

Particle spectrograph

Wave operator and propagator

| | $\sigma_{1+}^{\#1}{}^{\alpha\beta}$ | $\sigma_{1+}^{\#2}{}^{\alpha\beta}$ | $\tau_{1+}^{\#1}{}^{\alpha\beta}$ | $\sigma_{1+}^{\#1}{}^{\alpha}$ | $\sigma_{1+}^{\#2}{}^{\alpha}$ | $\tau_{1+}^{\#1}{}^{\alpha}$ | $\tau_{1+}^{\#2}{}^{\alpha}$ |
|-------------------------------------|---|---|---|--|---|------------------------------|--|
| $\sigma_{1+}^{\#1}{}^{\alpha\beta}$ | $\frac{1}{\frac{3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)}{16\left(\beta_1+2\beta_3\right)}+\left(\alpha_2+\alpha_5\right)k^2}$ | $-\frac{2\sqrt{2}\left(3\alpha_0-4\beta_1+16\beta_3\right)}{\left(1+k^2\right)\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)+16\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)k^2\right)}$ | $-\frac{2i\sqrt{2}\left(3\alpha_0-4\beta_1+16\beta_3\right)k}{\left(1+k^2\right)\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)+16\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)k^2\right)}$ | 0 | 0 | 0 | 0 |
| $\sigma_{1+}^{\#2}{}^{\alpha\beta}$ | $-\frac{2\sqrt{2}\left(3\alpha_0-4\beta_1+16\beta_3\right)}{\left(1+k^2\right)\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)+16\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)k^2\right)}$ | $\frac{6\alpha_0+8\left(\beta_1+8\beta_3+3\left(\alpha_2+\alpha_5\right)k^2\right)}{\left(1+k^2\right)^2\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)+16\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)k^2\right)}$ | $\frac{2ik\left(3\alpha_0+4\left(\beta_1+8\beta_3+3\left(\alpha_2+\alpha_5\right)k^2\right)\right)}{\left(1+k^2\right)^2\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)+16\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)k^2\right)}$ | 0 | 0 | 0 | 0 |
| $\tau_{1+}^{\#1}{}^{\alpha\beta}$ | $\frac{2i\sqrt{2}\left(3\alpha_0-4\beta_1+16\beta_3\right)k}{\left(1+k^2\right)\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)+16\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)k^2\right)}$ | $-\frac{2ik\left(3\alpha_0+4\left(\beta_1+8\beta_3+3\left(\alpha_2+\alpha_5\right)k^2\right)\right)}{\left(1+k^2\right)^2\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)+16\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)k^2\right)}$ | $\frac{2k^2\left(3\alpha_0+4\left(\beta_1+8\beta_3+3\left(\alpha_2+\alpha_5\right)k^2\right)\right)}{\left(1+k^2\right)^2\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)+16\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)k^2\right)}$ | 0 | 0 | 0 | 0 |
| $\sigma_{1+}^{\#1}{}^{\alpha}$ | 0 | 0 | 0 | $\frac{1}{\frac{3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)}{8\left(2\beta_1+\beta_2\right)}+\left(\alpha_4+\alpha_5\right)k^2}$ | $\frac{2\sqrt{2}\left(3\alpha_0-4\beta_1+4\beta_2\right)}{\left(1+2k^2\right)\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)+8\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)k^2\right)}$ | 0 | $\frac{4i\left(3\alpha_0-4\beta_1+4\beta_2\right)k}{\left(1+2k^2\right)\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)+8\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)k^2\right)}$ |
| $\sigma_{1+}^{\#2}{}^{\alpha}$ | 0 | 0 | 0 | $\frac{2\sqrt{2}\left(3\alpha_0-4\beta_1+4\beta_2\right)}{\left(1+2k^2\right)\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)+8\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)k^2\right)}$ | $\frac{6\alpha_0+8\left(\beta_1+2\beta_2+3\left(\alpha_4+\alpha_5\right)k^2\right)}{\left(1+2k^2\right)^2\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)+8\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)k^2\right)}$ | 0 | $\frac{2i\sqrt{2}k\left(3\alpha_0+4\left(\beta_1+2\beta_2+3\left(\alpha_4+\alpha_5\right)k^2\right)\right)}{\left(1+2k^2\right)^2\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)+8\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)k^2\right)}$ |
| $\tau_{1+}^{\#1}{}^{\alpha}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $\tau_{1+}^{\#2}{}^{\alpha}$ | 0 | 0 | 0 | $-\frac{4i\left(3\alpha_0-4\beta_1+4\beta_2\right)k}{\left(1+2k^2\right)\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)+8\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)k^2\right)}$ | $-\frac{2i\sqrt{2}k\left(3\alpha_0+4\left(\beta_1+2\beta_2+3\left(\alpha_4+\alpha_5\right)k^2\right)\right)}{\left(1+2k^2\right)^2\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)+8\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)k^2\right)}$ | 0 | $\frac{4k^2\left(3\alpha_0+4\left(\beta_1+2\beta_2+3\left(\alpha_4+\alpha_5\right)k^2\right)\right)}{\left(1+2k^2\right)^2\left(-3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)+8\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)k^2\right)}$ |

S==
[[[[[$\frac{1}{6}(-3\alpha_0\omega_{\alpha}^{\alpha\beta}\omega_{\beta}^{\alpha}X+4\beta_1\omega_{\alpha}^{\alpha\beta}\omega_{\beta}^{\alpha}X-4\beta_2\omega_{\alpha}^{\alpha\beta}\omega_{\beta}^{\alpha}X+6f^{\alpha\beta}\tau_{\alpha\beta}^{\alpha}+6\omega_{\alpha\beta}^{\alpha}C_{\alpha\beta\chi}-8\beta_1\omega_{\alpha}^{\alpha}X\partial_{\chi}f^{\alpha\beta}+8\beta_2\omega_{\alpha}^{\alpha}X\partial_{\beta}f^{\alpha\beta}-6\alpha_0f^{\alpha\beta}\partial_{\beta}\omega_{\alpha}^{\alpha}X+6\alpha_0\partial_{\beta}\omega_{\alpha}^{\alpha\beta}+8\beta_1\omega_{\beta}^{\alpha}X\partial_{\beta}f^{\alpha-}-8\beta_2\omega_{\beta}^{\alpha}X\partial_{\beta}f^{\alpha-}-4\beta_1\partial_{\beta}f^{\alpha}X\partial_{\beta}f^{\alpha-}+4\beta_2\partial_{\beta}f^{\alpha}X\partial_{\beta}f^{\alpha-}-4\beta_1\partial_{\beta}f^{\alpha\beta}\partial_{\chi}f^{\alpha}X+4\beta_2\partial_{\beta}f^{\alpha\beta}\partial_{\chi}f^{\alpha}X+8\beta_1\partial_{\beta}f^{\alpha}X\partial_{\chi}f^{\alpha-}-8\beta_2\partial_{\beta}f^{\alpha}X\partial_{\chi}f^{\alpha-}+6\alpha_0f^{\alpha\beta}\partial_{\chi}\omega_{\alpha}^{\alpha}\beta-6\alpha_1\partial_{\chi}\omega_{\beta}^{\alpha}\partial_{\beta}\omega_{\alpha}^{\alpha\beta}+8\beta_1\omega_{\beta}^{\alpha}X\partial_{\beta}f^{\alpha\beta}+16\beta_3\omega_{\beta\chi}^{\alpha}\partial_{\chi}f^{\alpha\beta}-8\beta_1\partial_{\chi}f^{\alpha\beta}\partial_{\beta}f^{\alpha\beta}+8\beta_3\partial_{\chi}f^{\alpha\beta}\partial_{\beta}f^{\alpha\beta}-8\beta_1\partial_{\chi}f^{\alpha\beta}\partial_{\beta}f^{\alpha\beta}-4\beta_3\partial_{\chi}f^{\alpha\beta}\partial_{\beta}f^{\alpha\beta}+4\beta_1\partial_{\beta}f^{\alpha\chi}\partial_{\chi}f^{\alpha\beta}+8\beta_2\partial_{\beta}f^{\alpha\chi}\partial_{\chi}f^{\alpha\beta}+4\beta_3\partial_{\beta}f^{\alpha\chi}\partial_{\chi}f^{\alpha\beta}-4\beta_3\partial_{\chi}f^{\alpha\beta}\partial_{\beta}f^{\alpha\beta}-4\beta_3\partial_{\chi}f^{\alpha\beta}\partial_{\beta}f^{\alpha\beta}+4\left(\beta_1+2\beta_3\right)\omega_{\alpha\beta\chi}\left(\omega^{\alpha\beta\chi}+2\partial_{\chi}f^{\alpha\beta}\right)+\omega_{\alpha\beta\chi}\left(-3\alpha_0+4\beta_1-16\beta_3\right)\omega^{\alpha\beta\chi}+16\left(\beta_1-\beta_3\right)\partial_{\chi}f^{\alpha\beta}\right)+\partial_{\delta}\omega_{\beta}^{\alpha}X+6\alpha_2\partial_{\alpha}\omega_{\chi\beta}^{\alpha}\partial_{\delta}\omega_{\beta}^{\alpha}X-6\alpha_4\partial_{\alpha}\omega^{\alpha\beta\chi}\partial_{\delta}\omega_{\beta}^{\alpha}X-6\alpha_5\partial_{\alpha}\omega_{\chi\beta}^{\alpha}\partial_{\delta}\omega_{\beta}^{\alpha}X-12\alpha_1\partial_{\chi}\omega^{\alpha\beta}\partial_{\delta}\omega_{\beta}^{\alpha}X-12\alpha_2\partial_{\chi}\omega^{\alpha\beta}\partial_{\delta}\omega_{\beta}^{\alpha}X+12\alpha_4\partial_{\chi}\omega^{\alpha\beta}\partial_{\delta}\omega_{\beta}^{\alpha}X+12\alpha_5\partial_{\chi}\omega^{\alpha\beta}\partial_{\delta}\omega_{\beta}^{\alpha}X+6\alpha_1\partial_{\alpha}\omega_{\beta}^{\alpha}\partial_{\delta}\omega_{\chi}^{\alpha}X-6\alpha_2\partial_{\alpha}\omega_{\chi\beta}^{\alpha}\partial_{\delta}\omega_{\beta}^{\alpha}X-6\alpha_4\partial_{\alpha}\omega^{\alpha\beta\chi}\partial_{\delta}\omega_{\beta}^{\alpha}X-6\alpha_5\partial_{\alpha}\omega_{\chi\beta}^{\alpha}\partial_{\delta}\omega_{\beta}^{\alpha}X-12\alpha_1\partial_{\chi}\omega^{\alpha\beta}\partial_{\delta}\omega_{\beta}^{\alpha}X-12\alpha_2\partial_{\chi}\omega^{\alpha\beta}\partial_{\delta}\omega_{\beta}^{\alpha}X+12\alpha_4\partial_{\chi}\omega^{\alpha\beta}\partial_{\delta}\omega_{\beta}^{\alpha}X-12\alpha_5\partial_{\chi}\omega^{\alpha\beta}\partial_{\delta}\omega_{\beta}^{\alpha}X-8\alpha_1\partial_{\beta}\omega_{\chi\delta\alpha}\partial^{\delta}\omega^{\alpha\beta\chi}+8\alpha_3\partial_{\beta}\omega_{\chi\delta\alpha}\partial^{\delta}\omega^{\alpha\beta\chi}+4\alpha_1\partial_{\beta}\omega_{\chi\delta\alpha}\partial^{\delta}\omega^{\alpha\beta\chi}-4\alpha_2\partial_{\beta}\omega_{\chi\delta\alpha}\partial^{\delta}\omega^{\alpha\beta\chi}-4\alpha_3\partial_{\beta}\omega_{\chi\delta\alpha}\partial^{\delta}\omega^{\alpha\beta\chi}-2\alpha_2\partial_{\chi}\omega_{\alpha\delta\beta}\partial^{\delta}\omega^{\alpha\beta\chi}+4\alpha_1\partial_{\chi}\omega_{\alpha\delta\beta}\partial^{\delta}\omega^{\alpha\beta\chi}+2\alpha_3\partial_{\chi}\omega_{\alpha\delta\beta}\partial^{\delta}\omega^{\alpha\beta\chi}+4\alpha_1\partial_{\chi}\omega_{\alpha\delta\beta}\partial^{\delta}\omega^{\alpha\beta\chi}-4\alpha_3\partial_{\chi}\omega_{\alpha\delta\beta}\partial^{\delta}\omega^{\alpha\beta\chi})][[t,x,y,z]]dzdydxdt$

$\sigma_{0+}^{\#1}{}^{\alpha\beta}$

$\frac{-4\beta_2}{\alpha_0^2+2\alpha_0\beta_2-4\left(\alpha_4+\alpha_6\right)\beta_2k^2}$

$\frac{i\sqrt{2}\left(\alpha_0+2\beta_2\right)}{-\alpha_0\left(\alpha_0+2\beta_2\right)+4\left(\alpha_4+\alpha_6\right)\beta_2k^3}$

0

$\tau_{0+}^{\#1}{}^{\alpha\beta}$

$\frac{i\sqrt{2}\left(\alpha_0+2\beta_2\right)}{\alpha_0\left(\alpha_0+2\beta_2\right)+4\left(\alpha_4+\alpha_6\right)\beta_2k^3}$

0

0

$\sigma_{0+}^{\#1}{}^{\alpha}$

0

0

0

$\omega_{2+}^{\#1}{}^{\alpha\beta}$

$\frac{-\frac{4}{\alpha_0}+\beta_1+\left(\alpha_1+\alpha_4\right)k^2}{2\sqrt{2}}$

$\frac{i\left(\alpha_0-4\beta_1\right)k}{2\sqrt{2}}$

0

$f_{2+}^{\#1}{}^{\alpha\beta}$

$-\frac{i\left(\alpha_0-4\beta_1\right)k}{2\sqrt{2}}$

$2\beta_1k^2$

0

$\omega_{2+}^{\#1}{}^{\alpha}$

0

$-\frac{\alpha_0}{4}+\beta_1+\left(\alpha_1+\alpha_2\right)k^2$

k^2

$\omega_{0+}^{\#1}{}^{\alpha\beta}$

$\frac{\alpha_0}{2}+\beta_2+\left(\alpha_4+\alpha_6\right)k^2$

$-\frac{i\left(\alpha_0+2\beta_2\right)k}{\sqrt{2}}$

0

$f_{0+}^{\#1}{}^{\alpha\beta}$

$\frac{i\left(\alpha_0+2\beta_2\right)k}{\sqrt{2}}$

$2\beta_2k^2$

0

$\omega_{0+}^{\#1}{}^{\alpha}$

0

0

0

$\sigma_{2+}^{\#1}{}^{\alpha\beta}$

$\frac{16\beta_1}{-\alpha_0^2+4\alpha_0\beta_1+16\left(\alpha_1+\alpha_4\right)\beta_1k^2}$

$\frac{2i\sqrt{2}\left(\alpha_0-4\beta_1\right)}{\alpha_0\left(\alpha_0-4\beta_1\right)+16\left(\alpha_1+\alpha_4\right)\beta_1k^3}$

0

$\tau_{2+}^{\#1}{}^{\alpha\beta}$

$\frac{2i\sqrt{2}\left(\alpha_0-4\beta_1\right)}{\alpha_0\left(\alpha_0-4\beta_1\right)+16\left(\alpha_1+\alpha_4\right)\beta_1k^3}$

$\frac{2\left(\alpha_0-4\beta_1\right)+\left(\alpha_1+\alpha_4\right)k^2}{k^2\left(\alpha_0^2-4\alpha_0\beta_1-16\left(\alpha_1+\alpha_4\right)\beta_1k^2\right)}$

0

$\sigma_{2+}^{\#1}{}^{\alpha}$

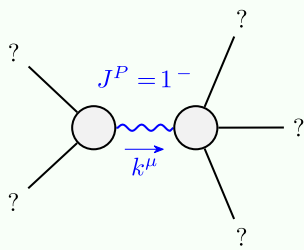
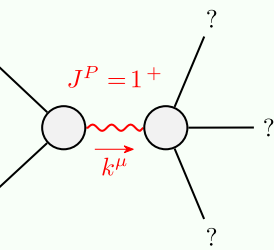
0

$\frac{\alpha_0}{2}+4\beta_3+\left(\alpha_2+\alpha_3\right)k^2$

k^2

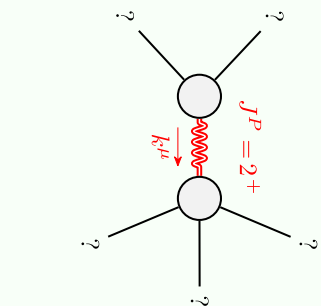
| Source constraints | | |
|--|---|----------------|
| SO(3) irreps | Fundamental fields | Multiplicities |
| $\tau_{0+}^{\#2}{}^{\alpha}==0$ | $\partial_{\beta}\partial_{\alpha}\tau^{\alpha\beta}==0$ | 1 |
| $\tau_{1+}^{\#2}{}^{\alpha}+2ik\sigma_{1+}^{\#2}{}^{\alpha}==0$ | $\partial_{\chi}\partial_{\beta}\partial^{\alpha}\tau^{\beta\chi}==\partial_{\chi}\partial^{\alpha}\partial_{\beta}\tau^{\alpha\beta}+2\partial_{\delta}\partial^{\delta}\partial_{\chi}\partial_{\beta}\sigma^{\alpha\beta\chi}$ | 3 |
| $\tau_{1+}^{\#1}{}^{\alpha}=0$ | $\partial_{\chi}\partial_{\beta}\partial^{\alpha}\tau^{\beta\chi}==\partial_{\chi}\partial^{\alpha}\partial_{\beta}\tau^{\beta\alpha}$ | 3 |
| $\tau_{1+}^{\#1}{}^{\alpha\beta}+ik\sigma_{1+}^{\#2}{}^{\alpha\beta}==0$ | $\partial_{\chi}\partial^{\alpha}\tau^{\beta\chi}+\partial_{\chi}\partial^{\beta}\tau^{\chi\alpha}+\partial_{\chi}\partial^{\alpha}\tau^{\alpha\beta}+$ $2\partial_{\delta}\partial_{\chi}\partial^{\alpha}\sigma^{\beta\chi\delta}+2\partial_{\delta}\partial^{\delta}\partial_{\chi}\sigma^{\alpha\beta\chi}==$ $\partial_{\chi}\partial^{\alpha}\tau^{\chi\beta}+\partial_{\chi}\partial^{\beta}\tau^{\alpha\chi}+$ $\partial_{\chi}\partial^{\alpha}\tau^{\beta\alpha}+2\partial_{\delta}\partial_{\chi}\partial^{\beta}\sigma^{\alpha\chi\delta}$ | 3 |
| Total constraints/gauge generators: | | 10 |

Massive and massless spectra

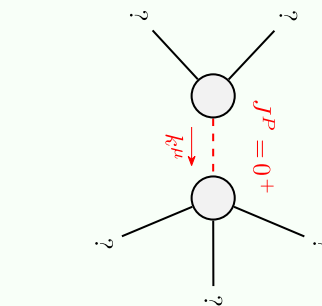


| Massive particle | |
|------------------|--|
| Pole residue: | $\left(3\left(\alpha_0^2\left(3\alpha_2+3\alpha_5+2\beta_1+4\beta_3\right)-8\alpha_0\left(\beta_1^2+\alpha_2\left(\beta_1-4\beta_3\right)+\alpha_5\left(\beta_1-4\beta_3\right)-4\beta_3^2\right)+16\left(-4\beta_1\beta_3\left(\beta_1+2\beta_3\right)+\alpha_2\left(\beta_1^2+8\beta_3^2\right)+\alpha_5\left(\beta_1^2+8\beta_3^2\right)\right)\right)/\left(2\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)\left(3\alpha_0^2-12\alpha_0\left(\beta_1-2\beta_3\right)+16\left(\alpha_5\beta_1+2\alpha_5\beta_3-6\beta_1\beta_3+\alpha_2\left(\beta_1+2\beta_3\right)\right)\right)\right)>0$ |
| Polarisations: | 3 |
| Square mass: | $\frac{3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+8\beta_3\right)}{16\left(\alpha_2+\alpha_5\right)\left(\beta_1+2\beta_3\right)}>0$ |
| Spin: | 1 |
| Parity: | Even |

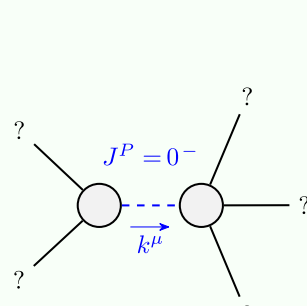
| Massive particle | |
|------------------|--|
| Pole residue: | $-((3\left(\alpha_0^2\left(3\alpha_4+3\alpha_5+4\beta_1+2\beta_2\right)+4\alpha_0\left(-2\alpha_4\beta_1-2\alpha_5\beta_1-4\beta_1^2+2\alpha_4\beta_2+2\alpha_5\beta_2+\beta_2^2\right)+8\left(-2\beta_1\beta_2\left(2\beta_1+\beta_2\right)+\alpha_4\left(2\beta_1^2+\beta_2^2\right)+\alpha_5\left(2\beta_1^2+\beta_2^2\right)\right)\right)/\left(2\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)\left(3\alpha_0^2+6\alpha_0\left(-2\beta_1+\beta_2\right)+4\left(2\alpha_5\beta_1+\alpha_5\beta_2-6\beta_1\beta_2+\alpha_4\left(2\beta_1+\beta_2\right)\right)\right)\right)>0$ |
| Polarisations: | 3 |
| Square mass: | $\frac{3\left(\alpha_0-4\beta_1\right)\left(\alpha_0+2\beta_2\right)}{8\left(\alpha_4+\alpha_5\right)\left(2\beta_1+\beta_2\right)}>0$ |
| Spin: | 1 |
| Parity: | Odd |



| Massive particle | |
|------------------|--|
| Pole residue: | $-\frac{2}{\alpha_0}+\frac{\alpha_1+\alpha_4+2\beta_1}{2\alpha_1\beta_1+2\alpha_4\beta_1}>0$ |
| Polarisations: | 5 |
| Square mass: | $\frac{\alpha_0\left(\alpha_0-4\beta_1\right)}{16\left(\alpha_1+\alpha_4\right)\beta_1}>0$ |
| Spin: | 2 |
| Parity: | Even |

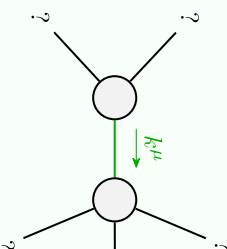


| Massive particle | |
|------------------|---|
| Pole residue: | $\frac{1}{\alpha_0}+\frac{\alpha_4+\alpha_6+2\beta_2}{2\alpha_4\beta_2+2\alpha_6\beta_2}>0$ |
| Polarisations: | 1 |
| Square mass: | $\frac{\alpha_0\left(\alpha_0+2\beta_2\right)}{4\left(\alpha_4+\alpha_6\right)\beta_2}>0$ |
| Spin: | 0 |
| Parity: | Even |



| Massive particle | |
|------------------|---|
| Pole residue: | $-\frac{1}{\alpha_1+\alpha_2}>0$ |
| Polarisations: | 5 |
| Square mass: | $\frac{\alpha_0-4\beta_1}{4\left(\alpha_1+\alpha_2\right)}>0$ |
| Spin: | 2 |
| Parity: | Odd |

| Massive particle | |
|------------------|--|
| Pole residue: | $-\frac{1}{\alpha_2+\alpha_3}>0$ |
| Polarisations: | 1 |
| Square mass: | $-\frac{\alpha_0+8\beta_3}{2\left(\alpha_2+\alpha_3\right)}>0$ |
| Spin: | 0 |
| Parity: | Odd |



| Quadratic pole | |
|----------------|------------------------|
| Pole residue: | $\frac{1}{\alpha_0}>0$ |
| Polarisations: | 2 |

Unitarity conditions

(Unitarity is demonstrably impossible)