

Quadratic pole

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

Polarisations: 2

Unitarity conditions

$a_0 < 0$

(No massive particles)

$\Delta_{1^+ \alpha \beta}^{#1}$	$\Delta_{1^+ \alpha \beta}^{#2}$	$\Delta_{1^+ \alpha \beta}^{#3}$	$\Delta_{1^+ \alpha \beta}^{#1}$	$\Delta_{1^+ \alpha \beta}^{#2}$	$\Delta_{1^+ \alpha \beta}^{#3}$	$\Delta_{1^+ \alpha \beta}^{#4}$	$\Delta_{1^+ \alpha \beta}^{#5}$	$\Delta_{1^+ \alpha \beta}^{#6}$	$\mathcal{T}_{1^+ \alpha}^{#1}$
$\Delta_{1^+}^{#1} \dagger^{\alpha \beta}$	0	$-\frac{2 \sqrt{2}}{a_0}$	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
$\Delta_{1^+}^{#3} \dagger^{\alpha \beta}$	0	0	$\frac{4}{a_0}$	0	0	0	0	0	0
$\Delta_{1^+}^{#1} \dagger^\alpha$	0	0	0	$\frac{2 \sqrt{2}}{a_0}$	0	0	0	0	0
$\Delta_{1^+}^{#2} \dagger^\alpha$	0	0	0	$\frac{2}{a_0}$	0	0	0	0	0
$\Delta_{1^+}^{#3} \dagger^\alpha$	0	0	0	0	$-\frac{19}{12 a_0}$	$-\frac{1}{6 \sqrt{2} a_0}$	$-\frac{1}{6 a_0}$	$-\frac{1}{6 a_0}$	0
$\Delta_{1^+}^{#4} \dagger^\alpha$	0	0	0	0	$\frac{5 \sqrt{5}}{12 a_0}$	$-\frac{1}{12 a_0}$	$-\frac{\sqrt{5}}{6 a_0}$	$-\frac{\sqrt{5}}{6 a_0}$	0
$\Delta_{1^+}^{#5} \dagger^\alpha$	0	0	0	0	$-\frac{1}{6 \sqrt{2} a_0}$	$-\frac{\sqrt{2}}{6 a_0}$	$\frac{17}{6 a_0}$	$-\frac{7}{3 \sqrt{2} a_0}$	0
$\Delta_{1^+}^{#6} \dagger^\alpha$	0	0	0	0	$-\frac{1}{6 a_0}$	$-\frac{\sqrt{5}}{6 a_0}$	$-\frac{7}{3 \sqrt{2} a_0}$	$\frac{5}{3 a_0}$	0
$\mathcal{T}_{1^+} \dagger^\alpha$	0	0	0	0	0	0	0	0	0

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

Lagrangian density

$$\begin{aligned}
&-\frac{1}{2} a_0 \Gamma^{\alpha \beta \chi} \Gamma_{\beta \chi \alpha} + \frac{1}{2} a_0 \Gamma_{\alpha}^{\alpha} \beta \Gamma_{\beta \chi}^{\chi} - \\
&\frac{1}{2} a_0 \Gamma^{\alpha \beta \chi} \partial_{\beta} h_{\alpha \chi} - \frac{1}{4} a_0 \Gamma_{\alpha}^{\alpha} \beta \partial_{\beta} h_{\chi}^{\chi} + \frac{1}{4} a_0 \Gamma^{\alpha \beta} \Gamma_{\alpha}^{\alpha} \partial_{\beta} h_{\chi}^{\chi} - \\
&\frac{1}{4} a_0 h_{\chi}^{\chi} \partial_{\beta} \Gamma_{\alpha}^{\alpha} \beta + \frac{1}{4} a_0 h_{\chi}^{\chi} \partial_{\beta} \Gamma_{\alpha}^{\alpha \beta} - \frac{1}{2} a_0 h_{\alpha \chi} \partial_{\beta} \Gamma^{\alpha \beta \chi} + \\
&\frac{1}{2} a_0 h^{\alpha \beta} \partial_{\beta} \partial_{\alpha} h_{\chi}^{\chi} - \frac{1}{8} a_0 \partial_{\beta} h_{\chi}^{\chi} \partial^{\beta} h_{\alpha}^{\alpha} + \frac{1}{2} a_0 \Gamma_{\alpha}^{\alpha} \beta \partial_{\chi} h_{\beta}^{\chi} - \\
&\frac{1}{2} a_0 \partial_{\alpha} h^{\alpha \beta} \partial_{\chi} h_{\beta}^{\chi} + \frac{1}{2} a_0 \partial^{\beta} h_{\alpha}^{\alpha} \partial_{\chi} h_{\beta}^{\chi} - a_0 h^{\alpha \beta} \partial_{\chi} \partial_{\beta} h_{\alpha}^{\alpha} \\
&\frac{1}{4} a_0 h_{\alpha}^{\alpha} \partial_{\chi} \partial_{\beta} h^{\beta \chi} + \frac{1}{2} a_0 h^{\alpha \beta} \partial_{\chi} \partial_{\beta} h_{\alpha \beta} - \frac{1}{4} a_0 h_{\alpha}^{\alpha} \partial_{\chi} h_{\beta}^{\beta} - \\
&\frac{1}{4} a_0 \partial_0 \partial_{\beta} h_{\alpha \chi} \partial^{\chi} h^{\alpha \beta} + \frac{3}{8} a_0 \partial_{\chi} h_{\alpha \beta} \partial^{\chi} h^{\alpha \beta} + \frac{1}{2} a_0 h_{\beta \chi} \partial^{\chi} \Gamma_{\alpha}^{\alpha} \beta
\end{aligned}$$

Added source term: $h^{\alpha \beta} \mathcal{T}_{\alpha \beta} + \Gamma^{\alpha \beta \chi} \Delta_{\alpha \beta \chi}$

$\Delta_{0^+}^{#1}$	$\Delta_{0^+}^{#2}$	$\Delta_{0^+}^{#3}$	$\Delta_{0^+}^{#4}$	$\mathcal{T}_{0^+}^{#1}$	$\mathcal{T}_{0^+}^{#2}$	$\Delta_{0^+}^{#1}$
$\Delta_{0^+}^{#1} \dagger$	$-\frac{2}{a_0}$	0	0	0	0	0
$\Delta_{0^+}^{#2} \dagger$	0	$-\frac{3}{4 a_0}$	$-\frac{1}{2 \sqrt{2} a_0}$	0	0	0
$\Delta_{0^+}^{#3} \dagger$	0	$\frac{5}{4 a_0}$	$-\frac{1}{2 \sqrt{2} a_0}$	0	0	0
$\Delta_{0^+}^{#4} \dagger$	0	$-\frac{1}{2 \sqrt{2} a_0}$	$\frac{1}{2 a_0}$	0	0	0
$\mathcal{T}_{0^+}^{#1} \dagger$	0	0	0	$\frac{4}{a_0 k^2}$	0	0
$\mathcal{T}_{0^+}^{#2} \dagger$	0	0	0	0	0	0
$\Delta_{0^+}^{#1} \dagger$	0	0	0	0	0	$-\frac{2}{a_0}$

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

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

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

$\Gamma_{2^+}^{#1}$	$\Gamma_{2^+}^{#2}$	$\Gamma_{2^+}^{#3}$	$h_{2^+}^{#1}$	$\Gamma_{2^+}^{#1}$	$\Gamma_{2^+}^{#2}$
$\Gamma_{2^+}^{#1} \dagger^{\alpha \beta}$	$\frac{a_0}{4}$	0	0	0	0
$\Gamma_{2^+}^{#2} \dagger^{\alpha \beta}$	0	$-\frac{a_0}{2}$	0	0	0
$\Gamma_{2^+}^{#3} \dagger^{\alpha \beta}$	0	0	$\frac{a_0}{4}$	0	0
$h_{2^+}^{#1} \dagger^{\alpha \beta}$	0	0	$-\frac{a_0 k^2}{8}$	0	0
$\Gamma_{2^+}^{#1} \dagger^{\alpha \beta \chi}$	0	0	0	$\frac{a_0}{4}$	0
$\Gamma_{2^+}^{#2} \dagger^{\alpha \beta \chi}$	0	0	0	0	$\frac{a_0}{4}$

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

Source constraints

SO(3) irreps

$\mathcal{T}_{0^+}^{#2} == 0$

$\Delta_{0^+}^{#3} + 2 \Delta_{0^+}^{#4} + 3 \Delta_{0^+}^{#2} == 0$

$\mathcal{T}_{1^+}^{#1 \alpha} == 0$

$2 \Delta_{1^+}^{#6 \alpha} + \Delta_{1^+}^{#4 \alpha} + 2 \Delta_{1^+}^{#5 \alpha} + \Delta_{1^+}^{#3 \alpha} == 0$

Total #: 8