Particle spectrograph

Wave operator and propagator

Quadratic (free) action
S _F ==
$\iiint (\frac{1}{8} (8 h^{\alpha\beta} \mathcal{T}_{\alpha\beta} - 4 \Gamma^{\alpha\beta\chi} (a_0 \Gamma_{\beta\chi\alpha} - 2 \Delta_{\alpha\beta\chi} + a_0 \partial_{\beta}h_{\alpha\chi}) + 2 a_0 \Gamma^{\alpha\beta}_{\alpha} \partial_{\beta}h_{\chi}^{\chi} -$
$2a_0h_{\chi}^{\chi}\partial_{\beta}\Gamma_{\alpha}^{\alpha\beta} + 2a_0h_{\chi}^{\chi}\partial_{\beta}\Gamma_{\alpha}^{\alpha\beta} - 4a_0h_{\alpha\chi}\partial_{\beta}\Gamma^{\alpha\beta\chi} + 44a_1\partial^{\alpha}\Gamma_{\delta}^{\chi\delta}\partial_{\beta}\Gamma_{\chi\alpha}^{\beta} +$
$4a_1\partial^\alpha \Gamma_{\chi\alpha}^{\beta}\partial_\beta \Gamma^{\chi\delta}_{\delta} - 152a_1\partial^\alpha \Gamma^{\chi\delta}_{\chi}\partial_\beta \Gamma_{\delta\alpha}^{\beta} + 2a_0h^{\alpha\beta}\partial_\beta\partial_\alpha h^\chi_{\chi} -$
$a_0\partial_\beta h^X_{\ \chi}\partial^\beta h^\alpha_{\ \alpha} + 2a_0\partial^\beta h^\alpha_{\ \alpha}\partial_\chi h_\beta^{\ \chi} + 2a_0\Gamma^\alpha_{\ \alpha}(2\Gamma^X_{\ \beta\chi} - \partial_\beta h^X_{\ \chi} + 2\partial_\chi h_\beta^{\ \chi}) +$
$74a_{1}\partial_{\beta}\partial_{\alpha}h^{\delta}_{\delta}\partial_{\chi}\Gamma^{\alpha\beta\chi} + 6a_{1}\partial_{\beta}\Gamma^{\alpha\beta\chi}\partial_{\chi}\partial_{\alpha}h^{\delta}_{\delta} - 4a_{0}h^{\alpha\beta}\partial_{\chi}\partial_{\beta}h_{\alpha}^{\chi} +$
$2a_0h^\alpha_{\alpha}\partial_{\chi}\partial_{\beta}h^{\beta\chi} + 2a_0h^{\alpha\beta}\partial_{\chi}\partial^{\chi}h_{\alpha\beta} - 2a_0h^\alpha_{\alpha}\partial_{\chi}\partial^{\chi}h^\beta_{\beta} - 2a_0\partial_{\beta}h_{\alpha\chi}\partial^{\chi}h^{\alpha\beta} +$
$a_0\partial_\chi h_{\alpha\beta}\partial^\chi h^{\alpha\beta} + 4a_0h_{\beta\chi}\partial^\chi \Gamma^\alpha_{\alpha}{}^\beta - 4a_1\partial_\beta \Gamma^{\delta}_{\delta}\partial^\chi \Gamma^\alpha_{\alpha}{}^\beta - 4a_1\partial_\beta \Gamma^{\delta}_{\delta\chi}\partial^\chi \Gamma^\alpha_{\alpha}{}^\beta +$
$4a_1\partial_\chi \Gamma_{\beta}^{\delta}\partial^\chi \Gamma^{\alpha}_{\beta} - 4a_1\partial_\chi \Gamma^{\delta}_{\beta\delta}\partial^\chi \Gamma^{\alpha}_{\beta} - 4a_1\partial_\chi \Gamma^{\delta}_{\delta\beta}\partial^\chi \Gamma^{\alpha}_{\beta} -$
$6a_1\partial_\chi\partial_\beta h^\delta_{\delta}\partial^\chi\Gamma^\alpha_{\alpha}{}^\beta - 44a_1\partial_\beta\Gamma^{\delta}_{\delta}\partial^\chi\Gamma^{\alpha\beta}_{\alpha} + 76a_1\partial_\beta\Gamma^\delta_{\chi\delta}\partial^\chi\Gamma^{\alpha\beta}_{\alpha} +$
$44a_1\partial_\chi \Gamma_{\beta\delta}^{\delta}\partial^\chi \Gamma^{\alpha\beta}_{\alpha} - 4a_1\partial_\chi \Gamma^{\delta}_{\delta}\partial^\chi \Gamma^{\alpha\beta}_{\alpha} - 74a_1\partial_\chi\partial_\beta h^{\delta}_{\delta}\partial^\chi \Gamma^{\alpha\beta}_{\alpha} +$
$8 a_1 \partial_{\alpha} \Gamma_{\chi \delta}^{\delta} \partial^{\chi} \Gamma^{\alpha\beta}_{\beta} - 8 a_1 \partial_{\chi} \Gamma_{\alpha \delta}^{\delta} \partial^{\chi} \Gamma^{\alpha\beta}_{\beta} - 36 a_1 \partial_{\chi} \partial_{\beta} h^{\delta}_{\delta} \partial^{\chi} \partial_{\alpha} h^{\alpha\beta} +$
$17a_1\partial_\chi\partial_\beta h^\delta_{\delta}\partial^\chi\partial^\beta h^\alpha_{\alpha}-4a_1\partial_\chi \Gamma^{\alpha\beta\chi}\partial_\delta \Gamma_{\alpha\beta}^{\delta}-4a_1\partial_\beta \Gamma^{\alpha\beta\chi}\partial_\delta \Gamma_{\alpha\chi}^{\delta}-$
$4 a_1 \partial_{\beta} \Gamma^{\alpha\beta\chi} \partial_{\delta} \Gamma_{\alpha \chi}^{\ \delta} + 76 a_1 \partial_{\chi} \Gamma^{\alpha\beta\chi} \partial_{\delta} \Gamma_{\beta\alpha}^{\ \delta} + 8 a_1 \partial^{\chi} \Gamma_{\alpha \alpha}^{\alpha \beta} \partial_{\delta} \Gamma_{\beta \chi}^{\ \delta} +$
$4a_1\partial^\chi\Gamma^\alpha_{\alpha}^{\beta}\partial_\delta\Gamma^{\delta}_{\chi\beta} + 4a_1\partial^\chi\Gamma^{\alpha\beta}_{\alpha}\partial_\delta\Gamma^{\delta}_{\chi\beta} - 4a_1\partial_\beta\Gamma^{\alpha\beta\chi}\partial_\delta\Gamma^{\delta}_{\chi\alpha} +$
$4a_1\partial^\chi \Gamma_{\beta\alpha}^{\beta}\partial_\delta \Gamma_{\chi}^{\delta\alpha} + 8a_1\partial^\chi \Gamma_{\alpha}^{\beta}\partial_\delta \Gamma_{\chi\beta}^{\delta} - 4a_1\partial_\beta \Gamma_{\alpha}^{\beta}\partial_\delta \Gamma_{\chi}^{\delta} +$
$8a_1\partial_\beta \Gamma^\alpha_{\alpha}^{\beta}\partial_\delta \Gamma^{\chi\delta}_{\lambda} - 4a_1\partial_\beta \Gamma^{\alpha\beta}_{\alpha}\partial_\delta \Gamma^{\chi\delta}_{\lambda} - 74a_1\partial_\chi \Gamma^{\alpha\beta\chi}\partial_\delta\partial_\alpha h_\beta^{\delta} -$
$6 a_1 \partial_{\beta} \Gamma^{\alpha\beta\chi} \partial_{\delta} \partial_{\alpha} h_{\chi}^{\delta} - 74 a_1 \partial_{\chi} \Gamma^{\alpha\beta\chi} \partial_{\delta} \partial_{\beta} h_{\alpha}^{\delta} + 3 a_1 \partial_{\chi} \partial^{\chi} h^{\alpha\beta} \partial_{\delta} \partial_{\beta} h_{\alpha}^{\delta} +$
$37 a_1 \partial_\alpha \partial^\chi h^{\alpha\beta} \partial_\delta \partial_\beta h_\chi^{\ \delta} + 6 a_1 \partial^\chi \Gamma^\alpha_{\ \alpha}{}^\beta \partial_\delta \partial_\beta h_\chi^{\ \delta} + 74 a_1 \partial^\chi \Gamma^{\alpha\beta}_{\ \alpha} \partial_\delta \partial_\beta h_\chi^{\ \delta} -$
$3 a_1 \partial^{\chi} \partial_{\alpha} h^{\alpha\beta} \partial_{\delta} \partial_{\beta} h_{\chi}^{\delta} + 26 a_1 \partial^{\chi} \partial^{\beta} h^{\alpha}_{\alpha} \partial_{\delta} \partial_{\beta} h_{\chi}^{\delta} - 6 a_1 \partial_{\beta} \Gamma^{\alpha\beta\chi} \partial_{\delta} \partial_{\chi} h_{\alpha}^{\delta} -$
$43 a_1 \partial_{\alpha} \partial^{\chi} h^{\alpha\beta} \partial_{\delta} \partial_{\chi} h_{\beta}^{\ \delta} + 6 a_1 \partial^{\chi} \Gamma^{\alpha}_{\ \alpha}{}^{\beta} \partial_{\delta} \partial_{\chi} h_{\beta}^{\ \delta} + 74 a_1 \partial^{\chi} \Gamma^{\alpha\beta}_{\ \alpha} \partial_{\delta} \partial_{\chi} h_{\beta}^{\ \delta} +$
$77 a_1 \partial^{\chi} \partial_{\alpha} h^{\alpha\beta} \partial_{\delta} \partial_{\chi} h_{\beta}^{\delta} - 58 a_1 \partial^{\chi} \partial^{\beta} h^{\alpha}_{\alpha} \partial_{\delta} \partial_{\chi} h_{\beta}^{\delta} + 8 a_1 \partial_{\beta} \Gamma^{\alpha}_{\alpha}{}^{\beta} \partial_{\delta} \partial_{\chi} h^{\chi\delta} -$
$8a_1\partial_{\beta}\Gamma^{\alpha\beta}_{ \alpha}\partial_{\delta}\partial_{\chi}h^{\chi\delta} - 4a_1\partial_{\beta}\partial_{\alpha}h^{\alpha\beta}\partial_{\delta}\partial_{\chi}h^{\chi\delta} + 8a_1\partial_{\beta}\partial^{\beta}h^{\alpha}_{ \alpha}\partial_{\delta}\partial_{\chi}h^{\chi\delta} +$
$74a_1\partial_\chi\Gamma^{\alpha\beta\chi}\partial_\delta\partial^\delta h_{\alpha\beta} + 17a_1\partial_\chi\partial^\chi h^{\alpha\beta}\partial_\delta\partial^\delta h_{\alpha\beta} + 6a_1\partial_\beta\Gamma^{\alpha\beta\chi}\partial_\delta\partial^\delta h_{\alpha\chi} +$
$2 a_1 \partial_{\alpha} \partial^{\chi} h^{\alpha\beta} \partial_{\delta} \partial^{\delta} h_{\beta\chi} - 6 a_1 \partial^{\chi} \Gamma^{\alpha}_{\alpha}{}^{\beta} \partial_{\delta} \partial^{\delta} h_{\beta\chi} - 74 a_1 \partial^{\chi} \Gamma^{\alpha\beta}_{\alpha} \partial_{\delta} \partial^{\delta} h_{\beta\chi} -$
$73 a_1 \partial^{\chi} \partial_{\alpha} h^{\alpha\beta} \partial_{\delta} \partial^{\delta} h_{\beta\chi} + 34 a_1 \partial^{\chi} \partial^{\beta} h^{\alpha}_{\alpha} \partial_{\delta} \partial^{\delta} h_{\beta\chi} - 8 a_1 \partial_{\beta} \Gamma^{\alpha}_{\alpha}{}^{\beta} \partial_{\delta} \partial^{\delta} h^{\chi}_{\chi} +$
$8 a_1 \partial_{\beta} \Gamma^{\alpha\beta}_{ \alpha} \partial_{\delta} \partial^{\delta} h^{\chi}_{ \chi} - 4 a_1 \partial_{\beta} \partial^{\beta} h^{\alpha}_{ \alpha} \partial_{\delta} \partial^{\delta} h^{\chi}_{ \chi} + 4 a_1 \partial_{\alpha} \Gamma_{\beta \chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} +$
$8 a_1 \partial_{\alpha} \Gamma_{\beta \delta \chi} \partial^{\delta} \Gamma^{\alpha \beta \chi} + 8 a_1 \partial_{\alpha} \Gamma_{\chi \beta \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} + 4 a_1 \partial_{\alpha} \Gamma_{\chi \delta \beta} \partial^{\delta} \Gamma^{\alpha \beta \chi} +$
$8 a_1 \partial_{\alpha} \Gamma_{\delta\beta\chi} \partial^{\delta} \Gamma^{\alpha\beta\chi} + 8 a_1 \partial_{\alpha} \Gamma_{\delta\chi\beta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - 4 a_1 \partial_{\beta} \Gamma_{\alpha\chi\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} -$
$4 a_1 \partial_{\beta} \Gamma_{\alpha \delta \chi} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 4 a_1 \partial_{\beta} \Gamma_{\chi \delta \alpha} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 12 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \lambda \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \lambda \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \lambda \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \lambda \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \lambda \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \lambda \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \lambda \chi} - 2 a_1 \partial_{\beta} \partial_{\alpha} h_{\chi \delta} \partial^{\delta} \Gamma^{\alpha \lambda \chi} - 2 a_1 \partial_{\beta} \partial^{\delta} \Gamma^{\alpha \lambda $
$4 a_1 \partial_{\chi} \Gamma_{\alpha\beta\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} - 4 a_1 \partial_{\chi} \Gamma_{\beta\alpha\delta} \partial^{\delta} \Gamma^{\alpha\beta\chi} + 8 a_1 \partial_{\chi} \Gamma_{\beta\delta\alpha} \partial^{\delta} \Gamma^{\alpha\beta\chi} +$
$12 a_1 \partial_{\chi} \partial_{\alpha} h_{\beta \delta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 8 a_1 \partial_{\delta} \Gamma_{\alpha \beta \chi} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 8 a_1 \partial_{\delta} \Gamma_{\alpha \chi \beta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 4 a_1 \partial_{\delta} \Gamma_{\beta \chi \alpha} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 4 a_1 \partial_{\delta} \Gamma_{\beta \chi \alpha} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 4 a_1 \partial_{\delta} \Gamma_{\chi \beta \alpha} \partial^{\delta} \Gamma^{\alpha \beta \chi} +$
$12 a_1 \partial_{\delta} \partial_{\beta} h_{\alpha \chi} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 12 a_1 \partial_{\delta} \partial_{\chi} h_{\alpha \beta} \partial^{\delta} \Gamma^{\alpha \beta \chi} - 44 a_1 \partial_{\beta} \Gamma_{\delta \alpha}^{\ \beta} \partial^{\delta} \Gamma^{\alpha \chi}_{\ \chi} -$
$4a_1 \partial^{\alpha} \Gamma_{\delta\alpha}^{\beta} \partial^{\delta} \Gamma_{\beta}^{\lambda} + 4a_1 \partial_{\beta} \Gamma_{\delta\alpha}^{\beta} \partial^{\delta} \Gamma^{\lambda\alpha}_{\lambda} - 6a_1 \partial_{\beta} \partial_{\alpha} h_{\lambda\delta} \partial^{\delta} \partial^{\lambda} h^{\alpha\beta} +$
$12 a_1 \partial_{\chi} \partial_{\beta} h_{\alpha\delta} \partial^{\delta} \partial^{\chi} h^{\alpha\beta} - 6 a_1 \partial_{\delta} \partial_{\chi} h_{\alpha\beta} \partial^{\delta} \partial^{\chi} h^{\alpha\beta}))[t, x, y, z] dz dy dx dt$
-2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2

													$\Delta_3^{\#1}$									
${\mathcal T}_{1^-}^{\#_1}{}_{lpha}$	0	0	0	0	0	0	0	0	0	0	Δ ₃ -1 †	αβχ	$\frac{2}{a_0+7}$	$a_1 k^2$,
$\Delta_{1^{-}\alpha}^{\#^{o}}$	0	0	0	0	$50 \sqrt{\frac{2}{3}} a_1 k^2$ $a_0^2 - 33 a_0 a_1 k^2$	$-\frac{a_0-28a_1k^2}{6a_0^2-198a_0a_1k^2}$	$-\frac{\sqrt{5}}{6(a_0-33a_1k^2)}$	$\frac{7(a_0+2a_1k^2)}{3\sqrt{2}a_0(a_0-33a_1k^2)}$	$\frac{5}{3(a_0-33a_1k^2)}$	0	h_{1}^{*1} α $+\frac{1}{\alpha}$	_	Γ ₃	αβχ		0	0	0	0	0	0	Λ#1 Λ#2
$\Delta_{1^{-}\alpha}^{\#\mathtt{o}}$	0	0	0	0	$\frac{10a_1k^2(-11a_0+118a_1k^2)}{\sqrt{3}a_0^2(a_0-33a_1k^2)}$	$\frac{a_0^2 - 118 a_0 a_1 k^2 + 2560 a_1^2 k^4}{6 \sqrt{2} a_0^2 (a_0 - 33 a_1 k^2)}$	$-\frac{\sqrt{\frac{5}{2}} (a_0-82a_1 k^2)}{6a_0 (a_0-33a_1 k^2)}$	$\frac{17a_0^2 - 236a_0 a_1 k^2 + 1280 a_1^2 k^4}{6a_0^2 (a_0 - 33 a_1 k^2)} - \frac{1}{6a_0^2 (a_0 - 33 a_1 k^2)}$	$-\frac{7(a_0+2a_1k^2)}{3\sqrt{2}a_0(a_0-33a_1k^2)}$	0	$\Gamma_{1}^{\#6}$ Λ	0	0	0	$-\frac{5a_1k^2}{\sqrt{3}}$	0	$\frac{1}{6} (-a_0 + 20 a_1 k^2)$	$^{2}) \begin{vmatrix} -\frac{1}{6} & \sqrt{5} & (a_{0} - 5 a_{1} k^{2}) \end{vmatrix}$	$\frac{a_0 + 40 a_1 k^2}{6 \sqrt{2}}$	$\frac{5}{12}(a_0-17a_1k^2)$	0	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
$\Delta_{1^{-}\alpha}^{\#4}$	0	0	0	0	$-\frac{5\sqrt{\frac{10}{3}}a_1k^2}{a_0^2-33a_0a_1k^2}$	ا ا	$\frac{1}{12 a_0 - 396 a_1 k^2}$	$-\frac{\sqrt{\frac{5}{2}} (a_0-82 a_1 k^2)}{6 a_0 (a_0-33 a_1 k^2)} $	$-\frac{\sqrt{5}}{6(a_0-33a_1k^2)}$	0	$\Gamma_1^{\#5}$	0	0	0	$5\sqrt{\frac{3}{2}}a_1k^2$	0	$-\frac{a_0}{6\sqrt{2}}$	$-\frac{1}{6}\sqrt{\frac{5}{2}}\left(a_0+16a_1k^2\right)$	3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	$\frac{a_0+40a_1k^2}{6\sqrt{2}}$	0	Λ_{i+1}^{*1} Λ_{i+2}^{*2}
$\Delta_1^{\# 5} \alpha$	0	0	0	0	$\frac{\sqrt{\frac{2}{3}} a_1 k^2 (7 a_0 - 236 a_1 k^2)}{a_0^2 (a_0 - 33 a_1 k^2)}$	$\frac{-19a_0^2 + 472a_0a_1k^2 + 5120a_1^2k^4}{12a_0^2(a_0 - 33a_1k^2)}$	$\sqrt{5} (5 a_0 - 164 a_1 k^2)$ $12 a_0 (a_0 - 33 a_1 k^2)$	$-\frac{a_0^2 - 118 a_0 a_1 k^2 + 2560 a_1^2 k^4}{6 \sqrt{2} a_0^2 (a_0 - 33 a_1 k^2)}$	$-\frac{a_0-28a_1k^2}{6a_0^2-198a_0a_1k^2}$	0	$\Gamma_{1}^{\#4}{}_{\alpha}$	0	0	0	$-\frac{5}{2}\sqrt{\frac{5}{3}}a_1k^2$	0	$\frac{1}{6}\sqrt{5}(a_0-8a_1k^2)$	$\frac{1}{3} (a_0 + 7 a_1 k^2)$	$-\frac{1}{6}\sqrt{\frac{5}{2}}(a_0+16a_1k^2)$	$-\frac{1}{6}\sqrt{5}(a_0-5a_1k^2)$	0	
$\Delta_{1}^{\#2}{}_{lpha}$	0	0	0	$\frac{2\sqrt{2}}{a_0}$	$\frac{2(a_0^2 - 30 a_0 a_1 k^2 + 401 a_1^2 k^4)}{a_0^2 (a_0 - 33 a_1 k^2)} = \frac{5}{a_0^2 (a_0 - 33 a_1 k^2)}$	$5\sqrt{\frac{2}{3}}a_1k^2(7a_0-236a_1k^2) \frac{-19a_0}{a_0^2(a_0-33a_1k^2)}$	$5\sqrt{\frac{10}{3}}a_1k^2$ $a_0^2-33a_0a_1k^2$	$\frac{1}{2}$	$50 \sqrt{\frac{2}{3}} a_1 k^2$ $a_0^2 - 33 a_0 a_1 k^2$	0	$\Gamma_{1}^{\#3}{}_{\alpha}$	0	0	0	$\frac{5}{2}\sqrt{3}a_1k^2$	0	- <u>40</u> 3	$\frac{1}{6}\sqrt{5}(a_0-8a_1k^2)$	$-\frac{a_0}{6\sqrt{2}}$	$\frac{1}{6} (-a_0 + 20 a_1 k^2)$	0	
					$a_0^2 (a_0^2)$	$\frac{2}{3} a_1 k^2$ $a_0^2 (a_0)$	$\frac{5}{a_0^2-3}$	$\frac{a_1 k^2 (-1)}{\sqrt{3} a_0^2 (}$	50 1 a 0 2 - 3		$\Gamma_{1^{-}\alpha}^{\#2}$	0	0	0	$\frac{a_0}{2\sqrt{2}}$	0	0	0	0	0	0	L
$\Delta_{1^{^-}\alpha}^{\#_1}$	0	2 0	0	0	$\frac{2\sqrt{2}}{a_0} \frac{2(a_0)}{a_0}$	0	0	0 10	0	0	$\lceil r_1^{\#1}_{\alpha}$	0	0	0	$\frac{1}{4} (-a_0 - 3 a_1 k^2)$	$\frac{a_0}{2\sqrt{2}}$	$\frac{5}{2}\sqrt{3}a_1k^2$	$-\frac{5}{2}\sqrt{\frac{5}{3}}a_1k^2$	$5\sqrt{\frac{3}{2}}a_1k^2$	$-\frac{5a_1k^2}{\sqrt{3}}$	0	7
$\Delta_1^{\#_2} + \alpha \beta$	0	$\frac{4}{a_0^{2-29}a_0a_1k^2}$	$\frac{4}{a_0 \cdot 29 a_1 k^2}$	0	0	0	0	0	0	0	$\Gamma_{1}^{\#3}$	$5 a_1 k^2$	0	$-29a_1k^2$	0	0	0	0	0	0	0	1
$\alpha \beta$	0	$k^{2}-35a_{1}^{2}k'$ $9a_{1}k^{2}$	$\frac{a_1 k^2}{0 a_1 k^2}$										0	$\frac{1}{4}(a_0)$	0	0		0	0	0		Г
$\Delta_1^{"\frac{2}{4}} \alpha \beta$	$-\frac{2\sqrt{2}}{a_0}$	$\frac{2(a_0^2-14a_0a_1k^2-35a_1^2k^4)}{a_0^2(a_0-29a_1k^2)}$	$\frac{40\sqrt{2}a_1k^2}{a_0^2-29a_0a_1k^2}$	0	0	0	0	0	0	0			3	0)	0))		0	Г
$\Delta_1^{\#_+^\pm} \alpha eta$	0	$\frac{2\sqrt{2}}{a_0} \frac{2(a_0)}{a_0}$	0	0	0	0	0	0	0	0	$\Gamma_{1}^{\#1}{}_{\alpha\beta}$	$(-a_0 - 15 a_1 k^2)$	$-\frac{a_0}{2\sqrt{2}}$	$5a_1k^2$	0	0	0	0	0	0	0	ſ
7	$\Delta_1^{#1} +^{lpha eta}$	$\Delta_1^{#2} + \alpha \beta$	$\Delta_{1}^{#3} + ^{\alpha \beta}$	$\Delta_{1^-}^{\#1} +^\alpha$	$\Delta_{1}^{#2} + \alpha$	$\Delta_{1}^{#3} + ^{\alpha}$	$\Delta_{1}^{#4} + ^{\alpha}$	$\Delta_{1}^{#5} + ^{\alpha}$	$\Delta_{1}^{\#6} +^{lpha}$	$\mathcal{T}_{1}^{\#1} +^{lpha}$		$\Gamma_1^{\#1} + \alpha \beta \frac{1}{4}$	$\Gamma_1^{\#2} + \alpha \beta$	$\Gamma_1^{#3} + ^{\alpha\beta}$	$\Gamma_1^{\#1} + ^{\alpha}$	$\Gamma_1^{#2} + \alpha$	$\Gamma_1^{#3} + \alpha$	$\Gamma_1^{\#4} + ^{\alpha}$	$\Gamma_1^{\#5} + ^{\alpha}$	$\Gamma_1^{\#6} + \alpha$	$h_1^{\#1} + \alpha$	/ / !

$\Delta_{2}^{#2} \alpha \beta \chi$	0	0	0		>	0	$\frac{4}{a_0-5a_1k^2}$																
$\Delta_{2}^{#1} \alpha \beta \chi$	0	0		0 0		$\frac{4}{a_0 - a_1 k^2}$																	
$\mathcal{T}_{2}^{\#1}$	$-\frac{44i \sqrt{2} u_1 \kappa}{a_0^2}$	a_0^2 $-\frac{80ia_1k}{\sqrt{3}a_0^2}$ $80i\sqrt{\frac{2}{3}a_1k}$ a_0^2 $8(a_0+11a_1k^2)$ $a_0^2k^2$		$a_0^2 k^2$	0	0	0		cities								αβχ						
$\Delta_{2}^{\#3} + \alpha \beta$	$\sqrt{3} a_0^2$	$\frac{2\sqrt{2}a_1k^2}{3a_0^2}$	$4(3a_0-a_1k^2)$	$80 i \sqrt{\frac{2}{3}} a_1 k$	a ₀ ²	0	0	Jrs	ors	Multiplicities	1	1	т	3	8			$\Gamma_{2}^{#2}$	0	0	0	0	²) 0
$\Delta_2^{#2} + \alpha \beta$	$\sqrt{\frac{3}{3}} a_1 x$	- ¹ -	$\sqrt{2} \frac{a_1 k^2}{3a_0^2}$			0	0		ge generat					$+ \Delta_{1}^{\#3\alpha} == 0$				$\Gamma_{2}^{\#1}$	0	0	0	0	$\frac{1}{4} (a_0 - a_1 k^2)$
$\Delta_{2}^{\#1}\alpha\beta$	$\frac{4(a_0-11a_1\kappa^{-})}{a_0^2}$	$-\alpha\beta = \frac{40\sqrt{\frac{2}{3}}a_1k^2}{a_0^2} = \frac{2(3)}{2}$	$ \alpha\beta = \frac{80a_1k^2}{\sqrt{3}a_0^2} = \frac{2}{2}$		a ₀ ²	0 X	0		Source constraints/gauge generators	irreps	0	$2 \Delta_{0^{+}}^{#4} + 3 \Delta_{0^{+}}^{#2} == 0$	0 ==	$^{\prime}+\Delta_{1}^{\#4}\alpha+2\Delta_{1}^{\#5}\alpha$	constraints:			$h_{2}^{\#1}$	$-\frac{11ia_1k_3^2}{4\sqrt{2}}$	$\frac{5ia_1k^3}{\sqrt{3}}$	$-\frac{5ia_1k^3}{\sqrt{6}}$	$\frac{1}{8}k^2(a_0-11a_1k^2)$	0
:	$\Delta_{2}^{\#1} + ^{\alpha\beta}$	$ \begin{array}{ccccccccccccccccccccccccccccccccc$		$\Delta_{2}^{#3} + ^{6}$ $\Delta_{2}^{0} + ^{6}$ $\Delta_{2}^{+1} + ^{6}$		$ \Delta_{2}^{\#1} + \alpha \beta \chi $ $ \Delta_{2}^{\oplus} + \omega $ $ \Delta_{2}^{\#2} + \alpha \beta \chi $			Source constraints $SO(3)$ irreps $T_0^{\#2} = 0$		$\Delta_{0}^{#3} + 7$	$\mathcal{T}_{0+}^{\#1}$		Total		#1	$\Gamma^{\#3}_{2^+\alpha\beta}$	$\frac{5a_1k^2}{\sqrt{3}}$	$\frac{a_1 k^2}{6 \sqrt{2}}$	$(3 a_0 + a_1 k^2)$	$\frac{5ia_1k^3}{\sqrt{6}}$	0	
Λ#1 +	$\Delta_{0}^{\#1} + \frac{2(a_0 + 25a_1 k^2)}{a_0^2}$		10			$\frac{\Delta_0^+}{10\sqrt{\frac{2}{3}}a_1k}$		_k 2				_ 5			0		#1 0 ⁻			·	$\frac{1}{12}$ (3		
Δ_{0}^{+} †		$\frac{a_0^2}{\frac{10\sqrt{6} a_1 k^2}{a_0^2}}$		$-\frac{3(a_0+23a_1k^2)}{4a_0^2}$		a_0^2						$\frac{50 i \sqrt{2} a_1 k}{a_0^2}$ $\frac{20 i \sqrt{3} a_1 k}{a_0^2}$		0		0	Γ#2 2 ⁺ αβ	$\sqrt{\frac{2}{3}} a_1 k^2$	$\frac{1}{6} \left(-3 a_0 + a_1 k^2 \right)$	$\frac{a_1 k^2}{6 \sqrt{2}}$	$\frac{5ia_1k^3}{\sqrt{3}}$	0	
Δ ₀ ^{#3} †		$-\frac{10\sqrt{\frac{2}{3}}a_1k^2}{a_0^2}$		$\frac{5a_0 + 23a_1 k^2}{4a_0^2}$. k ²	$\left -\frac{3a_0 + 23a_1 k^2}{6\sqrt{2}a_0^2} \right $		+	$-\frac{20ia_1k}{\sqrt{3}a_0^2}$		0	0			-5	$\frac{1}{6}$ (-3 a)	i	5		
Δ ₀ ^{#4} †	:	$-\frac{20 a_1 k^2}{\sqrt{3} a_0^2}$		$-\frac{a_0-23a_1k^2}{2\sqrt{2}a_0^2}$		$-\frac{3a_0+23a_1k}{6\sqrt{2}a_0^2}$			$\frac{k^2}{6a_0^2} \frac{3a_0-23a_1k^2}{6a_0^2}$		20	$\frac{20i\sqrt{\frac{2}{3}}a_1k}{a_0^2}$		0	(0		$\frac{1}{4} \left(a_0 + 11 a_1 k^2 \right)$	$-5\sqrt{\frac{2}{3}}a_1k^2$	$\frac{5a_1k^2}{\sqrt{3}}$	$\frac{11ia_1k^3}{4\sqrt{2}}$	0	
${\cal T}_0^{\#1}\dagger$	50	$\frac{50i\sqrt{2}a_1k}{a_0^2}$		$-\frac{20i\sqrt{3}a_1k}{a_0^2}$		$\frac{20 i a_1 k}{\sqrt{3} a_0^2}$			$\frac{20i\sqrt{\frac{2}{3}}a_1k}{a_0^2}$		$\frac{4(a_0-25a_0)^2 k^2}{a_0^2 k^2}$		1 k ²)	0	0 0		$\Gamma_{2}^{\#1}$	$\frac{1}{4}(a_0 +$					
${\cal T}_0^{\#2}\dagger$				0		0			0		0			0				$\Gamma_{2}^{#1} + \alpha \beta$	$\Gamma_{2}^{#2} + \alpha \beta$	$\Gamma_{2}^{#3} + \alpha \beta$	$h_{2}^{#1} + \alpha \beta$	$\Gamma_{2}^{#1} + ^{\alpha\beta\chi}$	
$\Delta_0^{\#1}$ †		0	0 0			0			0			0		0	$-{a_0}$	$\frac{2}{a_1 k^2}$		L #1	L #2	L #3	$h_2^{#1}$	$\Gamma_{2}^{#1}$	
Γ ₀ ^{#1}				Γ ₀ ^{#2}		Γ ₀ ^{#3}			Γ ₀ ^{#4}					#1 0 ⁺		$h_{0}^{\#2}$	Γ ₀ [#] -1		_				
$\Gamma_{0}^{#1}$ †	$\frac{1}{2}(-a_0+25a_1)$			k^2) 0 10		$0\sqrt{\frac{2}{3}}a_1k^2$			$-\frac{10 a_1 k^2}{\sqrt{3}}$			- 25 i		$\frac{a_1 k^3}{\sqrt{2}}$		0		0					
Γ ₀ ^{#2} †		0		0		<u>a₀</u> 2			$-\frac{a_0}{2\sqrt{2}}$					C			0		0				
Γ ₀ ^{#3} †		$\sqrt{\frac{2}{3}} \ a_1$				$\frac{23a_1k^2}{3}$			$-\frac{3 a_0 + 46 a_1 k^2}{6 \sqrt{2}}$					- 10 i	$\frac{a_1 k^3}{\sqrt{3}}$	$\frac{k_1 k^3}{3}$			0				
Γ ₀ ^{#4} †		$-\frac{10a_1k^2}{\sqrt{3}}$		$-\frac{a_0}{2\sqrt{2}} - \frac{3a}{2\sqrt{2}}$		$\frac{3a_0 + 46a_1 k^2}{6\sqrt{2}} \frac{1}{6}$		$\frac{1}{6}$ (3 a_0 + 23 a_1 k^2			k ²)	$5 i \sqrt{\frac{2}{3}} a_1 k^3$,3	0		0					
$h_{0}^{#1}$ †		$\frac{25 i a_1 k^3}{2 \sqrt{2}}$							$-5 i \sqrt{\frac{2}{3}} a_1 k^3$			3	$\frac{1}{4}k^2$	(a ₀ +	25 a	$25 a_1 k^2) 0$		0					
$h_{0}^{\#2} \dagger$		0		0			0			0			0				0		0				
Γ ₀ ^{#1} †		0		0		0		0				0				0	$\frac{1}{2}$ (- a_0	$+a_1k^2$)				

Massive and massless spectra

** MassiveAnalysisOfSector...Null

Unitarity conditions