

Wave operator and propagator

| | $\Delta_{1^+ \alpha \beta}^{\#1}$ | $\Delta_{1^+ \alpha \beta}^{\#2}$ | $\Delta_{1^+ \alpha \beta}^{\#3}$ | $\Delta_{1^+ \alpha}^{\#1}$ | $\Delta_{1^+ \alpha}^{\#2}$ | $\Delta_{1^+ \alpha}^{\#3}$ | $\Delta_{1^+ \alpha}^{\#4}$ | $\Delta_{1^+ \alpha}^{\#5}$ | $\Delta_{1^+ \alpha}^{\#6}$ | $\mathcal{T}_{1^+ \alpha}^{\#1}$ |
|---|-----------------------------------|---|--|---|---|---|--|---|---|---|
| $\Delta_{1^+}^{\#1} \dagger^{\alpha \beta}$ | 0 | $-\frac{2\sqrt{2}}{a_0}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $\Delta_{1^+}^{\#2} \dagger^{\alpha \beta}$ | $-\frac{2\sqrt{2}}{a_0}$ | $\frac{2(a_0^2-14a_0a_1k^2-35a_1^2k^4)}{a_0^2(a_0-29a_1k^2)}$ | $\frac{40\sqrt{2}a_1k^2}{a_0^2-29a_0a_1k^2}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $\Delta_{1^+}^{\#3} \dagger^{\alpha \beta}$ | 0 | $\frac{40\sqrt{2}a_1k^2}{a_0^2-29a_0a_1k^2}$ | $-\frac{4}{a_0-29a_1k^2}$ | 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 | $\frac{\sqrt{2}(4+k^2)}{a_0(2+k^2)}$ | $\frac{a_0^2(4+k^2)^2-30a_0a_1k^2(4+k^2)+(4+3k^2)+a_1^2k^4(6416+7928k^2+1901k^4)}{2a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $\frac{k^2(a_0^2(-2+k^2)+a_0a_1(560+302k^2+71k^4))-2a_1^2k^4(9440+1901k^2(4+k^2))}{2\sqrt{6}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $-\frac{\sqrt{\frac{5}{6}}k^2(a_0+a_1(40-31k^2))}{2a_0(2+k^2)(a_0-33a_1k^2)}$ | $\frac{k^2(2a_0^2(5+2k^2)-a_0a_1(880+778k^2+199k^4)+a_1^2k^4(9440+1901k^2(4+k^2)))}{2\sqrt{3}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $\frac{k^2(-a_0+a_1(200+43k^2))}{\sqrt{6}a_0(2+k^2)(a_0-33a_1k^2)}$ | $-\frac{ik(-30a_0a_1k^4+a_0^2(4+k^2)+27a_1^2k^4(-28+3k^2))}{a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ |
| $\Delta_{1^+}^{\#3} \dagger^{\alpha}$ | 0 | 0 | 0 | $-\frac{2k^2}{\sqrt{3}(2a_0+a_0k^2)}$ | $\frac{k^2(a_0^2(-2+k^2)+a_0a_1(560+302k^2+71k^4))-2a_1^2k^4(9440+1901k^2(4+k^2))}{2\sqrt{6}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $\frac{-a_0^2(76+52k^2+3k^4)+4a_0a_1k^2(472+214k^2+19k^4)+4a_1^2k^4(5120+7280k^2+1901k^4)}{12a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $\frac{\sqrt{5}(10a_0+(3a_0-328a_1)k^2-62a_1^4k^4)}{12a_0(2+k^2)(a_0-33a_1k^2)}$ | $\frac{2a_0^2(-2+k^2)+a_0a_1k^2(472+934k^2+289k^4)-2a_1^2k^4(5120+7280k^2+1901k^4)}{6\sqrt{2}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $-\frac{2a_0+(3a_0-56a_1)k^2+86a_1^4k^4}{6a_0(2+k^2)(a_0-33a_1k^2)}$ | $\frac{ik(54a_1^2k^4(40+3k^2)+a_0^2(6+5k^2)-3a_0a_1k^2(86+23k^2))}{\sqrt{6}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ |
| $\Delta_{1^+}^{\#4} \dagger^{\alpha}$ | 0 | 0 | 0 | 0 | $-\frac{\sqrt{\frac{5}{6}}k^2(a_0+a_1(40-31k^2))}{2a_0(2+k^2)(a_0-33a_1k^2)}$ | $\frac{\sqrt{5}(10a_0+k^2(3a_0-2a_1(164+31k^2)))}{12a_0(2+k^2)(a_0-33a_1k^2)}$ | $\frac{1}{12a_0-396a_1k^2}$ | $\frac{\sqrt{\frac{5}{2}}(-2a_0+a_1k^2(164+31k^2))}{6a_0(2+k^2)(a_0-33a_1k^2)}$ | $-\frac{\sqrt{5}}{6(a_0-33a_1k^2)}$ | $-\frac{i\sqrt{\frac{5}{6}}k(a_0-51a_1k^2)}{a_0(2+k^2)(a_0-33a_1k^2)}$ |
| $\Delta_{1^+}^{\#5} \dagger^{\alpha}$ | 0 | 0 | 0 | $\frac{\sqrt{\frac{2}{3}}k^2}{2a_0+a_0k^2}$ | $\frac{k^2(2a_0^2(5+2k^2)-a_0a_1(880+778k^2+199k^4)+a_1^2k^4(9440+1901k^2(4+k^2)))}{2\sqrt{3}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $\frac{2a_0^2(-2+k^2)+a_0a_1k^2(472+934k^2+289k^4)-2a_1^2k^4(5120+7280k^2+1901k^4)}{6\sqrt{2}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $\frac{\sqrt{\frac{5}{2}}(-2a_0+a_1k^2(164+31k^2))}{6a_0(2+k^2)(a_0-33a_1k^2)}$ | $\frac{4a_0^2(17+14k^2+3k^4)-4a_0a_1k^2(236+287k^2+77k^4)+a_1^2k^4(5120+7280k^2+1901k^4)}{6a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $\frac{a_1k^2(28+43k^2)+2a_0(7+3k^2)}{3\sqrt{2}a_0(2+k^2)(a_0-33a_1k^2)}$ | $\frac{ik(2a_0^2(3+k^2)-27a_1^2k^4(40+3k^2)+3a_0a_1k^2(34+7k^2))}{\sqrt{3}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ |
| $\Delta_{1^+}^{\#6} \dagger^{\alpha}$ | 0 | 0 | 0 | 0 | $\frac{k^2(-a_0+a_1(200+43k^2))}{\sqrt{6}a_0(2+k^2)(a_0-33a_1k^2)}$ | $-\frac{2a_0+(3a_0-56a_1)k^2+86a_1^4k^4}{6a_0(2+k^2)(a_0-33a_1k^2)}$ | $-\frac{\sqrt{5}}{6(a_0-33a_1k^2)}$ | $-\frac{a_1k^2(28-43k^2)+2a_0(7+3k^2)}{3\sqrt{2}a_0(2+k^2)(a_0-33a_1k^2)}$ | $\frac{5}{3(a_0-33a_1k^2)}$ | $-\frac{i\sqrt{\frac{2}{3}}k(a_0+57a_1k^2)}{a_0(2+k^2)(a_0-33a_1k^2)}$ |
| $\mathcal{T}_{1^+}^{\#1} \dagger^{\alpha}$ | 0 | 0 | 0 | $\frac{2i\sqrt{2}k}{2a_0+a_0k^2}$ | $\frac{i(-30a_0a_1k^5+a_0^2k(4+k^2)+27a_1^2k^5(-28+3k^2))}{a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $-\frac{i(54a_1^2k^5(40+3k^2)+a_0^2k(6+5k^2)-3a_0a_1k^3(86+23k^2))}{\sqrt{6}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $\frac{i\sqrt{\frac{5}{6}}k(a_0-51a_1k^2)}{a_0(2+k^2)(a_0-33a_1k^2)}$ | $-\frac{i(2a_0^2k(3+k^2)-27a_1^2k^5(40+3k^2)+3a_0a_1k^3(34+7k^2))}{\sqrt{3}a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ | $\frac{i\sqrt{\frac{2}{3}}k(a_0+57a_1k^2)}{a_0(2+k^2)(a_0-33a_1k^2)}$ | $\frac{2k^2(a_0^2+30a_0a_1k^2-459a_1^2k^4)}{a_0^2(2+k^2)^2(a_0-33a_1k^2)}$ |

$$\begin{aligned}
S = & \iiint \left(\frac{1}{4} (2a_0 \Gamma_{\alpha}^{\alpha\beta} \Gamma_{\beta\chi}^{\chi} + 4 h^{\alpha\beta} \mathcal{T}_{\alpha\beta} + \Gamma^{\alpha\beta\chi} (-2a_0 \Gamma_{\beta\chi\alpha} + 4 \Delta_{\alpha\beta\chi}) - \right. \\
& a_0 h_{\chi}^{\chi} \partial_{\beta} \Gamma_{\alpha}^{\alpha\beta} + a_0 h_{\chi}^{\chi} \partial_{\beta} \Gamma_{\chi\alpha}^{\alpha\beta} - 2a_0 h_{\alpha\chi} \partial_{\beta} \Gamma^{\alpha\beta\chi} + \\
& 22a_1 \partial^{\alpha} \Gamma_{\delta}^{\chi\delta} \partial_{\delta} \Gamma_{\chi\alpha}^{\alpha} + 2a_1 \partial^{\alpha} \Gamma_{\chi\alpha}^{\alpha} \partial_{\delta} \Gamma^{\chi\delta} - \\
& 76a_1 \partial^{\alpha} \Gamma_{\chi}^{\chi\delta} \partial_{\delta} \Gamma_{\alpha}^{\beta} + 2a_0 h_{\beta\chi} \partial^{\alpha} \Gamma_{\alpha}^{\beta} - \\
& 2a_1 \partial_{\beta} \Gamma_{\chi}^{\delta} \partial^{\alpha} \Gamma_{\alpha}^{\beta} - 2a_1 \partial_{\beta} \Gamma_{\delta}^{\delta} \partial_{\chi}^{\alpha} \Gamma_{\alpha}^{\beta} + \\
& 2a_1 \partial_{\chi} \Gamma_{\beta}^{\delta} \partial^{\alpha} \Gamma_{\alpha}^{\beta} - 2a_1 \partial_{\chi} \Gamma_{\delta}^{\delta} \partial_{\beta}^{\alpha} \Gamma_{\alpha}^{\beta} - \\
& 2a_1 \partial_{\chi} \Gamma_{\beta}^{\delta} \partial_{\delta}^{\alpha} \Gamma_{\alpha}^{\beta} - 22a_1 \partial_{\beta} \Gamma_{\chi}^{\delta} \partial^{\alpha} \Gamma_{\alpha}^{\beta} + \\
& 38a_1 \partial_{\beta} \Gamma_{\chi\delta}^{\delta} \partial^{\alpha} \Gamma_{\alpha}^{\beta} + 22a_1 \partial_{\chi} \Gamma_{\beta\delta}^{\delta} \partial^{\alpha} \Gamma_{\alpha}^{\beta} - \\
& 2a_1 \partial_{\chi} \Gamma_{\beta\delta}^{\delta} \partial^{\alpha} \Gamma_{\alpha}^{\beta} + 4a_1 \partial_{\alpha} \Gamma_{\chi}^{\delta} \partial^{\alpha} \Gamma_{\beta}^{\alpha} - \\
& 4a_1 \partial_{\chi} \Gamma_{\alpha}^{\delta} \partial^{\alpha} \Gamma_{\beta}^{\alpha} - 2a_1 \partial_{\chi} \Gamma^{\alpha\beta\chi} \partial_{\delta} \Gamma_{\alpha\beta}^{\delta} - \\
& 2a_1 \partial_{\beta} \Gamma^{\alpha\beta\chi} \partial_{\delta} \Gamma_{\alpha\chi}^{\delta} - 2a_1 \partial_{\beta} \Gamma^{\alpha\beta\chi} \partial_{\delta} \Gamma_{\alpha}^{\delta} + \\
& 38a_1 \partial_{\chi} \Gamma^{\alpha\beta\chi} \partial_{\delta} \Gamma_{\beta\alpha}^{\delta} + 4a_1 \partial^{\alpha} \Gamma_{\alpha}^{\beta} \partial_{\delta} \Gamma_{\beta}^{\chi} - \\
& 22a_1 \partial^{\alpha} \Gamma_{\beta}^{\alpha} \partial_{\delta} \Gamma_{\chi\alpha}^{\delta} + 2a_1 \partial^{\alpha} \Gamma_{\alpha}^{\beta} \partial_{\delta} \Gamma_{\chi\beta}^{\delta} - \\
& 2a_1 \partial_{\beta} \Gamma^{\alpha\beta\chi} \partial_{\delta} \Gamma_{\chi}^{\delta} - 2a_1 \partial^{\alpha} \Gamma_{\beta\alpha}^{\beta} \partial_{\delta} \Gamma_{\chi}^{\delta} + \\
& 2a_1 \partial^{\alpha} \Gamma_{\beta\alpha}^{\beta} \partial_{\delta} \Gamma_{\chi}^{\delta} + 4a_1 \partial^{\alpha} \Gamma_{\alpha}^{\beta} \partial_{\delta} \Gamma_{\chi}^{\delta} - \\
& 2a_1 \partial_{\beta} \Gamma_{\alpha}^{\beta} \partial_{\delta} \Gamma_{\chi}^{\delta} + 4a_1 \partial_{\beta} \Gamma_{\alpha}^{\beta} \partial_{\delta} \Gamma_{\chi}^{\delta} - \\
& 2a_1 \partial_{\beta} \Gamma_{\alpha}^{\beta} \partial_{\delta} \Gamma_{\chi}^{\delta} + 2a_1 \partial_{\alpha} \Gamma_{\beta\chi\delta}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} + \\
& 4a_1 \partial_{\alpha} \Gamma_{\beta\delta\chi}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} + 4a_1 \partial_{\alpha} \Gamma_{\chi\beta\delta}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} + \\
& 2a_1 \partial_{\alpha} \Gamma_{\chi\delta\beta}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} + 4a_1 \partial_{\alpha} \Gamma_{\delta\beta\chi}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} + \\
& 4a_1 \partial_{\alpha} \Gamma_{\delta\chi\beta}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - 2a_1 \partial_{\beta} \Gamma_{\alpha\chi\delta}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - \\
& 2a_1 \partial_{\beta} \Gamma_{\alpha\delta\chi}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - 2a_1 \partial_{\beta} \Gamma_{\chi\delta\alpha}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - \\
& 2a_1 \partial_{\chi} \Gamma_{\alpha\beta\delta}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - 2a_1 \partial_{\chi} \Gamma_{\beta\alpha\delta}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} + \\
& 4a_1 \partial_{\chi} \Gamma_{\beta\delta\alpha}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - 4a_1 \partial_{\delta} \Gamma_{\alpha\beta\chi}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - 4a_1 \partial_{\delta} \Gamma_{\alpha\chi\beta}^{\delta} \\
& \partial^{\delta} \Gamma^{\alpha\beta\chi} - 2a_1 \partial_{\delta} \Gamma_{\beta\alpha\chi}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - 2a_1 \partial_{\delta} \Gamma_{\beta\chi\alpha}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - \\
& 2a_1 \partial_{\delta} \Gamma_{\chi\beta\alpha}^{\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} + 2a_1 \partial_{\beta} \Gamma_{\alpha\alpha}^{\beta} \partial^{\delta} \Gamma_{\chi}^{\alpha} + \\
& 2a_1 \partial_{\beta} \Gamma_{\alpha\alpha}^{\beta} \partial^{\delta} \Gamma_{\chi}^{\alpha}) [t, x, y, z] dz dy dx dt
\end{aligned}$$

| | $\Gamma_{1^+ \alpha \beta}^{\#1}$ | $\Gamma_{1^+ \alpha \beta}^{\#2}$ | $\Gamma_{1^+ \alpha \beta}^{\#3}$ | $\Gamma_{1^- \alpha}^{\#1}$ | $\Gamma_{1^- \alpha}^{\#2}$ | $\Gamma_{1^- \alpha}^{\#3}$ | $\Gamma_{1^- \alpha}^{\#4}$ | $\Gamma_{1^- \alpha}^{\#5}$ | $\Gamma_{1^- \alpha}^{\#6}$ | $h_{1^- \alpha}^{\#1}$ |
|--|-----------------------------------|-----------------------------------|-----------------------------------|---|-----------------------------|--|--|--|---|---|
| $\Gamma_{1^+ \alpha \beta}^{\#1} \dagger \alpha \beta$ | $\frac{1}{4} (-a_0 - 15 a_1 k^2)$ | $-\frac{a_0}{2 \sqrt{2}}$ | $5 a_1 k^2$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $\Gamma_{1^+ \alpha \beta}^{\#2} \dagger \alpha \beta$ | $-\frac{a_0}{2 \sqrt{2}}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $\Gamma_{1^+ \alpha \beta}^{\#3} \dagger \alpha \beta$ | $5 a_1 k^2$ | 0 | $\frac{1}{4} (a_0 - 29 a_1 k^2)$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $\Gamma_{1^- \alpha}^{\#1} \dagger \alpha$ | 0 | 0 | 0 | $\frac{1}{4} (-a_0 - 3 a_1 k^2)$ | $\frac{a_0}{2 \sqrt{2}}$ | $\frac{5}{2} \sqrt{3} a_1 k^2$ | $-\frac{5}{2} \sqrt{\frac{5}{3}} a_1 k^2$ | $5 \sqrt{\frac{3}{2}} a_1 k^2$ | $-\frac{5 a_1 k^2}{\sqrt{3}}$ | $-\frac{i a_0 k}{4 \sqrt{2}}$ |
| $\Gamma_{1^- \alpha}^{\#2} \dagger \alpha$ | 0 | 0 | 0 | $\frac{a_0}{2 \sqrt{2}}$ | 0 | 0 | 0 | 0 | 0 | 0 |
| $\Gamma_{1^- \alpha}^{\#3} \dagger \alpha$ | 0 | 0 | 0 | $\frac{5}{2} \sqrt{3} a_1 k^2$ | 0 | $-\frac{a_0}{3}$ | $\frac{1}{6} \sqrt{5} (a_0 - 8 a_1 k^2)$ | $-\frac{a_0}{6 \sqrt{2}}$ | $\frac{1}{6} (-a_0 + 20 a_1 k^2)$ | $\frac{i a_0 k}{4 \sqrt{6}}$ |
| $\Gamma_{1^- \alpha}^{\#4} \dagger \alpha$ | 0 | 0 | 0 | $-\frac{5}{2} \sqrt{\frac{5}{3}} a_1 k^2$ | 0 | $\frac{1}{6} \sqrt{5} (a_0 - 8 a_1 k^2)$ | $\frac{1}{3} (a_0 + 7 a_1 k^2)$ | $-\frac{1}{6} \sqrt{\frac{5}{2}} (a_0 + 16 a_1 k^2)$ | $-\frac{1}{6} \sqrt{5} (a_0 - 5 a_1 k^2)$ | $-\frac{1}{4} i \sqrt{\frac{5}{6}} a_0 k$ |
| $\Gamma_{1^- \alpha}^{\#5} \dagger \alpha$ | 0 | 0 | 0 | $5 \sqrt{\frac{3}{2}} a_1 k^2$ | 0 | $-\frac{a_0}{6 \sqrt{2}}$ | $-\frac{1}{6} \sqrt{\frac{5}{2}} (a_0 + 16 a_1 k^2)$ | $\frac{a_0}{3}$ | $\frac{a_0 + 40 a_1 k^2}{6 \sqrt{2}}$ | $\frac{i a_0 k}{4 \sqrt{3}}$ |
| $\Gamma_{1^- \alpha}^{\#6} \dagger \alpha$ | 0 | 0 | 0 | $-\frac{5 a_1 k^2}{\sqrt{3}}$ | 0 | $\frac{1}{6} (-a_0 + 20 a_1 k^2)$ | $-\frac{1}{6} \sqrt{5} (a_0 - 5 a_1 k^2)$ | $\frac{a_0 + 40 a_1 k^2}{6 \sqrt{2}}$ | $\frac{5}{12} (a_0 - 17 a_1 k^2)$ | $\frac{i a_0 k}{4 \sqrt{6}}$ |
| $h_{1^- \alpha}^{\#1} \dagger \alpha$ | 0 | 0 | 0 | $\frac{i a_0 k}{4 \sqrt{2}}$ | 0 | $-\frac{i a_0 k}{4 \sqrt{6}}$ | $\frac{1}{4} i \sqrt{\frac{5}{6}} a_0 k$ | $-\frac{i a_0 k}{4 \sqrt{3}}$ | $-\frac{i a_0 k}{4 \sqrt{6}}$ | 0 |

| | $\Delta_{0+}^{\Delta_1}$ | $\Delta_{0+}^{\Delta_2}$ | $\Delta_{0+}^{\Delta_3}$ | $\Delta_{0+}^{\Delta_4}$ | $\mathcal{T}_{0+}^{\Delta_1}$ | $\mathcal{T}_{0+}^{\Delta_2}$ | $\Delta_{0+}^{\Delta_1}$ |
|---------------------------------------|--|---|--|---|--|--|--------------------------|
| $\Delta_{0+}^{\Delta_1} \dagger$ | 0 | $\frac{4\sqrt{6}}{16a_0+3a_0k^2}$ | $-\frac{4\sqrt{\frac{2}{3}}}{16a_0+3a_0k^2}$ | $-\frac{8}{\sqrt{3}(16a_0+3a_0k^2)}$ | $-\frac{2i\sqrt{2}}{a_0k}$ | $-\frac{2i\sqrt{6}k}{16a_0+3a_0k^2}$ | 0 |
| $\Delta_{0+}^{\Delta_2} \dagger$ | $\frac{4\sqrt{6}}{16a_0+3a_0k^2}$ | $-\frac{48(3a_0+197a_1k^2)}{a_0^2(16+3k^2)^2}$ | $\frac{16(19a_0+(3a_0+197a_1)k^2)}{a_0^2(16+3k^2)^2}$ | $-\frac{8\sqrt{2}(10a_0+(3a_0-394a_1)k^2)}{a_0^2(16+3k^2)^2}$ | $-\frac{8i\sqrt{3}(a_0-65a_1k^2)}{a_0^2(16+3k^2)^2}$ | $\frac{24ik(3a_0+197a_1k^2)}{a_0^2(16+3k^2)^2}$ | 0 |
| $\Delta_{0+}^{\Delta_3} \dagger$ | $-\frac{4\sqrt{\frac{2}{3}}}{16a_0+3a_0k^2}$ | $\frac{16(19a_0+(3a_0+197a_1)k^2)}{a_0^2(16+3k^2)^2}$ | $-\frac{16(35a_0+(6a_0+197a_1)k^2)}{3a_0^2(16+3k^2)^2}$ | $-\frac{8\sqrt{2}(22a_0+(3a_0+394a_1)k^2)}{3a_0^2(16+3k^2)^2}$ | $\frac{8i(a_0-65a_1k^2)}{\sqrt{3}a_0^2k(16+3k^2)}$ | $-\frac{8ik(19a_0+(3a_0+197a_1)k^2)}{a_0^2(16+3k^2)^2}$ | 0 |
| $\Delta_{0+}^{\Delta_4} \dagger$ | $-\frac{8}{\sqrt{3}(16a_0+3a_0k^2)}$ | $-\frac{8\sqrt{2}(10a_0+(3a_0-394a_1)k^2)}{a_0^2(16+3k^2)^2}$ | $-\frac{8\sqrt{2}(22a_0+(3a_0+394a_1)k^2)}{3a_0^2(16+3k^2)^2}$ | $\frac{32(13a_0+(3a_0-197a_1)k^2)}{3a_0^2(16+3k^2)^2}$ | $\frac{8i\sqrt{\frac{2}{3}}(a_0-65a_1k^2)}{a_0^2k(16+3k^2)}$ | $\frac{4i\sqrt{2}k(10a_0+(3a_0-394a_1)k^2)}{a_0^2(16+3k^2)^2}$ | 0 |
| $\mathcal{T}_{0+}^{\Delta_1} \dagger$ | $\frac{2i\sqrt{2}}{a_0k}$ | $\frac{8i\sqrt{3}(a_0-65a_1k^2)}{a_0^2k(16+3k^2)}$ | $-\frac{8i(a_0-65a_1k^2)}{\sqrt{3}a_0^2k(16+3k^2)}$ | $-\frac{8i\sqrt{\frac{2}{3}}(a_0-65a_1k^2)}{a_0^2k(16+3k^2)}$ | $\frac{4(a_0-25a_1k^2)}{a_0^2(16+3k^2)}$ | $\frac{4\sqrt{3}(a_0-65a_1k^2)}{a_0^2(16+3k^2)}$ | 0 |
| $\mathcal{T}_{0+}^{\Delta_2} \dagger$ | $\frac{2i\sqrt{6}k}{16a_0+3a_0k^2}$ | $-\frac{24ik(3a_0+197a_1k^2)}{a_0^2(16+3k^2)^2}$ | $\frac{8ik(19a_0+(3a_0+197a_1)k^2)}{a_0^2(16+3k^2)^2}$ | $-\frac{4i\sqrt{2}k(10a_0+(3a_0-394a_1)k^2)}{a_0^2(16+3k^2)^2}$ | $\frac{4\sqrt{3}(a_0-65a_1k^2)}{a_0^2(16+3k^2)}$ | $-\frac{12k^2(3a_0+197a_1k^2)}{a_0^2(16+3k^2)^2}$ | 0 |
| $\Delta_{0+}^{\Delta_1} \dagger$ | 0 | 0 | 0 | 0 | 0 | 0 | $-\frac{2}{a_0a_1k^2}$ |

| | $\Delta_{2^1+\alpha\beta}^{\#1}$ | $\Delta_{2^2+\alpha\beta}^{\#2}$ | $\Delta_{2^3+\alpha\beta}^{\#3}$ | $\mathcal{T}_{2^1+\alpha\beta}^{\#1}$ | $\Delta_{2^1\alpha\beta}^{\#1}$ | $\Delta_{2^2\alpha\beta}^{\#2}$ |
|---------------------------------------|-----------------------------------|---|---|--|---------------------------------|---------------------------------|
| $\Delta_{2^1+\alpha\beta}^{\#1}$ | 0 | $\frac{2\sqrt{\frac{2}{3}}}{a_0}$ | $\frac{4}{\sqrt{3}a_0}$ | $\frac{4i\sqrt{2}}{a_0k}$ | 0 | 0 |
| $\Delta_{2^2+\alpha\beta}^{\#2}$ | $\frac{2\sqrt{\frac{2}{3}}}{a_0}$ | $-\frac{8(a_0+13a_1k^2)}{3a_0^2}$ | $-\frac{2\sqrt{2}(a_0+52a_1k^2)}{3a_0^2}$ | $-\frac{4i(a_0+31a_1k^2)}{\sqrt{3}a_0^2k}$ | 0 | 0 |
| $\Delta_{2^3+\alpha\beta}^{\#3}$ | $\frac{4}{\sqrt{3}a_0}$ | $-\frac{2\sqrt{2}(a_0+52a_1k^2)}{3a_0^2}$ | $\frac{8(a_0-26a_1k^2)}{3a_0^2}$ | $-\frac{4i\sqrt{\frac{2}{3}}(a_0+31a_1k^2)}{a_0^2k}$ | 0 | $\sqrt{3}$ |
| $\mathcal{T}_{2^1+\alpha\beta}^{\#1}$ | $-\frac{4i\sqrt{2}}{a_0k}$ | $\frac{4i(a_0+31a_1k^2)}{\sqrt{3}a_0^2k}$ | $\frac{4i\sqrt{\frac{2}{3}}(a_0+31a_1k^2)}{a_0^2k}$ | $-\frac{8(a_0+11a_1k^2)}{a_0^2k^2}$ | 0 | 0 |
| $\Delta_{2^1+\alpha\beta\chi}^{\#1}$ | 0 | 0 | 0 | 0 | $-\frac{4}{a_0+1k^2}$ | 0 |
| $\Delta_{2^2+\alpha\beta\chi}^{\#2}$ | 0 | 0 | 0 | 0 | 0 | $\frac{4}{a_0-5a_1k^2}$ |

| | $\Gamma_{2^+ \alpha \beta}^{\#1}$ | $\Gamma_{2^+ \alpha \beta}^{\#2}$ | $\Gamma_{2^+ \alpha \beta}^{\#3}$ | $h_{2^+ \alpha \beta}^{\#1}$ | $\Gamma_{2^+ \alpha \beta \chi}^{\#1}$ | $\Gamma_{2^+ \alpha \beta \chi}^{\#2}$ |
|--|-----------------------------------|-----------------------------------|-----------------------------------|-------------------------------|--|--|
| $\Gamma_{2^+}^{\#1} \dagger \alpha \beta$ | $\frac{1}{4} (a_0 + 11 a_1 k^2)$ | $-5 \sqrt{\frac{2}{3}} a_1 k^2$ | $\frac{5 a_1 k^2}{\sqrt{3}}$ | $\frac{i a_0 k}{4 \sqrt{2}}$ | 0 | 0 |
| $\Gamma_{2^+}^{\#2} \dagger \alpha \beta$ | $-5 \sqrt{\frac{2}{3}} a_1 k^2$ | $\frac{1}{6} (-3 a_0 + a_1 k^2)$ | $-\frac{a_1 k^2}{6 \sqrt{2}}$ | $\frac{i a_0 k}{4 \sqrt{3}}$ | 0 | 0 |
| $\Gamma_{2^+}^{\#3} \dagger \alpha \beta$ | $\frac{5 a_1 k^2}{\sqrt{3}}$ | $-\frac{a_1 k^2}{6 \sqrt{2}}$ | $\frac{1}{12} (3 a_0 + a_1 k^2)$ | $-\frac{i a_0 k}{4 \sqrt{6}}$ | 0 | 0 |
| $h_{2^+}^{\#1} \dagger \alpha \beta$ | $-\frac{i a_0 k}{4 \sqrt{2}}$ | $-\frac{i a_0 k}{4 \sqrt{3}}$ | $\frac{i a_0 k}{4 \sqrt{6}}$ | 0 | 0 | 0 |
| $\Gamma_{2^+}^{\#1} \dagger \alpha \beta \chi$ | 0 | 0 | 0 | 0 | $\frac{1}{4} (a_0 - a_1 k^2)$ | 0 |
| $\Gamma_{2^+}^{\#2} \dagger \alpha \beta \chi$ | 0 | 0 | 0 | 0 | 0 | $\frac{1}{4} (a_0 - 5 a_1 k^2)$ |

| Source constraints | Fundamental fields | Multiplicities |
|--|--|----------------|
| SO(3) irreps | | |
| $2\mathcal{T}_{0+}^{\#2} - i k \Delta_{0+}^{\#2} = 0$ | $2\partial_\beta\partial_\alpha\mathcal{T}^{\alpha\beta} = \partial_\chi\partial_\beta\partial_\alpha\Delta^{\alpha\beta\chi}$ | 1 |
| $\Delta_{0+}^{\#3} + 2\Delta_{0+}^{\#4} + 3\Delta_{0+}^{\#2} = 0$ | $\partial_\alpha\Delta^{\alpha\beta}{}_\beta = 0$ | 1 |
| $6\mathcal{T}_1^{\#1\alpha} - i k (3\Delta_1^{\#2\alpha} - \Delta_1^{\#5\alpha} + \Delta_1^{\#3\alpha}) = 0$ | $2\partial_\chi\partial_\beta\partial_\alpha\mathcal{T}^{\beta\chi} + \partial_\beta\partial^\delta\partial_\chi\partial_\beta\Delta^{\beta\alpha\chi} = 2\partial_\chi\chi^\delta\partial_\beta\mathcal{T}^{\alpha\beta} + \partial_\delta\partial_\chi\partial_\beta\partial_\alpha\Delta^{\beta\chi\delta}$ | 3 |
| $2\Delta_1^{\#6\alpha} + \Delta_1^{\#4\alpha} + 2\Delta_1^{\#5\alpha} + \Delta_1^{\#3\alpha} = 0$ | $\partial_\beta\partial^\alpha\Delta^{\beta\chi}{}_\chi = \partial_\chi\chi^\delta\Delta^{\alpha\beta}{}_\beta$ | 3 |
| Total constraints/gauge generators: | | 8 |

| | $\Gamma_{0+}^{\#1}$ | $\Gamma_{0+}^{\#2}$ | $\Gamma_{0+}^{\#3}$ | $\Gamma_{0+}^{\#4}$ | $h_{0+}^{\#1}$ | $h_{0+}^{\#2}$ | $\Gamma_{0-}^{\#1}$ |
|-----------------------------|-----------------------------------|---------------------------|--|--|-------------------------------|------------------------------|--------------------------------|
| $\Gamma_{0+}^{\#1} \dagger$ | $\frac{1}{2} (-a_0 + 25 a_1 k^2)$ | 0 | $10 \sqrt{\frac{2}{3}} a_1 k^2$ | $-\frac{10 a_1 k^2}{\sqrt{3}}$ | $-\frac{i a_0 k}{2 \sqrt{2}}$ | 0 | 0 |
| $\Gamma_{0+}^{\#2} \dagger$ | 0 | 0 | $\frac{a_0}{2}$ | $-\frac{a_0}{2 \sqrt{2}}$ | 0 | 0 | 0 |
| $\Gamma_{0+}^{\#3} \dagger$ | $10 \sqrt{\frac{2}{3}} a_1 k^2$ | $\frac{a_0}{2}$ | $\frac{23 a_1 k^2}{3}$ | $-\frac{3 a_0 + 46 a_1 k^2}{6 \sqrt{2}}$ | $\frac{i a_0 k}{4 \sqrt{3}}$ | $-\frac{1}{4} i a_0 k$ | 0 |
| $\Gamma_{0+}^{\#4} \dagger$ | $-\frac{10 a_1 k^2}{\sqrt{3}}$ | $-\frac{a_0}{2 \sqrt{2}}$ | $-\frac{3 a_0 + 46 a_1 k^2}{6 \sqrt{2}}$ | $\frac{1}{6} (3 a_0 + 23 a_1 k^2)$ | $-\frac{i a_0 k}{4 \sqrt{6}}$ | $\frac{i a_0 k}{4 \sqrt{2}}$ | 0 |
| $h_{0+}^{\#1} \dagger$ | $\frac{i a_0 k}{2 \sqrt{2}}$ | 0 | $-\frac{i a_0 k}{4 \sqrt{3}}$ | $\frac{i a_0 k}{4 \sqrt{6}}$ | 0 | 0 | 0 |
| $h_{0+}^{\#2} \dagger$ | 0 | 0 | $\frac{i a_0 k}{4}$ | $-\frac{i a_0 k}{4 \sqrt{2}}$ | 0 | 0 | 0 |
| $\Gamma_{0-}^{\#1} \dagger$ | 0 | 0 | 0 | 0 | 0 | 0 | $\frac{1}{2} (-a_0 + a_1 k^2)$ |

$$\Delta_{3^{-}}^{\#1} + \alpha\beta_X \left[-\frac{2}{a_0 + 7a_1k^2} \right]$$

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** MassiveAnalysisOfSector... Null
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