

$$\begin{aligned} \mathbb{S} = & \iiint \left(\frac{1}{6} (-3\alpha_0 \mathcal{A}^{ab} \mathcal{A}_{\beta\gamma}^X + 4\beta_1 \mathcal{A}^{ab} \mathcal{A}_{\beta\gamma}^X - 4\beta_2 \mathcal{A}^{ab} \mathcal{A}_{\beta\gamma}^X + 6 \mathcal{A}^{abX} \alpha_{ab\beta\gamma} + 6 f^{ab} \tau(\Delta) \mathcal{A}_{ab} - 6\alpha_0 f^{ab} \partial_a \mathcal{A}_{\beta\gamma}^X + 6\alpha_0 \partial_a \mathcal{A}^{ab} - 8\beta_1 \mathcal{A}_{\alpha\gamma}^X \partial_{\beta} f^{ab} + 8\beta_2 \mathcal{A}_{\alpha\gamma}^X \partial_{\beta} f^{ab} + 8\beta_3 \mathcal{A}_{\beta\gamma}^X \partial^b f_{\alpha} - 8\beta_2 \mathcal{A}_{\alpha\gamma}^X \partial^b f_{\alpha} - 4\beta_1 \partial_{\beta} f_{\alpha}^X \partial^b f_{\alpha}^X + 4\beta_2 \partial_{\beta} f_{\alpha}^X \partial^b f_{\alpha}^X + 6\alpha_0 f^{ab} \partial_{\alpha} \mathcal{A}_{\beta\gamma}^X - 6\alpha_0 f_{\alpha} \partial_{\beta} \mathcal{A}^{ab} - \beta_1 \partial_{\beta} f^{ab} \partial_{\alpha} f_{\alpha}^X + 4\beta_2 \partial_{\beta} f^{ab} \partial_{\alpha} f_{\alpha}^X + 8\beta_3 \partial^b f_{\alpha} \partial_{\alpha} f_{\beta}^X - \right. \\ & 8\beta_2 \partial^b f_{\alpha} \partial_{\beta} f_{\alpha}^X + 6\alpha_1 \partial_{\beta} \mathcal{A}_{\alpha\gamma}^{\delta} \partial^{\delta} \mathcal{A}^{ab} - 6\alpha_2 \partial_{\beta} \mathcal{A}_{\alpha\gamma}^{\delta} \partial^{\delta} \mathcal{A}^{ab} - 6\alpha_3 \partial_{\beta} \mathcal{A}_{\alpha\gamma}^{\delta} \partial^{\delta} \mathcal{A}^{ab} + 6\alpha_4 \partial_{\beta} \mathcal{A}_{\alpha\gamma}^{\delta} \partial^{\delta} \mathcal{A}^{ab} + 6\alpha_5 \partial_{\beta} \mathcal{A}_{\alpha\gamma}^{\delta} \partial^{\delta} \mathcal{A}^{ab} + 6\alpha_6 \partial_{\beta} \mathcal{A}_{\alpha\gamma}^{\delta} \partial^{\delta} \mathcal{A}^{ab} - 6\alpha_4 \partial_{\beta} \mathcal{A}_{\alpha\gamma}^{\delta} \partial^{\delta} \mathcal{A}^{ab} - 6\alpha_5 \partial_{\beta} \mathcal{A}_{\alpha\gamma}^{\delta} \partial^{\delta} \mathcal{A}^{ab} + 8\beta_1 \mathcal{A}_{\beta\alpha\gamma} \partial^b f^{ab} + 16\beta_3 \mathcal{A}_{\beta\alpha\gamma} \partial^b f^{ab} - 8\beta_1 \partial_{\beta} f_{\alpha\gamma} \partial^b f^{ab} + \\ & 8\beta_3 \partial_{\beta} f_{\alpha\gamma} \partial^b f^{ab} - 8\beta_1 \partial_{\alpha\beta} f_{\gamma\delta} \partial^{\delta} f^{ab} - 4\beta_3 \partial_{\alpha\beta} f_{\gamma\delta} \partial^{\delta} f^{ab} + 4\beta_1 \partial_{\alpha\beta} f_{\gamma\delta} \partial^{\delta} f^{ab} - 4\beta_3 \partial_{\alpha\beta} f_{\gamma\delta} \partial^{\delta} f^{ab} + 8\beta_1 \partial_{\alpha\beta} f_{\gamma\delta} \partial^{\delta} f^{ab} + 4\beta_3 \partial_{\alpha\beta} f_{\gamma\delta} \partial^{\delta} f^{ab} + 4\beta_1 \partial_{\beta} f_{\alpha\gamma} \partial^b f^{ab} - 4\beta_3 \partial_{\beta} f_{\alpha\gamma} \partial^b f^{ab} + 4(\beta_1 + 2\beta_3) \mathcal{A}_{\beta\alpha\gamma} (\mathcal{A}^{abX} + 2\partial^b f^{ab}) + \mathcal{A}_{\alpha\beta\gamma} ((-3\alpha_0 + 4\beta_1 - 16\beta_3) \mathcal{A}^{abX} + 16(\beta_1 - \beta_3) \partial^b f^{ab}) + \\ & 6\alpha_1 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 6\alpha_2 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 6\alpha_3 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 6\alpha_4 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 12\alpha_1 \partial^a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 12\alpha_2 \partial^a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 12\alpha_4 \partial^a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 12\alpha_5 \partial^a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 6\alpha_1 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 6\alpha_2 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 6\alpha_3 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 6\alpha_4 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - \\ & 12\alpha_1 \partial^a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 12\alpha_2 \partial^a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 12\alpha_4 \partial^a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 12\alpha_5 \partial^a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 8\alpha_1 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 12\alpha_4 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 4\alpha_6 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 8\alpha_1 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 8\alpha_3 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 4\alpha_1 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 4\alpha_3 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - \\ & 8\alpha_1 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 12\alpha_2 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 4\alpha_3 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 4\alpha_1 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 6\alpha_2 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 2\alpha_3 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 4\alpha_1 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 6\alpha_2 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 2\alpha_3 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X + 4\alpha_1 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X - 4\alpha_3 \partial_a \mathcal{A}^{abX} \partial_{\beta} \mathcal{A}_{\gamma\delta}^X) [t, x, y, z] dy dx dt \end{aligned}$$

	$0^+ \mathcal{A}^\dagger$	$0^+ f^\dagger$	$0^+ f^\pm$	$0^+ \mathcal{A}^\dagger$								
$0^+ \mathcal{A}^\dagger \uparrow$	$\frac{\alpha_0}{2} + \beta_2 + (\alpha_4 + \alpha_6) k^2$	$\frac{i(\alpha_4 + 2\beta_2)k}{\sqrt{2}}$	0	0								
$0^+ f^\dagger \uparrow$	$\frac{i(\alpha_4 + 2\beta_2)k}{\sqrt{2}}$	$2\beta_2 k^2$	0	0								
$0^+ f^\pm \uparrow$	0	0	0	0								
$0^+ \mathcal{A}^\dagger \downarrow$	0	0	0	$\frac{\alpha_0}{2} + 4\beta_3 + (\alpha_2 + \alpha_3) k^2$	$1^+ \mathcal{A}^\dagger_{\alpha\beta}$	$1^+ \mathcal{A}^\pm_{\alpha\beta}$	$1^+ f^\dagger_{\alpha\beta}$	$1^+ \mathcal{A}^\dagger_\alpha$	$1^+ \mathcal{A}^\pm_\alpha$	$1^+ f^\dagger_\alpha$	$1^+ f^\pm_\alpha$	
$1^+ \mathcal{A}^\dagger \uparrow^{\alpha\beta}$	$\frac{\alpha_3}{4} + \frac{1}{3}(\beta_2 + 8\beta_3) + (\alpha_2 + \alpha_5) k^2$	$\frac{3\alpha_2 - 4\beta_1 + 16\beta_3}{6\sqrt{2}}$	$\frac{i(3\alpha_2 - 4\beta_1 + 16\beta_3)k}{6\sqrt{2}}$	0	0	0	0					
$1^+ \mathcal{A}^\pm \uparrow^{\alpha\beta}$	$\frac{3\alpha_2 - 4\beta_1 + 16\beta_3}{6\sqrt{2}}$	$\frac{2}{3}(\beta_1 + 2\beta_3)$	$\frac{2}{3}i(\beta_1 + 2\beta_3)k$	0	0	0	0					
$1^+ f^\dagger \uparrow^{\alpha\beta}$	$\frac{i(3\alpha_2 - 4\beta_1 + 16\beta_3)k}{6\sqrt{2}}$	$-\frac{2}{3}i(\beta_1 + 2\beta_3)k$	$\frac{2}{3}(\beta_1 + 2\beta_3)k^2$	0	0	0	0					
$1^+ \mathcal{A}^\dagger \uparrow^\alpha$	0	0	0	$\frac{\alpha_1}{4} + \frac{1}{3}(\beta_1 + 2\beta_2) + (\alpha_4 + \alpha_5) k^2$	$-\frac{3\alpha_2 - 4\beta_1 + 4\beta_2}{6\sqrt{2}}$	0	$\frac{1}{6}i(3\alpha_0 - 4\beta_1 + 4\beta_2)k$					
$1^+ \mathcal{A}^\pm \uparrow^\alpha$	0	0	0	$-\frac{3\alpha_2 - 4\beta_1 + 4\beta_2}{6\sqrt{2}}$	$\frac{1}{3}(2\beta_1 + \beta_2)$	0	$\frac{1}{3}i\sqrt{2}(2\beta_1 + \beta_2)k$					
$1^+ f^\dagger \uparrow^\alpha$	0	0	0	0	0	0	0					
$1^+ f^\pm \uparrow^\alpha$	0	0	0	$\frac{1}{6}i(3\alpha_0 - 4\beta_1 + 4\beta_2)k$	$-\frac{1}{3}i\sqrt{2}(2\beta_1 + \beta_2)k$	0	$\frac{2}{3}(2\beta_1 + \beta_2)k^2$	$2^+ \mathcal{A}^\dagger_{\alpha\beta}$	$2^+ f^\dagger_{\alpha\beta}$	$2^+ \mathcal{A}^\dagger_{\alpha\beta X}$		
								$2^+ \mathcal{A}^\dagger \uparrow^{\alpha\beta}$	$\frac{\alpha_0}{4} + \beta_1 + (\alpha_1 + \alpha_4) k^2$	$\frac{i(\alpha_2 - 4\beta_1)k}{2\sqrt{2}}$	0	
								$2^+ f^\dagger \uparrow^{\alpha\beta}$	$-\frac{i(\alpha_2 - 4\beta_1)k}{2\sqrt{2}}$	$2\beta_1 k^2$	0	
								$2^+ \mathcal{A}^\dagger \uparrow^{\alpha X}$	0	0	$-\frac{\alpha_0}{4} + \beta_1 + (\alpha_1 + \alpha_2) k^2$	

[illegible]

Spin-parity form	Covariant form	Multiplicities
$0^+ 1^+ = 0$	$\partial_\beta \partial_\alpha \tau (\Delta + \mathcal{K})^{\alpha\beta} = 0$	1
$0^+ 1^- = 0$	$\partial_\beta \partial_\alpha \tau (\Delta + \mathcal{K})^{\alpha\beta} = 0$	1
$2 \text{ i } k \cdot 1^+ \sigma^a + 1^+ 1^+{}^a = 0$	$\partial_\alpha \partial_\beta \partial^\alpha \tau (\Delta + \mathcal{K})^{\beta\gamma} = \partial_\alpha \partial^\alpha \partial_\beta \tau (\Delta + \mathcal{K})^{\alpha\beta} + 2 \partial_\alpha \partial^\beta \partial_\gamma \partial_\sigma \sigma^{\beta\alpha\gamma}$	3
$1^+ 1^+{}^a = 0$	$\partial_\alpha \partial_\beta \partial^\alpha \tau (\Delta + \mathcal{K})^{\beta\gamma} = \partial_\alpha \partial^\alpha \partial_\beta \tau (\Delta + \mathcal{K})^{\beta\alpha}$	3
$\text{i } k \cdot 1^+ \sigma^{ab} + 1^+ 1^+{}^{ab} = 0$	$\partial_\alpha \partial_\gamma \partial^\alpha \tau (\Delta + \mathcal{K})^{\beta\gamma} + \partial_\alpha \partial^\beta \tau (\Delta + \mathcal{K})^{\alpha\gamma} + \partial_\alpha \partial^\gamma \tau (\Delta + \mathcal{K})^{\alpha\beta} + 2 \partial_\beta \partial_\gamma \partial^\alpha \sigma^{\alpha\beta\delta} + 2 \partial_\beta \partial_\gamma \partial_\alpha \sigma^{\alpha\beta\delta} = \partial_\alpha \partial^\alpha \tau (\Delta + \mathcal{K})^{\beta\delta} + \partial_\alpha \partial^\beta \tau (\Delta + \mathcal{K})^{\alpha\delta} + \partial_\alpha \partial^\delta \tau (\Delta + \mathcal{K})^{\beta\alpha} + 2 \partial_\beta \partial_\gamma \partial_\alpha \sigma^{\alpha\beta\delta}$	3
Total expected gauge generators:		11

$J^P = 0^+$
 $k^\mu = (\ell, 0, 0, p)$

Massive particle

Pole residue:	$\frac{1}{a_1} + \frac{a_2 + a_3 + 2\beta_2}{2a_1a_2 + 2a_3\beta_2} > 0$
Square mass:	$\frac{a_2(a_2 + 2\beta_2)}{4(a_1 + a_3)\beta_2} > 0$
Spin:	0
Parity:	Even

$J^P = 0^-$
 $k^\mu = (\ell, 0, 0, p)$

Massive particle

Pole residue:	$\frac{1}{a_2 + a_3} > 0$
Square mass:	$\frac{a_2 + 8\beta_2}{2(a_2 + a_3)} > 0$
Spin:	0
Parity:	Odd

$J^P = 1^+$
 $k^\mu = (\ell, 0, 0, p)$

Massive particle

Pole residue:	$(3(\alpha_0^2(3\alpha_2 + 3\alpha_5 + 2\beta_1 + 4\beta_3) - 8\alpha_0(\beta_1^2 + \alpha_2(\beta_1 - 4\beta_3) + \alpha_3(\beta_1 - 4\beta_3) - 4\beta_3^2) + 16(-4\beta_1\beta_3(\beta_1 + 2\beta_3) + \alpha_2(\beta_1^2 + 8\beta_3^2) + \alpha_5(\beta_1^2 + 8\beta_3^2))))/(2(\alpha_2 + \alpha_3)(\beta_1 + 2\beta_3)(3\alpha_0^2 - 12\alpha_0(\beta_1 - 2\beta_3) + 16(\alpha_5\beta_1 + 2\alpha_5\beta_3 - 6\beta_1\beta_3 + \alpha_2(\beta_1 + 2\beta_3)))) > 0$
Square mass:	$\frac{3(\alpha_1 - 4\beta_1)(\alpha_1 + 8\beta_1)}{16(a_2 + a_3)(a_1^2 + 2\beta_1^2)} > 0$
Spin:	1
Parity:	Even

$J^P = 1^-$
 $k^\mu = (\ell, 0, 0, p)$

Massive particle

Pole residue:	$-((3(\alpha_0^2(3\alpha_2 + 3\alpha_5 + 4\beta_1 + 2\beta_2) + 4\alpha_0(-2\alpha_2\beta_1 - 2\alpha_3\beta_1 - 4\beta_1^2 + 2\alpha_2\beta_2 + 2\alpha_3\beta_2 + \beta_2^2) + 8(-2\beta_1\beta_2(2\beta_1 + \beta_2) + \alpha_4(2\beta_1^2 + \beta_2^2) + \alpha_5(2\beta_1^2 + \beta_2^2))))/(2(\alpha_2 + \alpha_3)(2\beta_1 + \beta_2)(3\alpha_0^2 + 6\alpha_0(-2\beta_1 + \beta_2) + 4(2\alpha_5\beta_1 + \alpha_5\beta_2 - 6\beta_1\beta_2 + \alpha_4(2\beta_1 + \beta_2)))) > 0$
Square mass:	$\frac{3(\alpha_1 - 4\beta_1)(\alpha_1 + 2\beta_1)}{8(a_2 + a_3)(2\beta_1^2 + \beta_2^2)} > 0$
Spin:	1
Parity:	Odd

(Demonstrably impossible)