Particle spectrograph

Wave operator and propagator

					$\Gamma_{2}^{\#2}_{\alpha\beta}$	$\Gamma_{2}^{\#3}_{\alpha\beta}$	$h_{2}^{\#1}_{\alpha\beta}$	$\Gamma_{2}^{\#1}_{\alpha\beta\chi}$	$\Gamma_{2}^{\#2}\alpha\beta\chi$
			$\Gamma_{2}^{#1} \dagger^{\alpha\beta}$		0	0	$\frac{i a_0 k}{4 \sqrt{2}}$	0	0
$\Gamma_{2}^{#2}$ † lphaeta				0	$-\frac{a_0}{2}$	0	$\frac{i a_0 k}{4 \sqrt{3}}$	0	0
			$\Gamma_2^{#3} \dagger^{\alpha\beta}$	0	0	<u>a₀</u> 4	$-\frac{i a_0 k}{4 \sqrt{6}}$	0	0
	0	$-\frac{2}{a_0}$	$h_{2}^{\#1} \dagger^{\alpha\beta}$. , –	$-\frac{i a_0 k}{4 \sqrt{3}}$	$\frac{i a_0 k}{4 \sqrt{6}}$	0	0	0
V 0 77 0	$\frac{36k^2}{0(16+3k^2)^2}$		$\Gamma_2^{\#1} \dagger^{\alpha\beta\chi}$	0	0	0	0	<u>a₀</u> 4	0
, + 0 +	36) (16-	0	$\Gamma_{2}^{#2} + \alpha \beta \chi$	0	0	0	0	0	$\frac{a_0}{4}$

 $\frac{4i\sqrt{2}k(10+3k^2)}{a_0(16+3k^2)^2}$

 $\frac{32(13+3k^2)}{3a_0(16+3k^2)^2}$

 $\Delta_{0}^{#2}$ †

 $\Delta_{0}^{#3}$ †

 $\mathcal{T}_{0}^{\#2}$ †

Source constraints/gauge generators	
SO(3) irreps	Multiplicities
$2\mathcal{T}_{0+}^{\#2} - \bar{l}k\Delta_{0+}^{\#2} == 0$	1
$\Delta_{0^{+}}^{\#3} + 2 \Delta_{0^{+}}^{\#4} + 3 \Delta_{0^{+}}^{\#2} == 0$	1
$6 \mathcal{T}_{1}^{\#1\alpha} - i k (3 \Delta_{1}^{\#2\alpha} - \Delta_{1}^{\#5\alpha} + \Delta_{1}^{\#3\alpha}) == 0$	3
$2 \Delta_{1}^{\#6\alpha} + \Delta_{1}^{\#4\alpha} + 2 \Delta_{1}^{\#5\alpha} + \Delta_{1}^{\#3\alpha} == 0$	3
Total constraints:	8

Quadratic (free) action

 $S == \iiint (\frac{1}{4})^{\frac{1}{4}}$

		$\dagger^{\alpha\beta}$		$+^{\alpha}$	+α	3 + α	+ ₄	; + _α	$\Gamma_{1}^{\#6}+^{lpha}$	
$\Gamma_1^{\#1}_+ \alpha \beta$	$-\frac{a_0}{4}$	$-\frac{a_0}{2\sqrt{2}}$	0	0	0	0	0	0	0	0
$\Gamma_{1}^{\#1}$ $\Gamma_{3}^{\#2}$ $\Gamma_{1}^{\#3}$	$-\frac{a_0}{2\sqrt{2}}$	0	0	0	0	0	0	0	0	0
$\Gamma_{1}^{\#3}$	0	0	<u>a0</u> 4	0	0	0	0	0	0	0
$\Gamma_{1^{-}}^{\#1}{}_{\alpha}$	0	0	0	$-\frac{a_0}{4}$	$\frac{a_0}{2\sqrt{2}}$	0	0	0	0	$\frac{i a_0 k}{4 \sqrt{2}}$
$\Gamma_{1^-}^{\#2}$	0	0	0	$\frac{a_0}{2\sqrt{2}}$	0	0	0	0	0	0
$\Gamma_{1^{-}\alpha}^{\#3}$	0	0	0	0	0	- <u>a0</u>	$\frac{\sqrt{5} a_0}{6}$	$-\frac{a_0}{6\sqrt{2}}$	$\frac{9}{60}$	$-\frac{ia_0k}{4\sqrt{6}}$
$\Gamma_1^{\#4}$	0	0	0	0	0	$\frac{\sqrt{5} a_0}{6}$	<u>a0</u> 3	$-\frac{1}{6}\sqrt{\frac{5}{2}}a_0$	$-\frac{\sqrt{5} a_0}{6}$	$\frac{1}{4}\overline{i}\sqrt{\frac{5}{6}}a_0k$
$\Gamma_1^{\#5}$	0	0	0	0	0	$-\frac{a_0}{6\sqrt{2}}$	$-\frac{1}{6}\sqrt{\frac{5}{2}}a_0$	3 3	$\frac{a_0}{6\sqrt{2}}$	$-\frac{i a_0 k}{4 \sqrt{3}}$
$\Gamma_{1}^{\#6}$	0	0	0	0	0	9 - <u>0</u> 0	$-\frac{\sqrt{5} a_0}{6}$	$\frac{a_0}{6\sqrt{2}}$	$\frac{5a_0}{12}$	$-\frac{i a_0 k}{4 \sqrt{6}}$
$h_{1^{-}\alpha}^{\#1}$	0	0	0	$-\frac{ia_0k}{4\sqrt{2}}$	0	$\frac{i a_0 k}{4 \sqrt{6}}$	$-\frac{1}{4}\bar{l}\sqrt{\frac{5}{6}}a_0k$	$\frac{i a_0 k}{4 \sqrt{3}}$	$\frac{i a_0 k}{4 \sqrt{6}}$	0

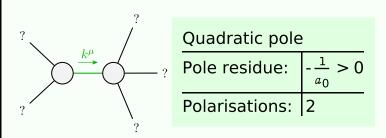
$\Gamma_{0^{\text{-}}}^{\#1}$	0	0	0	0	0	0	$-\frac{a_0}{2}$
$h_0^{#2}$	0	0	$-\frac{1}{4}ia_0k$	$\frac{i a_0 k}{4 \sqrt{2}}$	0	0	0
$h_{0}^{\#1}$	$-\frac{i a_0 k}{2 \sqrt{2}}$	0	$\frac{i a_0 k}{4 \sqrt{3}}$	$-\frac{i a_0 k}{4 \sqrt{6}}$	0	0	0
Γ#4 0+	0	$-\frac{a_0}{2\sqrt{2}}$	$-\frac{a_0}{2\sqrt{2}}$	$\frac{a_0}{2}$	$\frac{i a_0 k}{4 \sqrt{6}}$	$-\frac{i a_0 k}{4 \sqrt{2}}$	0
Γ#3 0+	0	$\frac{a_0}{2}$	0	$-\frac{a_0}{2\sqrt{2}}$	$-\frac{ia_0k}{4\sqrt{3}}$	$\frac{i a_0 k}{4}$	0
Γ#2 0+	0	0	<u>a0</u>	$-\frac{a_0}{2\sqrt{2}}$	0	0	0
$\Gamma_0^{\#1}$	$-\frac{a_0}{2}$	0	0	0	$\frac{i a_0 k}{2 \sqrt{2}}$	0	0
	$\Gamma_0^{\#1}$ \dagger	Γ#2 †	Γ ₀ + +	Γ#4 †	$h_{0}^{\#1}$ †	$h_0^{#2} +$	$\Gamma_{0}^{\#1}$ \dagger

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

 $a_0 h_{\chi}^{\chi} \partial_{\beta} \Gamma_{\alpha}^{\alpha\beta} - 2 a_0 h_{\alpha\chi} \partial_{\beta} \Gamma_{\alpha}^{\alpha\beta\chi} + 2 a_0 h_{\beta\chi} \partial^{\chi} \Gamma_{\alpha}^{\alpha\beta}))[t, x, y, z] dz dy dx dt$

	$\Delta_{2^{+}\alpha\beta}^{\#1}$	$\Delta_{2^{+}\alpha\beta}^{\#2}$	$\Delta_{2}^{\#3}_{\alpha\beta}$	${\mathcal T}_{2}^{\#1}{}_{lphaeta}$	$\Delta_{2}^{\#1}{}_{\alpha\beta\chi}$	$\Delta_{2}^{#2} \alpha \beta \chi$
$\Delta_{2}^{\#1}\dagger^{lphaeta}$	0	$\frac{2\sqrt{\frac{2}{3}}}{a_0}$	$\frac{4}{\sqrt{3} a_0}$	$\frac{4i\sqrt{2}}{a_0k}$	0	0
$\Delta_{2}^{\#2}$ † lphaeta	$\frac{2\sqrt{\frac{2}{3}}}{a_0}$	$-\frac{8}{3a_0}$	$-\frac{2\sqrt{2}}{3a_0}$	$-\frac{4i}{\sqrt{3} a_0 k}$	0	0
$\Delta_{2}^{#3}$ † $^{\alpha\beta}$	$\frac{4}{\sqrt{3} a_0}$	$-\frac{2\sqrt{2}}{3a_0}$	8 3 a ₀	$-\frac{4\bar{i}\sqrt{\frac{2}{3}}}{a_0k}$	0	0
${\mathcal T}_2^{\sharp 1}\dagger^{lphaeta}$	$-\frac{4i\sqrt{2}}{a_0k}$	$\frac{4i}{\sqrt{3} a_0 k}$	$\frac{4i\sqrt{\frac{2}{3}}}{a_0k}$	$-\frac{8}{a_0 k^2}$	0	0
$\Delta_2^{#1} \dagger^{lphaeta\chi}$	0	0	0	0	$\frac{4}{a_0}$	0
$\Delta_2^{\#2} \dagger^{\alpha\beta\chi}$	0	0	0	0	0	$\frac{4}{a_0}$

Massive and massless spectra



(No massive particles)

Unitarity conditions