{\alpha\beta\chi}\partial_{\delta}\mathcal{A}_{\chi}{}^{\delta}{}_{\beta}+36r_4\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}\partial_{\delta}\mathcal{A}_{\chi}{}^{\delta}{}_{\beta}-36r_5\partial^{\chi}\mathcal{A}^{\alpha\beta}{}_{\alpha}\partial_{\delta}\mathcal{A}_{\chi}{}^{\delta}{}_{\beta}-\\
&4\xi\,\partial_{\beta}\partial^{\chi}f^{\alpha\beta}\partial_{\delta}\partial_{\alpha}f_{\chi}{}^{\delta}+4\xi\,\partial_{\beta}\partial^{\chi}f^{\alpha\beta}\partial_{\delta}\partial_{\chi}f_{\alpha}{}^{\delta}-24r_1\partial_{\beta}\mathcal{A}_{\alpha\chi\delta}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}+24r_2\partial_{\beta}\mathcal{A}_{\alpha\chi\delta}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}+\\
&12r_1\partial_{\beta}\mathcal{A}_{\alpha\delta\chi}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}-12r_2\partial_{\beta}\mathcal{A}_{\alpha\delta\chi}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}+24r_1\partial_{\beta}\mathcal{A}_{\chi\delta\alpha}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}+12r_2\partial_{\beta}\mathcal{A}_{\chi\delta\alpha}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}-\\
&72r_3\partial_{\beta}\mathcal{A}_{\chi\delta\alpha}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}-12r_1\partial_{\chi}\mathcal{A}_{\alpha\beta\delta}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}-6r_2\partial_{\chi}\mathcal{A}_{\alpha\beta\delta}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}+12r_1\partial_{\delta}\mathcal{A}_{\alpha\beta\chi}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}+\\
&6r_2\partial_{\delta}\mathcal{A}_{\alpha\beta\chi}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}+12r_1\partial_{\delta}\mathcal{A}_{\alpha\chi\beta}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}-12r_2\partial_{\delta}\mathcal{A}_{\alpha\chi\beta}\partial^{\delta}\mathcal{A}^{\alpha\beta\chi}\big)\Big)[t,x,y,z]\,dz\,dy\,dx\,dt
\end{aligned}
$$

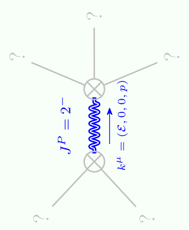
	$2^+\sigma^{\parallel}_{\alpha\beta}$	$2^+\tau^{\parallel}_{\alpha\beta}$	$2^-\sigma^{\parallel}_{\alpha\beta\chi}$
$2^+\sigma^{\parallel}\dagger^{\alpha\beta}$	$\frac{k^2(\lambda+t_1)}{k^4(2r_1-2r_3+r_4)(\lambda+t_1)-\frac{1}{2}k^2\lambda(2\lambda+t_1)}$	$\frac{i\sqrt{2}(2\lambda+t_1)}{2k^3(2r_1-2r_3+r_4)(\lambda+t_1)-k\lambda(2\lambda+t_1)}$	0
$2^+\tau^{\parallel}\dagger^{\alpha\beta}$	$-\frac{i\sqrt{2}(2\lambda+t_1)}{2k^3(2r_1-2r_3+r_4)(\lambda+t_1)-k\lambda(2\lambda+t_1)}$	$\frac{\lambda+k^2(2r_1-2r_3+r_4)+\frac{t_1}{2}}{k^4(2r_1-2r_3+r_4)(\lambda+t_1)-\frac{1}{2}k^2\lambda(2\lambda+t_1)}$	0
$2^-\sigma^{\parallel}\dagger^{\alpha\beta\chi}$	0	0	$\frac{1}{\lambda+k^2r_1+\frac{t_1}{2}}$

	$2^+\mathcal{A}^{\parallel}_{\alpha\beta}$	$2^+f^{\parallel}_{\alpha\beta}$	$2^-\mathcal{A}^{\parallel}_{\alpha\beta\chi}$
$2^+\mathcal{A}^{\parallel}\dagger^{\alpha\beta}$	$\lambda+k^2(2r_1-2r_3+r_4)+\frac{t_1}{2}$	$-\frac{i k(2\lambda+t_1)}{\sqrt{2}}$	0
$2^+f^{\parallel}\dagger^{\alpha\beta}$	$\frac{i k(2\lambda+t_1)}{\sqrt{2}}$	$k^2(\lambda+t_1)$	0
$2^-\mathcal{A}^{\parallel}\dagger^{\alpha\beta\chi}$	0 0		$\lambda+k^2r_1+\frac{t_1}{2}$

	$0^+\mathcal{J}$	$0^+\rho$	$0^+\sigma^{\parallel}$	$0^+\tau^{\parallel}$	$0^+\tau^{\perp}$	$0^-\sigma^{\parallel}$
$0^+\mathcal{J}\dagger$	0	0	0	0 0		0
$0^+\rho\dagger$	0	0	0	0 0		0
$0^+\sigma^{\parallel}\dagger$	0	0	$\frac{v}{-12\lambda^2+\lambda v+2k^2v(r_1-r_3+2r_4)}$	$\frac{i}{\sqrt{2}k\left(\lambda+\frac{2k^2v(r_1-r_3+2r_4)}{-12\lambda+v}\right)}$	0	0
$0^+\tau^{\parallel}\dagger$	0	0	$-\frac{i}{\sqrt{2}k\left(\lambda+\frac{2k^2v(r_1-r_3+2r_4)}{-12\lambda+v}\right)}$	$\frac{-12\lambda+v+24k^2(r_1-r_3+2r_4)}{2k^2(-12\lambda^2+\lambda v+2k^2v(r_1-r_3+2r_4))}$	0	0
$0^+\tau^{\perp}\dagger$	0	0	0	0 0		0
$0^-\sigma^{\parallel}\dagger$	0	0	0	0	0	$\frac{1}{-2\lambda+k^2r_2+t_2}$

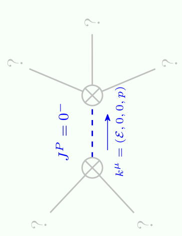
Spin-parity form	Covariant form	Multiplicities
$0^+\tau^{\perp} == 0$	$\partial_{\beta}\partial_{\alpha}\tau^{\alpha\beta} == 0$	1
$0^+\rho == 0$	$\rho == 0$	1
$0^+\mathcal{J} == 0$	$\partial_{\alpha}\mathcal{J}^{\alpha} == 0$	1
$2 i k\, 1^-\sigma^{\perp\alpha} + 1^-\tau^{\perp\alpha} == 0$	$\partial_{\chi}\partial_{\beta}\partial^{\alpha}\tau^{\beta\chi} == \partial_{\chi}\partial^{\chi}\partial_{\beta}\tau^{\alpha\beta} + 2\,\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial_{\beta}\sigma^{\beta\alpha\chi}$	3
$1^-\tau^{\parallel\alpha} == 0$	$\partial_{\chi}\partial_{\beta}\partial^{\alpha}\tau^{\beta\chi} == \partial_{\chi}\partial^{\chi}\partial_{\beta}\tau^{\beta\alpha}$	3
$1^-\mathcal{J}^{\alpha} == 0$	$\partial_{\beta}\partial^{\alpha}\mathcal{J}^{\beta} == \partial_{\beta}\partial^{\beta}\mathcal{J}^{\alpha}$	3
$i k\, 1^+\sigma^{\perp\alpha\beta} + 1^+\tau^{\parallel\alpha\beta} == 0$	$\partial_{\chi}\partial^{\alpha}\tau^{\beta\chi} + \partial_{\chi}\partial^{\beta}\tau^{\chi\alpha} + \partial_{\chi}\partial^{\chi}\tau^{\alpha\beta} + 2\,\partial_{\delta}\partial_{\chi}\partial^{\alpha}\sigma^{\chi\beta\delta} + 2\,\partial_{\delta}\partial^{\delta}\partial_{\chi}\sigma^{\chi\alpha\beta} == \partial_{\chi}\partial^{\alpha}\tau^{\chi\beta} + \partial_{\chi}\partial^{\beta}\tau^{\alpha\chi} + \partial_{\chi}\partial^{\chi}\tau^{\beta\alpha} + 2\,\partial_{\delta}\partial_{\chi}\partial^{\beta}\sigma^{\chi\alpha\delta}$	3
Total expected gauge generators:		15

Massive and massless spectra



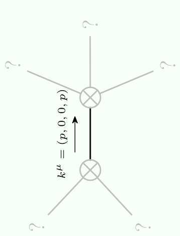
Massive particle

Pole residue:	$-\frac{1}{r_1} > 0$
Square mass:	$-\frac{2\lambda+t_1}{2r_1} > 0$
Spin:	2
Parity:	Odd



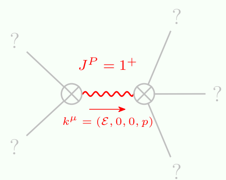
Massive particle

Pole residue:	$-\frac{1}{r_2} > 0$
Square mass:	$\frac{2\lambda+t_2}{r_2} > 0$
Spin:	0
Parity:	Odd



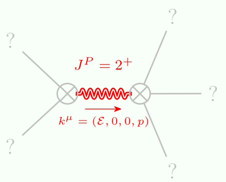
Massless particle

Pole residue:	$-\frac{1}{\lambda} > 0$
Polarisations:	2



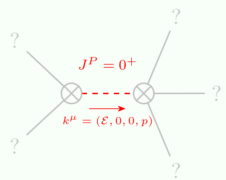
Massive particle

Pole residue:	$\frac{3(r_5t_1^2-t_1^2t_2+2r_5t_2^2-t_1t_2^2+4\lambda^2(6r_3+3r_5+t_1+t_2)+2\lambda(2r_5t_1+t_1^2+4r_3(t_1-2t_2)-4r_5t_2-t_2^2)+2r_3(t_1^2+2t_2^2))}{(2r_3+r_5)(t_1+t_2)(12\lambda^2+2r_5t_1+6\lambda(t_1-t_2)+2r_5t_2-3t_1t_2+4r_3(t_1+t_2))} > 0$
Square mass:	$\frac{3(2\lambda+t_1)(2\lambda-t_2)}{2(2r_3+r_5)(t_1+t_2)} > 0$
Spin:	1
Parity:	Even



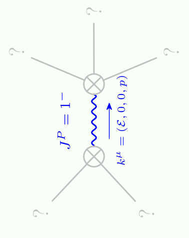
Massive particle

Pole residue:	$\frac{\lambda^2+(2r_1-2r_3+r_4)t_1+\lambda(4r_1-4r_3+2r_4+t_1)}{\lambda(2r_1-2r_3+r_4)(\lambda+t_1)} > 0$
Square mass:	$\frac{\lambda(2\lambda+t_1)}{2(2r_1-2r_3+r_4)(\lambda+t_1)} > 0$
Spin:	2
Parity:	Even



Massive particle

Pole residue:	$\frac{v(-r_1+r_3-2r_4)+\lambda(v+12(r_1-r_3+2r_4))}{2\lambda v(r_1-r_3+2r_4)} > 0$
Square mass:	$\frac{12\lambda^2-\lambda v}{2vr_1-2vr_3+4vr_4} > 0$
Spin:	0
Parity:	Even



Massive particle

Pole residue:

$$
\begin{aligned}
&(6(36\lambda r_1^3+3vr_1^3+108\lambda r_1^2r_4+9vr_1^2r_4+108\lambda r_1r_4^2+9vr_1r_4^2+36\lambda r_4^3+3vr_4^3+\\
&108\lambda r_1^2r_5+9vr_1^2r_5+216\lambda r_1r_4r_5+18vr_1r_4r_5+108\lambda r_4^2r_5+9vr_4^2r_5+\\
&108\lambda r_1r_5^2+9vr_1r_5^2+108\lambda r_4r_5^2+9vr_4r_5^2+36\lambda r_5^3+3vr_5^3+\\
&36r_1^3t_1+108r_1^2r_4t_1+108r_1r_4^2t_1+36r_4^3t_1+108r_1^2r_5t_1+216r_1r_4r_5t_1+\\
&108r_4^2r_5t_1+108r_1r_5^2t_1+108r_4r_5^2t_1+36r_5^3t_1-72\lambda^2r_1\xi+2\lambda vr_1\xi+\\
&48\lambda r_1^2\xi-vr_1^2\xi-72\lambda^2r_4\xi+2\lambda vr_4\xi+96\lambda r_1r_4\xi-2vr_1r_4\xi+\\
&48\lambda r_4^2\xi-vr_4^2\xi-72\lambda^2r_5\xi+2\lambda vr_5\xi+96\lambda r_1r_5\xi-2vr_1r_5\xi+\\
&96\lambda r_4r_5\xi-2vr_4r_5\xi+48\lambda r_5^2\xi-vr_5^2\xi-60\lambda r_1t_1\xi+vr_1t_1\xi+18r_1^2t_1\xi-\\
&60\lambda r_4t_1\xi+vr_4t_1\xi+36r_1r_4t_1\xi+18r_4^2t_1\xi-60\lambda r_5t_1\xi+vr_5t_1\xi+\\
&36r_1r_5t_1\xi+36r_4r_5t_1\xi+18r_5^2t_1\xi-12r_1t_1^2\xi-12r_4t_1^2\xi-12r_5t_1^2\xi-\\
&24\lambda^2\xi^2+12\lambda r_1\xi^2+12\lambda r_4\xi^2+12\lambda r_5\xi^2-24\lambda t_1\xi^2+6r_1t_1\xi^2+\\
&6r_4t_1\xi^2+6r_5t_1\xi^2-6t_1^2\xi^2+\tfrac{3}{2}r_1^2\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}+\\
&3r_1r_4\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}+\\
&\tfrac{3}{2}r_4^2\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}+\\
&3r_1r_5\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}+\\
&3r_4r_5\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}+\\
&\tfrac{3}{2}r_5^2\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}-\\
&\lambda\xi\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}+\\
&\tfrac{1}{2}r_1\xi\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}+\\
&\tfrac{1}{2}r_4\xi\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}+\\
&\tfrac{1}{2}r_5\xi\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}-\\
&\tfrac{1}{2}t_1\xi\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+4(v(r_1+r_4+r_5)+12}\\
&\qquad\overline{\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}))/\\
&((r_1+r_4+r_5)\sqrt{(144\lambda^2r_1^2+24\lambda vr_1^2+v^2r_1^2+288\lambda^2r_1r_4+48\lambda vr_1r_4+}\\
&\quad 2v^2r_1r_4+144\lambda^2r_4^2+24\lambda vr_4^2+v^2r_4^2+288\lambda^2r_1r_5+\\
&\quad 48\lambda vr_1r_5+2v^2r_1r_5+288\lambda^2r_4r_5+48\lambda vr_4r_5+2v^2r_4r_5+\\
&\quad 144\lambda^2r_5^2+24\lambda vr_5^2+v^2r_5^2+288\lambda r_1^2t_1+24vr_1^2t_1+\\
&\quad 576\lambda r_1r_4t_1+48vr_1r_4t_1+288\lambda r_4^2t_1+24vr_4^2t_1+576\lambda r_1r_5t_1+\\
&\quad 48vr_1r_5t_1+576\lambda r_4r_5t_1+48vr_4r_5t_1+288\lambda r_5^2t_1+\\
&\quad 24vr_5^2t_1+144r_1^2t_1^2+288r_1r_4t_1^2+144r_4^2t_1^2+288r_1r_5t_1^2+\\
&\quad 288r_4r_5t_1^2+144r_5^2t_1^2+864\lambda^2r_1\xi-24\lambda vr_1\xi+864\lambda^2r_4\xi-\\
&\quad 24\lambda vr_4\xi+864\lambda^2r_5\xi-24\lambda vr_5\xi+720\lambda r_1t_1\xi-12vr_1t_1\xi+\\
&\quad 720\lambda r_4t_1\xi-12vr_4t_1\xi+720\lambda r_5t_1\xi-12vr_5t_1\xi+144r_1t_1^2\xi+\\
&\quad 144r_4t_1^2\xi+144r_5t_1^2\xi+144\lambda^2\xi^2+144\lambda t_1\xi^2+36t_1^2\xi^2)}\\
&(12\lambda r_1+vr_1+12\lambda r_4+vr_4+12\lambda r_5+vr_5+12r_1t_1+12r_4t_1+\\
&\quad 12r_5t_1+12\lambda\xi-4r_1\xi-4r_4\xi-4r_5\xi+6t_1\xi+\\
&\quad \tfrac{1}{2}\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+4(v(r_1+r_4+r_5)+12\lambda}\\
&\qquad\overline{(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)}))>0
\end{aligned}
$$

Square mass:

$$
\begin{aligned}
&-\frac{1}{8(r_1+r_4+r_5)\xi}(12\lambda r_1+vr_1+12\lambda r_4+vr_4+12\lambda r_5+vr_5+12r_1t_1+12r_4t_1+\\
&12r_5t_1+12\lambda\xi+6t_1\xi+\tfrac{1}{2}\sqrt{(96(12\lambda-v)(r_1+r_4+r_5)(2\lambda+t_1)\xi+}\\
&\qquad\overline{4(v(r_1+r_4+r_5)+12\lambda(r_1+r_4+r_5+\xi)+6t_1(2r_1+2r_4+2r_5+\xi))^2)})>0
\end{aligned}
$$

Spin:	1
Parity:	Odd

Unitarity conditions

(Timeout after 10 seconds)