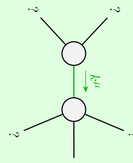
Unitarity conditions

$a_0 < 0$



Quadratic pole

Pole residue: $-\frac{1}{a_0} > 0$

Polarisations: 2

(No massive particles)

	$\Delta_{1^+}^{\#1}{}_{\alpha\beta}$	$\Delta_{1^+}^{\#2}{}_{\alpha\beta}$	$\Delta_{1^+}^{\#3}{}_{\alpha\beta}$	$\Delta_{1^-}^{\#1}{}_{\alpha}$	$\Delta_{1^-}^{\#2}{}_{\alpha}$	$\Delta_{1^-}^{\#3}{}_{\alpha}$	$\Delta_{1^-}^{\#4}{}_{\alpha}$	$\Delta_{1^-}^{\#5}{}_{\alpha}$	$\Delta_{1^-}^{\#6}{}_{\alpha}$	$\mathcal{T}_{1^-}^{\#1}{}_{\alpha}$
$\Delta_{1^+}^{\#1}\dagger^{\alpha\beta}$	0	$-\frac{2\sqrt{2}}{a_0}$	0	0	0	0	0	0	0	0
$\Delta_{1^+}^{\#2}\dagger^{\alpha\beta}$	$-\frac{2\sqrt{2}}{a_0}$	$\frac{2}{a_0}$	0	0	0	0	0	0	0	0
$\Delta_{1^+}^{\#3}\dagger^{\alpha\beta}$	0	0	$\frac{4}{a_0}$	0	0	0	0	0	0	0
$\Delta_{1^-}^{\#1}\dagger^{\alpha}$	0	0	0	0	$\frac{\sqrt{2}\,(4+k^2)}{a_0\,(2+k^2)}$	$-\frac{2k^2}{\sqrt{3}\,a_0\,(2+k^2)}$	0	$\frac{\sqrt{\frac{2}{3}}\,k^2}{a_0\,(2+k^2)}$	0	$-\frac{2i\sqrt{2}\,k}{a_0\,(2+k^2)}$
$\Delta_{1^-}^{\#2}\dagger^{\alpha}$	0	0	0	$\frac{\sqrt{2}\,(4+k^2)}{a_0\,(2+k^2)}$	$\frac{(4+k^2)^2}{2a_0\,(2+k^2)^2}$	$\frac{k^2\,(-2+k^2)}{2\sqrt{6}\,a_0\,(2+k^2)^2}$	$-\frac{\sqrt{\frac{5}{6}}\,k^2}{4a_0+2a_0\,k^2}$	$\frac{k^2\,(5+2k^2)}{\sqrt{3}\,a_0\,(2+k^2)^2}$	$-\frac{k^2}{\sqrt{6}\,a_0\,(2+k^2)}$	$-\frac{ik\,(4+k^2)}{a_0\,(2+k^2)^2}$
$\Delta_{1^-}^{\#3}\dagger^{\alpha}$	0	0	0	$-\frac{2k^2}{\sqrt{3}\,(2a_0+a_0\,k^2)}$	$\frac{k^2\,(-2+k^2)}{2\sqrt{6}\,a_0\,(2+k^2)^2}$	$-\frac{76+52k^2+3k^4}{12a_0\,(2+k^2)^2}$	$\frac{\sqrt{5}\,(10+3k^2)}{12a_0\,(2+k^2)}$	$\frac{-2+k^2}{3\sqrt{2}\,a_0\,(2+k^2)^2}$	$\frac{1}{-2a_0-\frac{8a_0}{2+3k^2}}$	$\frac{ik\,(6+5k^2)}{\sqrt{6}\,a_0\,(2+k^2)^2}$
$\Delta_{1^-}^{\#4}\dagger^{\alpha}$	0	0	0	0	$-\frac{\sqrt{\frac{5}{6}}\,k^2}{4a_0+2a_0\,k^2}$	$\frac{\sqrt{5}\,(10+3k^2)}{12a_0\,(2+k^2)}$	$\frac{1}{12a_0}$	$-\frac{\sqrt{\frac{5}{2}}}{6a_0+3a_0\,k^2}$	$-\frac{\sqrt{5}}{6a_0}$	$-\frac{i\sqrt{\frac{5}{6}}\,k}{a_0\,(2+k^2)}$
$\Delta_{1^-}^{\#5}\dagger^{\alpha}$	0	0	0	$\frac{\sqrt{\frac{2}{3}}\,k^2}{2a_0+a_0\,k^2}$	$\frac{k^2\,(5+2k^2)}{\sqrt{3}\,a_0\,(2+k^2)^2}$	$\frac{-2+k^2}{3\sqrt{2}\,a_0\,(2+k^2)^2}$	$-\frac{\sqrt{\frac{5}{2}}}{6a_0+3a_0\,k^2}$	$\frac{2\,(17+14k^2+3k^4)}{3a_0\,(2+k^2)^2}$	$-\frac{\sqrt{2}\,(7+3k^2)}{3a_0\,(2+k^2)}$	$\frac{2ik\,(3+k^2)}{\sqrt{3}\,a_0\,(2+k^2)^2}$
$\Delta_{1^-}^{\#6}\dagger^{\alpha}$	0	0	0	0	$-\frac{k^2}{\sqrt{6}\,(2a_0+a_0\,k^2)}$	$\frac{1}{-2a_0-\frac{8a_0}{2+3k^2}}$	$-\frac{\sqrt{5}}{6a_0}$	$-\frac{\sqrt{2}\,(7+3k^2)}{3a_0\,(2+k^2)}$	$\frac{5}{3a_0}$	$-\frac{i\sqrt{\frac{2}{3}}\,k}{a_0\,(2+k^2)}$
$\mathcal{T}_{1^-}^{\#1}\dagger^{\alpha}$	0	0	0	$\frac{2i\sqrt{2}\,k}{2a_0+a_0\,k^2}$	$\frac{ik\,(4+k^2)}{a_0\,(2+k^2)^2}$	$-\frac{ik\,(6+5k^2)}{\sqrt{6}\,a_0\,(2+k^2)^2}$	$\frac{i\sqrt{\frac{5}{6}}\,k}{2a_0+a_0\,k^2}$	$-\frac{2ik\,(3+k^2)}{\sqrt{3}\,a_0\,(2+k^2)^2}$	$\frac{i\sqrt{\frac{2}{3}}\,k}{2a_0+a_0\,k^2}$	$\frac{2k^2}{a_0\,(2+k^2)^2}$

Lagrangian density

$$-\frac{1}{2}a_0\,\Gamma^{\alpha\beta\chi}\,\Gamma_{\beta\chi\alpha}+\frac{1}{2}a_0\,\Gamma_{\alpha}{}^{\beta}{}_{\beta}\,\Gamma^{\alpha}{}_{\chi}{}^{\chi}+h^{\alpha\beta}\,\mathcal{T}_{\alpha\beta}+\Gamma^{\alpha\beta\chi}\,\Delta_{\alpha\beta\chi}-\frac{1}{4}a_0\,h^{\chi}{}_{\chi}\,\partial_{\beta}\Gamma_{\alpha}{}^{\alpha}{}_{\beta}+\frac{1}{4}a_0\,h^{\chi}{}_{\chi}\,\partial_{\beta}\Gamma_{\alpha}{}^{\alpha\beta}-\frac{1}{2}a_0\,h_{\alpha\chi}\,\partial_{\beta}\Gamma^{\alpha\beta\chi}+\frac{1}{2}a_0\,h_{\beta\chi}\,\partial_{\chi}\Gamma_{\alpha}{}^{\alpha}{}_{\beta}$$

	$\Delta_{0^+}^{\#1}$	$\Delta_{0^+}^{\#2}$	$\Delta_{0^+}^{\#3}$	$\Delta_{0^+}^{\#4}$	$\mathcal{T}_{0^+}^{\#1}$	$\mathcal{T}_{0^+}^{\#2}$	$\Delta_{0^-}^{\#1}$
$\Delta_{0^+}^{\#1}\dagger$	0	$\frac{4\sqrt{6}}{16a_0+3a_0\,k^2}$	$-\frac{4\sqrt{\frac{2}{3}}}{16a_0+3a_0\,k^2}$	$-\frac{8}{\sqrt{3}\,(16a_0+3a_0\,k^2)}$	$-\frac{2i\sqrt{2}}{a_0\,k}$	$-\frac{2i\sqrt{6}\,k}{16a_0+3a_0\,k^2}$	0
$\Delta_{0^+}^{\#2}\dagger$	$\frac{4\sqrt{6}}{16a_0+3a_0\,k^2}$	$-\frac{144}{a_0\,(16+3k^2)^2}$	$\frac{16\,(19+3k^2)}{a_0\,(16+3k^2)^2}$	$-\frac{8\sqrt{2}\,(10+3k^2)}{a_0\,(16+3k^2)^2}$	$-\frac{8i\sqrt{3}}{16a_0\,k+3a_0\,k^3}$	$\frac{72ik}{a_0\,(16+3k^2)^2}$	0
$\Delta_{0^+}^{\#3}\dagger$	$-\frac{4\sqrt{\frac{2}{3}}}{16a_0+3a_0\,k^2}$	$\frac{16\,(19+3k^2)}{a_0\,(16+3k^2)^2}$	$-\frac{16\,(35+6k^2)}{3a_0\,(16+3k^2)^2}$	$-\frac{8\sqrt{2}\,(22+3k^2)}{3a_0\,(16+3k^2)^2}$	$\frac{8i}{\sqrt{3}\,(16a_0\,k+3a_0\,k^3)}$	$-\frac{8ik\,(19+3k^2)}{a_0\,(16+3k^2)^2}$	0
$\Delta_{0^+}^{\#4}\dagger$	$-\frac{8}{\sqrt{3}\,(16a_0+3a_0\,k^2)}$	$-\frac{8\sqrt{2}\,(10+3k^2)}{a_0\,(16+3k^2)^2}$	$-\frac{8\sqrt{2}\,(22+3k^2)}{3a_0\,(16+3k^2)^2}$	$\frac{32\,(13+3k^2)}{3a_0\,(16+3k^2)^2}$	$\frac{8i\sqrt{\frac{2}{3}}}{16a_0\,k+3a_0\,k^3}$	$\frac{4i\sqrt{2}\,k\,(10+3k^2)}{a_0\,(16+3k^2)^2}$	0
$\mathcal{T}_{0^+}^{\#1}\dagger$	$\frac{2i\sqrt{2}}{a_0\,k}$	$\frac{8i\sqrt{3}}{16a_0\,k+3a_0\,k^3}$	$-\frac{8i}{\sqrt{3}\,(16a_0\,k+3a_0\,k^3)}$	$-\frac{8i\sqrt{\frac{2}{3}}}{16a_0\,k+3a_0\,k^3}$	$\frac{4}{a_0\,k^2}$	$\frac{4\sqrt{3}}{16a_0+3a_0\,k^2}$	0
$\mathcal{T}_{0^+}^{\#2}\dagger$	$\frac{2i\sqrt{6}\,k}{16a_0+3a_0\,k^2}$	$-\frac{72ik}{a_0\,(16+3k^2)^2}$	$\frac{8ik\,(19+3k^2)}{a_0\,(16+3k^2)^2}$	$-\frac{4i\sqrt{2}\,k\,(10+3k^2)}{a_0\,(16+3k^2)^2}$	$\frac{4\sqrt{3}}{16a_0+3a_0\,k^2}$	$-\frac{36k^2}{a_0\,(16+3k^2)^2}$	0
$\Delta_{0^-}^{\#1}\dagger$	0	0	0	0	0	0	$-\frac{2}{a_0}$

	$\Delta_{3^-}^{\#1}{}_{\alpha\beta\chi}$
$\Delta_{3^-}^{\#1}\dagger^{\alpha\beta\chi}$	$-\frac{2}{a_0}$

	$\Gamma_{3^-}^{\#1}{}_{\alpha\beta\chi}$
$\Gamma_{3^-}^{\#1}\dagger^{\alpha\beta\chi}$	$-\frac{a_0}{2}$

	$\Gamma_{1^+}^{\#1}{}_{\alpha\beta}$	$\Gamma_{1^+}^{\#2}{}_{\alpha\beta}$	$\Gamma_{1^+}^{\#3}{}_{\alpha\beta}$	$\Gamma_{1^-}^{\#1}{}_{\alpha}$	$\Gamma_{1^-}^{\#2}{}_{\alpha}$	$\Gamma_{1^-}^{\#3}{}_{\alpha}$	$\Gamma_{1^-}^{\#4}{}_{\alpha}$	$\Gamma_{1^-}^{\#5}{}_{\alpha}$	$\Gamma_{1^-}^{\#6}{}_{\alpha}$	$h_{1^-}^{\#1}{}_{\alpha}$
$\Gamma_{1^+}^{\#1}\dagger^{\alpha\beta}$	$-\frac{a_0}{4}$	$-\frac{a_0}{2\sqrt{2}}$	0	0	0	0	0	0	0	0
$\Gamma_{1^+}^{\#2}\dagger^{\alpha\beta}$	$-\frac{a_0}{2\sqrt{2}}$	0	0	0	0	0	0	0	0	0
$\Gamma_{1^+}^{\#3}\dagger^{\alpha\beta}$	0	0	$\frac{a_0}{4}$	0	0	0	0	0	0	0
$\Gamma_{1^-}^{\#1}\dagger^{\alpha}$	0	0	0	$-\frac{a_0}{4}$	$\frac{a_0}{2\sqrt{2}}$	0	0	0	0	$-\frac{ia_0\,k}{4\sqrt{2}}$
$\Gamma_{1^-}^{\#2}\dagger^{\alpha}$	0	0	0	$\frac{a_0}{2\sqrt{2}}$	0	0	0	0	0	0
$\Gamma_{1^-}^{\#3}\dagger^{\alpha}$	0	0	0	0	0	$-\frac{a_0}{3}$	$\frac{\sqrt{5}\,a_0}{6}$	$-\frac{a_0}{6\sqrt{2}}$	$-\frac{a_0}{6}$	$\frac{ia_0\,k}{4\sqrt{6}}$
$\Gamma_{1^-}^{\#4}\dagger^{\alpha}$	0	0	0	0	0	$\frac{\sqrt{5}\,a_0}{6}$	$\frac{a_0}{3}$	$-\frac{1}{6}\sqrt{\frac{5}{2}}\,a_0$	$-\frac{\sqrt{5}\,a_0}{6}$	$-\frac{1}{4}i\sqrt{\frac{5}{6}}\,a_0\,k$
$\Gamma_{1^-}^{\#5}\dagger^{\alpha}$	0	0	0	0	0	$-\frac{a_0}{6\sqrt{2}}$	$-\frac{1}{6}\sqrt{\frac{5}{2}}\,a_0$	$\frac{a_0}{3}$	$\frac{a_0}{6\sqrt{2}}$	$\frac{ia_0\,k}{4\sqrt{3}}$
$\Gamma_{1^-}^{\#6}\dagger^{\alpha}$	0	0	0	0	0	$-\frac{a_0}{6}$	$-\frac{\sqrt{5}\,a_0}{6}$	$\frac{a_0}{6\sqrt{2}}$	$\frac{5a_0}{12}$	$\frac{ia_0\,k}{4\sqrt{6}}$
$h_{1^-}^{\#1}\dagger^{\alpha}$	0	0	0	$\frac{ia_0\,k}{4\sqrt{2}}$	0	$-\frac{ia_0\,k}{4\sqrt{6}}$	$\frac{1}{4}i\sqrt{\frac{5}{6}}\,a_0\,k$	$-\frac{ia_0\,k}{4\sqrt{3}}$	$-\frac{ia_0\,k}{4\sqrt{6}}$	0

Source constraints	#	Total #:
SO(3) irreps	1	8
$2\,\mathcal{T}_{0^+}^{\#2}-ik\,\Delta_{0^+}^{\#2}==0$	1	
$\Delta_{0^+}^{\#3}+2\,\Delta_{0^+}^{\#4}+3\,\Delta_{0^+}^{\#2}==0$	1	
$6\,\mathcal{T}_{1^-}^{\#1\,\alpha}-ik\,(3\,\Delta_{1^-}^{\#2\,\alpha}-\Delta_{1^-}^{\#5\,\alpha}+\Delta_{1^-}^{\#3\,\alpha})==0$	3	
$2\,\Delta_{1^-}^{\#6\,\alpha}+\Delta_{1^-}^{\#4\,\alpha}+2\,\Delta_{1^-}^{\#5\,\alpha}+\Delta_{1^-}^{\#3\,\alpha}==0$	3	

	$\Delta_{2^+}^{\#1}{}_{\alpha\beta}$	$\Delta_{2^+}^{\#2}{}_{\alpha\beta}$	$\Delta_{2^+}^{\#3}{}_{\alpha\beta}$	$\mathcal{T}_{2^+}^{\#1}{}_{\alpha\beta}$	$\Delta_{2^-}^{\#1}{}_{\alpha\beta\chi}$	$\Delta_{2^-}^{\#2}{}_{\alpha\beta\chi}$
$\Delta_{2^+}^{\#1}\dagger^{\alpha\beta}$	0	$\frac{2\sqrt{\frac{2}{3}}}{a_0}$	$\frac{4}{\sqrt{3}\,a_0}$	$\frac{4i\sqrt{2}}{a_0\,k}$	0	0
$\Delta_{2^+}^{\#2}\dagger^{\alpha\beta}$	$\frac{2\sqrt{\frac{2}{3}}}{a_0}$	$-\frac{8}{3a_0}$	$-\frac{2\sqrt{2}}{3a_0}$	$-\frac{4i}{\sqrt{3}\,a_0\,k}$	0	0
$\Delta_{2^+}^{\#3}\dagger^{\alpha\beta}$	$\frac{4}{\sqrt{3}\,a_0}$	$-\frac{2\sqrt{2}}{3a_0}$	$\frac{8}{3a_0}$	$-\frac{4i\sqrt{\frac{2}{3}}}{a_0\,k}$	0	0
$\mathcal{T}_{2^+}^{\#1}\dagger^{\alpha\beta}$	$-\frac{4i\sqrt{2}}{a_0\,k}$	$\frac{4i}{\sqrt{3}\,a_0\,k}$	$\frac{4i\sqrt{\frac{2}{3}}}{a_0\,k}$	$-\frac{8}{a_0\,k^2}$	0	0
$\Delta_{2^-}^{\#1}\dagger^{\alpha\beta\chi}$	0	0	0	0	$\frac{4}{a_0}$	0
$\Delta_{2^-}^{\#2}\dagger^{\alpha\beta\chi}$	0	0	0	0	0	$\frac{4}{a_0}$

	$\Gamma_{0^+}^{\#1}$	$\Gamma_{0^+}^{\#2}$	$\Gamma_{0^+}^{\#3}$	$\Gamma_{0^+}^{\#4}$	$h_{0^+}^{\#1}$	$h_{0^+}^{\#2}$	$\Gamma_{0^-}^{\#1}$
$\Gamma_{0^+}^{\#1}\dagger$	$-\frac{a_0}{2}$	0	0	0	$-\frac{ia_0\,k}{2\sqrt{2}}$	0	0
$\Gamma_{0^+}^{\#2}\dagger$	0	0	$\frac{a_0}{2}$	$-\frac{a_0}{2\sqrt{2}}$	0	0	0
$\Gamma_{0^+}^{\#3}\dagger$	0	$\frac{a_0}{2}$	0	$-\frac{a_0}{2\sqrt{2}}$	$\frac{ia_0\,k}{4\sqrt{3}}$	$-\frac{1}{4}i\,a_0\,k$	0
$\Gamma_{0^+}^{\#4}\dagger$	0	$-\frac{a_0}{2\sqrt{2}}$	$-\frac{a_0}{2\sqrt{2}}$	$\frac{a_0}{2}$	$-\frac{ia_0\,k}{4\sqrt{6}}$	$\frac{ia_0\,k}{4\sqrt{2}}$	0
$h_{0^+}^{\#1}\dagger$	$\frac{ia_0\,k}{2\sqrt{2}}$	0	$-\frac{ia_0\,k}{4\sqrt{3}}$	$\frac{ia_0\,k}{4\sqrt{6}}$	0	0	0
$h_{0^+}^{\#2}\dagger$	0	0	$\frac{ia_0\,k}{4}$	$-\frac{ia_0\,k}{4\sqrt{2}}$	0	0	0
$\Gamma_{0^-}^{\#1}\dagger$	0	0	0	0	0	0	$-\frac{a_0}{2}$

	$\Gamma_{2^+}^{\#1}{}_{\alpha\beta}$	$\Gamma_{2^+}^{\#2}{}_{\alpha\beta}$	$\Gamma_{2^+}^{\#3}{}_{\alpha\beta}$	$h_{2^+}^{\#1}{}_{\alpha\beta}$	$\Gamma_{2^-}^{\#1}{}_{\alpha\beta\chi}$	$\Gamma_{2^-}^{\#2}{}_{\alpha\beta\chi}$
$\Gamma_{2^+}^{\#1}\dagger^{\alpha\beta}$	$\frac{a_0}{4}$	0	0	$\frac{ia_0\,k}{4\sqrt{2}}$	0	0
$\Gamma_{2^+}^{\#2}\dagger^{\alpha\beta}$	0	$-\frac{a_0}{2}$	0	$\frac{ia_0\,k}{4\sqrt{3}}$	0	0
$\Gamma_{2^+}^{\#3}\dagger^{\alpha\beta}$	0	0	$\frac{a_0}{4}$	$-\frac{ia_0\,k}{4\sqrt{6}}$	0	0
$h_{2^+}^{\#1}\dagger^{\alpha\beta}$	$-\frac{ia_0\,k}{4\sqrt{2}}$	$-\frac{ia_0\,k}{4\sqrt{3}}$	$\frac{ia_0\,k}{4\sqrt{6}}$	0	0	0
$\Gamma_{2^-}^{\#1}\dagger^{\alpha\beta\chi}$	0	0	0	0	$\frac{a_0}{4}$	0
$\Gamma_{2^-}^{\#2}\dagger^{\alpha\beta\chi}$	0	0	0	0	0	$\frac{a_0}{4}$