```
<< FeynCalc`
```

FeynCalc 10.0.0 (stable version). For help, use the
online documentation, check out the wiki or visit the forum.

Please check our FAQ
for answers to some common FeynCalc questions and have a look at the supplied examples.

If you use FeynCalc in your research, please
evaluate FeynCalcHowToCite[] to learn how to cite this software.

Please keep in mind that the proper academic attribution
of our work is crucial to ensure the future development of this package!

```
A = kf + pf
B = pi - kf
S0 = (GS[A] + m) / (s - m^2)
S1 = ((2 * Pi * i) / (Exp[β * q10] + 1)) . ((GS[Q1] + m) / (2 ξ)) .Δ1 .δ1
          número pi  exponencial
S2 = ((2 * Pi * i) / (Exp[β * q10] + 1)) . ((GS[Q2] - m) / (2 ξ)) .Δ2 .δ2
          número pi  exponencial
SP[pi, kf] = SP[pf, ki] = (m^2 - t) / 2
SP[pi, pf] = SP[kf, ki] = (m^2 - u) / 2
SP[ki, ki] = SP[kf, kf] = 0
SP[pi, pi] = SP[pf, pf] = m^2
SP[kf, pf] = SP[ki, pi] = (s - m^2) / 2

SP[pf, Q1] = ωξ
SP[pi, Q1] = ωξ
SP[pi, Q2] = ωξ
SP[pf, Q2] = ωξ
SP[pf, Q3] = ωξ - ω^2 (1 + Cos[θ])
                        cosseno
SP[pi, Q3] = ωξ - ω^2 (1 + Cos[θ])
                        cosseno
SP[pi, Q4] = ωξ + ω^2 (1 + Cos[θ])
                        cosseno
SP[pf, Q4] = ωξ + ω^2 (1 + Cos[θ])
                        cosseno

SP[Q1, Q2] = ξ^2
SP[Q1, Q1] = ξ^2
SP[Q2, Q2] = ξ^2
SP[Q2, Q4] = ξ^2
SP[Q2, Q3] = ξ^2
SP[Q1, Q3] = ξ^2
SP[Q1, Q4] = ξ^2
SP[Q3, Q4] = ξ^2 + 2 ω^2 (1 + Cos[θ])
                          cosseno
SP[Q3, Q3] = ξ^2 - 2 ω^2 (1 + Cos[θ])
                          cosseno
SP[Q4, Q4] = ξ^2 - 2 ω^2 (1 + Cos[θ])
                          cosseno

SP[ki, Q1] = ωξ
SP[ki, Q2] = ωξ
SP[kf, Q1] = ωξ
SP[kf, Q2] = ωξ
SP[kf, Q3] = ωξ + ω^2 (1 + Cos[θ])
                        cosseno
SP[kf, Q4] = ωξ - ω^2 (1 + Cos[θ])
                        cosseno
SP[ki, Q3] = ωξ + ω^2 (1 + Cos[θ])
                        cosseno
SP[ki, Q4] = ωξ - ω^2 (1 + Cos[θ])
                        cosseno

q10 = ω
q20 = 0
```

$\mathrm{kf} + \mathrm{pf}$

$\mathrm{pi} - \mathrm{kf}$

$$\frac{\overline{\gamma} \cdot \left(\overline{\mathrm{kf}} + \overline{\mathrm{pf}}\right) + m}{s - m^2}$$

$$\frac{2\, i\, \pi}{e^{\beta\, \mathrm{q10}} + 1} . \frac{\overline{\gamma} \cdot \overline{\mathrm{Q1}} + m}{2\, \xi} . \Delta 1 . \delta 1$$

$$\frac{2\, i\, \pi}{e^{\beta\, \mathrm{q10}} + 1} . \frac{\overline{\gamma} \cdot \overline{\mathrm{Q2}} - m}{2\, \xi} . \Delta 2 . \delta 2$$

$$\frac{1}{2}\left(m^2 - t\right)$$

$$\frac{1}{2}\left(m^2 - u\right)$$

0

m^2

$$\frac{1}{2}\left(s - m^2\right)$$

$\omega\xi$

$\omega\xi$

$\omega\xi$

$\omega\xi$

$\omega\xi - \omega^2\,(\cos(\theta) + 1)$

$\omega\xi - \omega^2\,(\cos(\theta) + 1)$

$\omega^2\,(\cos(\theta) + 1) + \omega\xi$

$\omega^2\,(\cos(\theta) + 1) + \omega\xi$

ξ^2

ξ^2

ξ^2

ξ^2

ξ^2

ξ^2

ξ^2

$2\,\omega^2\,(\cos(\theta) + 1) + \xi^2$

$\xi^2 - 2\,\omega^2\,(\cos(\theta) + 1)$

$\xi^2 - 2\,\omega^2\,(\cos(\theta) + 1)$

$\omega\xi$

$\omega\xi$

$\omega\xi$

$\omega\xi$

$\omega^2 (\cos(\theta) + 1) + \omega\xi$

$\omega\xi - \omega^2 (\cos(\theta) + 1)$

$\omega^2 (\cos(\theta) + 1) + \omega\xi$

$\omega\xi - \omega^2 (\cos(\theta) + 1)$

ω

0

```
DiracTrace[
  (GS[pf] + m).GA[μ].(S0 + S1 + S2).GA[α].(GS[pi] + m).GA[ρ].(-S2 - S1 + S0).GA[λ]]
```

$$\text{tr}\left(\left(\overline{\gamma}\cdot\overline{\text{pf}}+m\right).\overline{\gamma}^{\mu}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)+m}{s-m^2}+\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\text{Q1}}+m}{2\,\xi}.\Delta 1.\delta 1+\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\text{Q2}}-m}{2\,\xi}.\Delta 2.\delta 2\right).\overline{\gamma}^{\alpha}.\right.$$
$$\left.\left(\overline{\gamma}\cdot\overline{\text{pi}}+m\right).\overline{\gamma}^{\rho}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)+m}{s-m^2}-\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\text{Q1}}+m}{2\,\xi}.\Delta 1.\delta 1-\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\text{Q2}}-m}{2\,\xi}.\Delta 2.\delta 2\right).\overline{\gamma}^{\lambda}\right)$$

```
(1/4) * ((κ^2 U1^2 U2^2)/16)^2 ((2 FV[pf, ν] + FV[kf, ν])
  (2 FV[pi, β] + FV[ki, β]) (2 FV[pi, σ] + FV[ki, σ]) (2 FV[pf, ξ] + FV[kf, ξ])
  (1/4) (MT[ν, ξ] MT[μ, λ] + MT[ν, λ] MT[μ, ξ] - MT[ν, μ] MT[ξ, λ])
  (MT[β, σ] MT[α, ρ] + MT[β, ρ] MT[α, σ] - MT[β, α] MT[σ, ρ]))
```

$$\frac{1}{4096}\kappa^4\,\text{U1}^4\,\text{U2}^4\left(\overline{\text{kf}}^{\nu}+2\,\overline{\text{pf}}^{\nu}\right)\left(\overline{\text{kf}}^{\xi}+2\,\overline{\text{pf}}^{\xi}\right)\left(\overline{\text{ki}}^{\beta}+2\,\overline{\text{pi}}^{\beta}\right)$$
$$\left(\overline{\text{ki}}^{\sigma}+2\,\overline{\text{pi}}^{\sigma}\right)\left(\overline{g}^{\alpha\,\sigma}\,\overline{g}^{\beta\,\rho}+\overline{g}^{\alpha\,\rho}\,\overline{g}^{\beta\,\sigma}-\overline{g}^{\alpha\,\beta}\,\overline{g}^{\rho\,\sigma}\right)\left(-\overline{g}^{\lambda\,\xi}\,\overline{g}^{\mu\,\nu}+\overline{g}^{\lambda\,\nu}\,\overline{g}^{\mu\,\xi}+\overline{g}^{\lambda\,\mu}\,\overline{g}^{\nu\,\xi}\right)$$

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%41 * %40
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$$\frac{1}{4096}\kappa^4\,\text{U1}^4\,\text{U2}^4\left(\overline{\text{kf}}^{\nu}+2\,\overline{\text{pf}}^{\nu}\right)\left(\overline{\text{kf}}^{\xi}+2\,\overline{\text{pf}}^{\xi}\right)\left(\overline{\text{ki}}^{\beta}+2\,\overline{\text{pi}}^{\beta}\right)$$
$$\left(\overline{\text{ki}}^{\sigma}+2\,\overline{\text{pi}}^{\sigma}\right)\left(\overline{g}^{\alpha\,\sigma}\,\overline{g}^{\beta\,\rho}+\overline{g}^{\alpha\,\rho}\,\overline{g}^{\beta\,\sigma}-\overline{g}^{\alpha\,\beta}\,\overline{g}^{\rho\,\sigma}\right)\left(-\overline{g}^{\lambda\,\xi}\,\overline{g}^{\mu\,\nu}+\overline{g}^{\lambda\,\nu}\,\overline{g}^{\mu\,\xi}+\overline{g}^{\lambda\,\mu}\,\overline{g}^{\nu\,\xi}\right)$$
$$\text{tr}\left(\left(\overline{\gamma}\cdot\overline{\text{pf}}+m\right).\overline{\gamma}^{\mu}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)+m}{s-m^2}+\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\text{Q1}}+m}{2\,\xi}.\Delta 1.\delta 1+\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\text{Q2}}-m}{2\,\xi}.\Delta 2.\delta 2\right).\overline{\gamma}^{\alpha}.\right.$$
$$\left.\left(\overline{\gamma}\cdot\overline{\text{pi}}+m\right).\overline{\gamma}^{\rho}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)+m}{s-m^2}-\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\text{Q1}}+m}{2\,\xi}.\Delta 1.\delta 1-\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\text{Q2}}-m}{2\,\xi}.\Delta 2.\delta 2\right).\overline{\gamma}^{\lambda}\right)$$

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Contract[%]
```

$$\frac{1}{4096}\kappa^4\,\text{U1}^4\,\text{U2}^4\left(2\,m^2+2\,s\right)^2$$
$$\text{tr}\left(\left(\overline{\gamma}\cdot\overline{\text{pf}}+m\right).\overline{\gamma}^{\mu}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)+m}{s-m^2}+\frac{i\,\pi\,\delta 1\,\Delta 1\left(\overline{\gamma}\cdot\overline{\text{Q1}}+m\right)}{\xi\left(e^{\beta\,\omega}+1\right)}+\frac{i\,\pi\,\delta 2\,\Delta 2\left(\overline{\gamma}\cdot\overline{\text{Q2}}-m\right)}{\xi\left(e^{\beta\,\omega}+1\right)}\right).\overline{\gamma}^{\rho}.\left(\overline{\gamma}\cdot\overline{\text{pi}}+m\right).\right.$$
$$\left.\overline{\gamma}^{\rho}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)+m}{s-m^2}-\frac{i\,\pi\,\delta 1\,\Delta 1\left(\overline{\gamma}\cdot\overline{\text{Q1}}+m\right)}{\xi\left(e^{\beta\,\omega}+1\right)}-\frac{i\,\pi\,\delta 2\,\Delta 2\left(\overline{\gamma}\cdot\overline{\text{Q2}}-m\right)}{\xi\left(e^{\beta\,\omega}+1\right)}\right).\overline{\gamma}^{\mu}\right)$$

DiracSimplify[%]

$$\frac{9\,\pi^2\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^{12}}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+\frac{9\,\pi^2\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^{12}}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-\frac{9\,\pi^2\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^{12}}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+$$
$$\frac{7\,\pi^2\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^{10}}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{7\,\pi^2\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^{10}}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{7\,\pi^2\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^{10}}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-$$
$$\frac{\pi^2\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,\omega\xi\,m^{10}}{8\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,\omega\xi\,m^{10}}{8\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-\frac{\pi^2\,u\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^{10}}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-$$
$$\frac{\pi^2\,u\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^{10}}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+\frac{\pi^2\,u\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^{10}}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-\frac{e^{\beta\,\omega}\,U1^4\,U2^4\,\kappa^4\,m^8}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-$$
$$\frac{e^{2\,\beta\,\omega}\,U1^4\,U2^4\,\kappa^4\,m^8}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-\frac{U1^4\,U2^4\,\kappa^4\,m^8}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{\pi^2\,u\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^8}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+$$
$$\frac{\pi^2\,u\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^8}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{\pi^2\,u\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^8}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,\omega\xi^2\,m^8}{32\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+$$
$$\frac{\pi^2\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,\omega\xi^2\,m^8}{32\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,\omega\xi^2\,m^8}{16\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-\frac{9\,\pi^2\,s^2\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^8}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-$$
$$\frac{9\,\pi^2\,s^2\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^8}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+\frac{9\,\pi^2\,s^2\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^8}{32\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+\frac{3\,e^{\beta\,\omega}\,s\,U1^4\,U2^4\,\kappa^4\,m^6}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+$$
$$\frac{3\,e^{2\,\beta\,\omega}\,s\,U1^4\,U2^4\,\kappa^4\,m^6}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{3\,s\,U1^4\,U2^4\,\kappa^4\,m^6}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{3\,e^{\beta\,\omega}\,t\,U1^4\,U2^4\,\kappa^4\,m^6}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{3\,e^{2\,\beta\,\omega}\,t\,U1^4\,U2^4\,\kappa^4\,m^6}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+$$
$$\frac{3\,t\,U1^4\,U2^4\,\kappa^4\,m^6}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{e^{\beta\,\omega}\,u\,U1^4\,U2^4\,\kappa^4\,m^6}{32\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{e^{2\,\beta\,\omega}\,u\,U1^4\,U2^4\,\kappa^4\,m^6}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{u\,U1^4\,U2^4\,\kappa^4\,m^6}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-$$
$$\frac{7\,\pi^2\,s^2\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^6}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-\frac{7\,\pi^2\,s^2\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^6}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-\frac{7\,\pi^2\,s^2\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^6}{32\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+$$
$$\frac{\pi^2\,s^2\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,\omega\xi\,m^6}{4\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-\frac{\pi^2\,s^2\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,\omega\xi\,m^6}{4\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+\frac{\pi^2\,s^2\,u\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^6}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+$$
$$\frac{\pi^2\,s^2\,u\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^6}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-\frac{\pi^2\,s^2\,u\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^6}{32\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+\frac{9\,e^{\beta\,\omega}\,s^2\,U1^4\,U2^4\,\kappa^4\,m^4}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+$$
$$\frac{9\,e^{2\,\beta\,\omega}\,s^2\,U1^4\,U2^4\,\kappa^4\,m^4}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{9\,s^2\,U1^4\,U2^4\,\kappa^4\,m^4}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{5\,e^{\beta\,\omega}\,s\,t\,U1^4\,U2^4\,\kappa^4\,m^4}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{5\,e^{2\,\beta\,\omega}\,s\,t\,U1^4\,U2^4\,\kappa^4\,m^4}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+$$
$$\frac{5\,s\,t\,U1^4\,U2^4\,\kappa^4\,m^4}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{e^{\beta\,\omega}\,s\,u\,U1^4\,U2^4\,\kappa^4\,m^4}{16\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{e^{2\,\beta\,\omega}\,s\,u\,U1^4\,U2^4\,\kappa^4\,m^4}{32\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}+\frac{s\,u\,U1^4\,U2^4\,\kappa^4\,m^4}{32\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-$$
$$\frac{\pi^2\,s^2\,u\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^4}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-\frac{\pi^2\,s^2\,u\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^4}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-\frac{\pi^2\,s^2\,u\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^4}{32\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2}-$$
$$\frac{\pi^2\,s^2\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,\omega\xi^2\,m^4}{16\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-\frac{\pi^2\,s^2\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,\omega\xi^2\,m^4}{16\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-\frac{\pi^2\,s^2\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,\omega\xi^2\,m^4}{8\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+$$
$$\frac{9\,\pi^2\,s^4\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^4}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+\frac{9\,\pi^2\,s^4\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^4}{128\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}-\frac{9\,\pi^2\,s^4\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^4}{64\,(1+e^{\beta\,\omega})^2\left(m^2-s\right)^2\xi^2}+$$

$$\frac{5\,e^{\beta\omega}\,s^3\,U1^4\,U2^4\,\kappa^4\,m^2}{64\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{5\,e^{2\beta\omega}\,s^3\,U1^4\,U2^4\,\kappa^4\,m^2}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{5\,s^3\,U1^4\,U2^4\,\kappa^4\,m^2}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{e^{\beta\omega}\,s^2\,t\,U1^4\,U2^4\,\kappa^4\,m^2}{64\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+$$
$$\frac{e^{2\beta\omega}\,s^2\,t\,U1^4\,U2^4\,\kappa^4\,m^2}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{s^2\,t\,U1^4\,U2^4\,\kappa^4\,m^2}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{e^{\beta\omega}\,s^2\,u\,U1^4\,U2^4\,\kappa^4\,m^2}{32\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{e^{2\beta\omega}\,s^2\,u\,U1^4\,U2^4\,\kappa^4\,m^2}{64\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+$$
$$\frac{s^2\,u\,U1^4\,U2^4\,\kappa^4\,m^2}{64\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{7\,\pi^2\,s^4\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^2}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{7\,\pi^2\,s^4\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^2}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+$$
$$\frac{7\,\pi^2\,s^4\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^2}{64\,(1+e^{\beta\omega})^2\,(m^2-s)^2}-\frac{\pi^2\,s^4\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,\omega\xi\,m^2}{8\,(1+e^{\beta\omega})^2\,(m^2-s)^2\,\xi^2}+\frac{\pi^2\,s^4\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,\omega\xi\,m^2}{8\,(1+e^{\beta\omega})^2\,(m^2-s)^2\,\xi^2}-$$
$$\frac{\pi^2\,s^4\,u\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,m^2}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2\,\xi^2}-\frac{\pi^2\,s^4\,u\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,m^2}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2\,\xi^2}+\frac{\pi^2\,s^4\,u\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,m^2}{64\,(1+e^{\beta\omega})^2\,(m^2-s)^2\,\xi^2}-$$
$$\frac{e^{\beta\omega}\,s^3\,t\,U1^4\,U2^4\,\kappa^4}{64\,(1+e^{\beta\omega})^2\,(m^2-s)^2}-\frac{e^{2\beta\omega}\,s^3\,t\,U1^4\,U2^4\,\kappa^4}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}-\frac{s^3\,t\,U1^4\,U2^4\,\kappa^4}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+$$
$$\frac{\pi^2\,s^4\,u\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{\pi^2\,s^4\,u\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4}{128\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+\frac{\pi^2\,s^4\,u\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4}{64\,(1+e^{\beta\omega})^2\,(m^2-s)^2}+$$
$$\frac{\pi^2\,s^4\,U1^4\,U2^4\,\delta1^2\,\Delta1^2\,\kappa^4\,\omega\xi^2}{32\,(1+e^{\beta\omega})^2\,(m^2-s)^2\,\xi^2}+\frac{\pi^2\,s^4\,U1^4\,U2^4\,\delta2^2\,\Delta2^2\,\kappa^4\,\omega\xi^2}{32\,(1+e^{\beta\omega})^2\,(m^2-s)^2\,\xi^2}+\frac{\pi^2\,s^4\,U1^4\,U2^4\,\delta1\,\Delta1\,\delta2\,\Delta2\,\kappa^4\,\omega\xi^2}{16\,(1+e^{\beta\omega})^2\,(m^2-s)^2\,\xi^2}$$

FullSimplify[%]

simplifica completamente

$$\frac{1}{128}\kappa^4\,U1^4\,U2^4\,(m^2+s)^2\left(\frac{1}{\xi^2\,(e^{\beta\omega}+1)^2}\pi^2\left(9\,m^4\,(\delta1\,\Delta1-\delta2\,\Delta2)^2+m^2\left((\delta1\,\Delta1+\delta2\,\Delta2)\left(7\,\xi^2\,(\delta1\,\Delta1+\delta2\,\Delta2)+16\,\omega\xi\,(\delta2\,\Delta2-\delta1\,\Delta1)\right)-\right.\right.\right.$$
$$\left.\left.\left.u\,(\delta1\,\Delta1-\delta2\,\Delta2)^2\right)+\left(\xi^2\,u+4\,\omega\xi^2\right)(\delta1\,\Delta1+\delta2\,\Delta2)^2\right)-\frac{m^4-m^2\,(5\,s+3\,t+2\,u)+s\,t}{(m^2-s)^2}\right)$$

Limit[%, m → 0]

limite

$$\frac{1}{128}\kappa^4\,s^2\,U1^4\,U2^4\left(\frac{\pi^2\left(\xi^2\,u+4\,\omega\xi^2\right)(\delta1\,\Delta1+\delta2\,\Delta2)^2}{\xi^2\,(e^{\beta\omega}+1)^2}-\frac{t}{s}\right)$$

S5 = (GS[B] + m) / (t - m^2)

$$\frac{\overline{\gamma}\cdot(\overline{\text{pi}}-\overline{\text{kf}})+m}{t-m^2}$$

S3 = ((2 * Pi * i) / (Exp[β * q20] + 1)) . ((GS[Q3] + m) / (2 ξ)) .Δ3 .δ3

número pi exponencial

$$(i\,\pi).\frac{\overline{\gamma}\cdot\overline{\text{Q3}}+m}{2\,\xi}.\Delta3.\delta3$$

```
S4 = ((2 * Pi * ⅈ) / (Exp[β * q20] + 1)) . ((GS[Q4] - m) / (2 ξ)) .Δ4 .δ4
```
número pi exponencial

$$(i\,\pi).\frac{\overline{\gamma}\cdot\overline{Q4}-m}{2\,\xi}.\Delta4.\delta4$$

```
DiracTrace[
  (GS[pf] + m) .GA[μ] . (S5 + S3 + S4) .GA[α] . (GS[pi] + m) .GA[ρ] . (-S4 - S3 + S5) .GA[λ]]
```

$$\mathrm{tr}\left(\left(\overline{\gamma}\cdot\overline{\mathrm{pf}}+m\right).\overline{\gamma}^{\mu}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{pi}}-\overline{\mathrm{kf}}\right)+m}{t-m^2}+(i\,\pi).\frac{\overline{\gamma}\cdot\overline{Q3}+m}{2\,\xi}.\Delta3.\delta3+(i\,\pi).\frac{\overline{\gamma}\cdot\overline{Q4}-m}{2\,\xi}.\Delta4.\delta4\right).\right.$$
$$\left.\overline{\gamma}^{\alpha}.\left(\overline{\gamma}\cdot\overline{\mathrm{pi}}+m\right).\overline{\gamma}^{\rho}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{pi}}-\overline{\mathrm{kf}}\right)+m}{t-m^2}-(i\,\pi).\frac{\overline{\gamma}\cdot\overline{Q3}+m}{2\,\xi}.\Delta3.\delta3-(i\,\pi).\frac{\overline{\gamma}\cdot\overline{Q4}-m}{2\,\xi}.\Delta4.\delta4\right).\overline{\gamma}^{\lambda}\right)$$

```
(1 / 4) (κ^2 U1^2 U2^2 / 16) ^2 ((2 FV[pf, ν] - FV[ki, ν])
  (2 FV[pi, β] - FV[kf, β]) (2 FV[pi, σ] - FV[kf, σ]) (2 FV[pf, ξ] - FV[ki, ξ])
  (1 / 4) (MT[ν, ξ] MT[μ, λ] + MT[ν, λ] MT[μ, ξ] - MT[ν, μ] MT[ξ, λ])
  (MT[β, σ] MT[α, ρ] + MT[β, ρ] MT[α, σ] - MT[β, α] MT[σ, ρ]))
```

$$\frac{1}{4096}\kappa^4\,\mathrm{U1}^4\,\mathrm{U2}^4\left(2\,\overline{\mathrm{pi}}^{\beta}-\overline{\mathrm{kf}}^{\beta}\right)\left(2\,\overline{\mathrm{pi}}^{\sigma}-\overline{\mathrm{kf}}^{\sigma}\right)\left(2\,\overline{\mathrm{pf}}^{\nu}-\overline{\mathrm{ki}}^{\nu}\right)$$
$$\left(2\,\overline{\mathrm{pf}}^{\xi}-\overline{\mathrm{ki}}^{\xi}\right)\left(\overline{g}^{\alpha\,\sigma}\,\overline{g}^{\beta\,\rho}+\overline{g}^{\alpha\,\rho}\,\overline{g}^{\beta\,\sigma}-\overline{g}^{\alpha\,\beta}\,\overline{g}^{\rho\,\sigma}\right)\left(-\overline{g}^{\lambda\,\xi}\,\overline{g}^{\mu\,\nu}+\overline{g}^{\lambda\,\nu}\,\overline{g}^{\mu\,\xi}+\overline{g}^{\lambda\,\mu}\,\overline{g}^{\nu\,\xi}\right)$$

```
%51 * %50
```

$$\frac{1}{4096}\kappa^4\,\mathrm{U1}^4\,\mathrm{U2}^4\left(2\,\overline{\mathrm{pi}}^{\beta}-\overline{\mathrm{kf}}^{\beta}\right)\left(2\,\overline{\mathrm{pi}}^{\sigma}-\overline{\mathrm{kf}}^{\sigma}\right)\left(2\,\overline{\mathrm{pf}}^{\nu}-\overline{\mathrm{ki}}^{\nu}\right)$$
$$\left(2\,\overline{\mathrm{pf}}^{\xi}-\overline{\mathrm{ki}}^{\xi}\right)\left(\overline{g}^{\alpha\,\sigma}\,\overline{g}^{\beta\,\rho}+\overline{g}^{\alpha\,\rho}\,\overline{g}^{\beta\,\sigma}-\overline{g}^{\alpha\,\beta}\,\overline{g}^{\rho\,\sigma}\right)\left(-\overline{g}^{\lambda\,\xi}\,\overline{g}^{\mu\,\nu}+\overline{g}^{\lambda\,\nu}\,\overline{g}^{\mu\,\xi}+\overline{g}^{\lambda\,\mu}\,\overline{g}^{\nu\,\xi}\right)$$
$$\mathrm{tr}\left(\left(\overline{\gamma}\cdot\overline{\mathrm{pf}}+m\right).\overline{\gamma}^{\mu}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{pi}}-\overline{\mathrm{kf}}\right)+m}{t-m^2}+(i\,\pi).\frac{\overline{\gamma}\cdot\overline{Q3}+m}{2\,\xi}.\Delta3.\delta3+(i\,\pi).\frac{\overline{\gamma}\cdot\overline{Q4}-m}{2\,\xi}.\Delta4.\delta4\right).\overline{\gamma}^{\alpha}.\right.$$
$$\left.\left(\overline{\gamma}\cdot\overline{\mathrm{pi}}+m\right).\overline{\gamma}^{\rho}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{pi}}-\overline{\mathrm{kf}}\right)+m}{t-m^2}-(i\,\pi).\frac{\overline{\gamma}\cdot\overline{Q3}+m}{2\,\xi}.\Delta3.\delta3-(i\,\pi).\frac{\overline{\gamma}\cdot\overline{Q4}-m}{2\,\xi}.\Delta4.\delta4\right).\overline{\gamma}^{\lambda}\right)$$

```
Contract[%]
```

$$\frac{1}{4096}\kappa^4\,\mathrm{U1}^4\,\mathrm{U2}^4\left(2\,m^2+2\,t\right)^2$$
$$\mathrm{tr}\left(\left(\overline{\gamma}\cdot\overline{\mathrm{pf}}+m\right).\overline{\gamma}^{\mu}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{pi}}-\overline{\mathrm{kf}}\right)+m}{t-m^2}+\frac{i\,\pi\,\delta3\,\Delta3\left(\overline{\gamma}\cdot\overline{Q3}+m\right)}{2\,\xi}+\frac{i\,\pi\,\delta4\,\Delta4\left(\overline{\gamma}\cdot\overline{Q4}-m\right)}{2\,\xi}\right).\overline{\gamma}^{\rho}.\left(\overline{\gamma}\cdot\overline{\mathrm{pi}}+m\right).\right.$$
$$\left.\overline{\gamma}^{\rho}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{pi}}-\overline{\mathrm{kf}}\right)+m}{t-m^2}-\frac{i\,\pi\,\delta3\,\Delta3\left(\overline{\gamma}\cdot\overline{Q3}+m\right)}{2\,\xi}-\frac{i\,\pi\,\delta4\,\Delta4\left(\overline{\gamma}\cdot\overline{Q4}-m\right)}{2\,\xi}\right).\overline{\gamma}^{\mu}\right)$$

```
DiracSimplify[%]
```

$$\frac{9\,\pi^2\,\mathrm{U1}^4\,\mathrm{U2}^4\,\delta3^2\,\Delta3^2\,\kappa^4\,m^{12}}{512\left(m^2-t\right)^2\xi^2}+\frac{9\,\pi^2\,\mathrm{U1}^4\,\mathrm{U2}^4\,\delta4^2\,\Delta4^2\,\kappa^4\,m^{12}}{512\left(m^2-t\right)^2\xi^2}-\frac{9\,\pi^2\,\mathrm{U1}^4\,\mathrm{U2}^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,m^{12}}{256\left(m^2-t\right)^2\xi^2}+$$
$$\frac{7\,\pi^2\,\mathrm{U1}^4\,\mathrm{U2}^4\,\delta3^2\,\Delta3^2\,\kappa^4\,m^{10}}{512\left(m^2-t\right)^2}+\frac{7\,\pi^2\,\mathrm{U1}^4\,\mathrm{U2}^4\,\delta4^2\,\Delta4^2\,\kappa^4\,m^{10}}{512\left(m^2-t\right)^2}+\frac{7\,\pi^2\,\mathrm{U1}^4\,\mathrm{U2}^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,m^{10}}{256\left(m^2-t\right)^2}+$$
$$\frac{\pi^2\,\mathrm{U1}^4\,\mathrm{U2}^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^2\,m^{10}}{256\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,\mathrm{U1}^4\,\mathrm{U2}^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^2\,m^{10}}{256\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,\mathrm{U1}^4\,\mathrm{U2}^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega^2\,m^{10}}{128\left(m^2-t\right)^2\xi^2}-$$

$$\frac{\pi^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega\xi\,m^{10}}{32\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega\xi\,m^{10}}{32\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^2\cos(\theta)\,m^{10}}{256\left(m^2-t\right)^2\xi^2}+$$
$$\frac{\pi^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^2\cos(\theta)\,m^{10}}{256\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega^2\cos(\theta)\,m^{10}}{128\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,u\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,m^{10}}{512\left(m^2-t\right)^2\xi^2}-$$
$$\frac{\pi^2\,u\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,m^{10}}{512\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,u\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,m^{10}}{256\left(m^2-t\right)^2\xi^2}-\frac{U1^4\,U2^4\,\kappa^4\,m^8}{128\left(m^2-t\right)^2}+\frac{\pi^2\,u\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,m^8}{512\left(m^2-t\right)^2}+$$
$$\frac{\pi^2\,u\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,m^8}{512\left(m^2-t\right)^2}+\frac{\pi^2\,u\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,m^8}{256\left(m^2-t\right)^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^4\,m^8}{128\left(m^2-t\right)^2\xi^2}+$$
$$\frac{\pi^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^4\,m^8}{128\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega^4\,m^8}{64\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,u\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^2\,m^8}{256\left(m^2-t\right)^2\xi^2}-$$
$$\frac{\pi^2\,u\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^2\,m^8}{256\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,u\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega^2\,m^8}{128\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega\xi^2\,m^8}{128\left(m^2-t\right)^2\xi^2}+$$
$$\frac{\pi^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega\xi^2\,m^8}{128\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega\xi^2\,m^8}{64\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^4\cos^2(\theta)\,m^8}{128\left(m^2-t\right)^2\xi^2}+$$
$$\frac{\pi^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^4\cos^2(\theta)\,m^8}{128\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega^4\cos^2(\theta)\,m^8}{64\left(m^2-t\right)^2\xi^2}-$$
$$\frac{\pi^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^2\,\omega\xi\,m^8}{64\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^2\,\omega\xi\,m^8}{64\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^4\cos(\theta)\,m^8}{64\left(m^2-t\right)^2\xi^2}+$$
$$\frac{\pi^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^4\cos(\theta)\,m^8}{64\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega^4\cos(\theta)\,m^8}{32\left(m^2-t\right)^2\xi^2}-$$
$$\frac{\pi^2\,u\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^2\cos(\theta)\,m^8}{256\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,u\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^2\cos(\theta)\,m^8}{256\left(m^2-t\right)^2\xi^2}+$$
$$\frac{\pi^2\,u\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega^2\cos(\theta)\,m^8}{128\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^2\,\omega\xi\cos(\theta)\,m^8}{64\left(m^2-t\right)^2\xi^2}+$$
$$\frac{\pi^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^2\,\omega\xi\cos(\theta)\,m^8}{64\left(m^2-t\right)^2\xi^2}-\frac{9\,\pi^2\,t^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,m^8}{256\left(m^2-t\right)^2\xi^2}-\frac{9\,\pi^2\,t^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,m^8}{256\left(m^2-t\right)^2\xi^2}+$$
$$\frac{9\,\pi^2\,t^2\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,m^8}{128\left(m^2-t\right)^2\xi^2}+\frac{3\,t\,U1^4\,U2^4\,\kappa^4\,m^6}{128\left(m^2-t\right)^2}+\frac{u\,U1^4\,U2^4\,\kappa^4\,m^6}{64\left(m^2-t\right)^2}+\frac{3\,s\,U1^4\,U2^4\,\kappa^4\,m^6}{128\left(m^2-t\right)^2}-$$
$$\frac{7\,\pi^2\,t^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,m^6}{256\left(m^2-t\right)^2}-\frac{7\,\pi^2\,t^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,m^6}{256\left(m^2-t\right)^2}-\frac{7\,\pi^2\,t^2\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,m^6}{128\left(m^2-t\right)^2}-$$
$$\frac{\pi^2\,t^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^2\,m^6}{128\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,t^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^2\,m^6}{128\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,t^2\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega^2\,m^6}{64\left(m^2-t\right)^2\xi^2}+$$
$$\frac{\pi^2\,t^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega\xi\,m^6}{16\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,t^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega\xi\,m^6}{16\left(m^2-t\right)^2\xi^2}-\frac{\pi^2\,t^2\,U1^4\,U2^4\,\delta3^2\,\Delta3^2\,\kappa^4\,\omega^2\cos(\theta)\,m^6}{128\left(m^2-t\right)^2\xi^2}-$$
$$\frac{\pi^2\,t^2\,U1^4\,U2^4\,\delta4^2\,\Delta4^2\,\kappa^4\,\omega^2\cos(\theta)\,m^6}{128\left(m^2-t\right)^2\xi^2}+\frac{\pi^2\,t^2\,U1^4\,U2^4\,\delta3\,\Delta3\,\delta4\,\Delta4\,\kappa^4\,\omega^2\cos(\theta)\,m^6}{64\left(m^2-t\right)^2\xi^2}+$$

$$\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, m^6}{256\left(m^2-t\right)^2 \xi^2}+\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, m^6}{256\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, m^6}{128\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{9 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \kappa^4\, m^4}{128\left(m^2-t\right)^2}+\frac{5 s t\, \mathrm{U1}^4\, \mathrm{U2}^4\, \kappa^4\, m^4}{128\left(m^2-t\right)^2}+\frac{t u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \kappa^4\, m^4}{32\left(m^2-t\right)^2}-\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, m^4}{256\left(m^2-t\right)^2}-$$
$$\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, m^4}{256\left(m^2-t\right)^2}-\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, m^4}{128\left(m^2-t\right)^2}-\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^4\, m^4}{64\left(m^2-t\right)^2 \xi^2}-$$
$$\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^4\, m^4}{64\left(m^2-t\right)^2 \xi^2}+\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^4\, m^4}{32\left(m^2-t\right)^2 \xi^2}+\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2\, m^4}{128\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2\, m^4}{128\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^2\, m^4}{64\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega \xi^2\, m^4}{64\left(m^2-t\right)^2 \xi^2}-$$
$$\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega \xi^2\, m^4}{64\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega \xi^2\, m^4}{32\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^4 \cos^2(\theta)\, m^4}{64\left(m^2-t\right)^2 \xi^2}-$$
$$\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^4 \cos^2(\theta)\, m^4}{64\left(m^2-t\right)^2 \xi^2}+\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^4 \cos^2(\theta)\, m^4}{32\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2\, \omega \xi\, m^4}{32\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2\, \omega \xi\, m^4}{32\left(m^2-t\right)^2 \xi^2}-$$
$$\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^4 \cos(\theta)\, m^4}{32\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^4 \cos(\theta)\, m^4}{32\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^4 \cos(\theta)\, m^4}{16\left(m^2-t\right)^2 \xi^2}+\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2 \cos(\theta)\, m^4}{128\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2 \cos(\theta)\, m^4}{128\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^2 \cos(\theta)\, m^4}{64\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2\, \omega \xi \cos(\theta)\, m^4}{32\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2\, \omega \xi \cos(\theta)\, m^4}{32\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{9 \pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, m^4}{512\left(m^2-t\right)^2 \xi^2}+\frac{9 \pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, m^4}{512\left(m^2-t\right)^2 \xi^2}-\frac{9 \pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, m^4}{256\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{5 t^3\, \mathrm{U1}^4\, \mathrm{U2}^4\, \kappa^4\, m^2}{128\left(m^2-t\right)^2}+\frac{s t^2\, \mathrm{U1}^4\, \mathrm{U2}^4\, \kappa^4\, m^2}{128\left(m^2-t\right)^2}+\frac{t^2 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \kappa^4\, m^2}{64\left(m^2-t\right)^2}+\frac{7 \pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, m^2}{512\left(m^2-t\right)^2}+$$
$$\frac{7 \pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, m^2}{512\left(m^2-t\right)^2}+\frac{7 \pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, m^2}{256\left(m^2-t\right)^2}+\frac{\pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2\, m^2}{256\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{\pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2\, m^2}{256\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^2\, m^2}{128\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega \xi\, m^2}{32\left(m^2-t\right)^2 \xi^2}+$$
$$\frac{\pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega \xi\, m^2}{32\left(m^2-t\right)^2 \xi^2}+\frac{\pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2 \cos(\theta)\, m^2}{256\left(m^2-t\right)^2 \xi^2}+\frac{\pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2 \cos(\theta)\, m^2}{256\left(m^2-t\right)^2 \xi^2}-$$
$$\frac{\pi^2 t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^2 \cos(\theta)\, m^2}{128\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^4 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, m^2}{512\left(m^2-t\right)^2 \xi^2}-\frac{\pi^2 t^4 u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, m^2}{512\left(m^2-t\right)^2 \xi^2}+$$

$$\frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, m^2}{256\left(m^2-t\right)^2 \xi^2} - \frac{s\, t^3\, \mathrm{U1}^4\, \mathrm{U2}^4\, \kappa^4}{128\left(m^2-t\right)^2} + \frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4}{512\left(m^2-t\right)^2} +$$
$$\frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4}{512\left(m^2-t\right)^2} + \frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4}{256\left(m^2-t\right)^2} + \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^4}{128\left(m^2-t\right)^2 \xi^2} +$$
$$\frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^4}{128\left(m^2-t\right)^2 \xi^2} - \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^4}{64\left(m^2-t\right)^2 \xi^2} - \frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2}{256\left(m^2-t\right)^2 \xi^2} -$$
$$\frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2}{256\left(m^2-t\right)^2 \xi^2} + \frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^2}{128\left(m^2-t\right)^2 \xi^2} + \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega \xi^2}{128\left(m^2-t\right)^2 \xi^2} +$$
$$\frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega \xi^2}{128\left(m^2-t\right)^2 \xi^2} + \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega \xi^2}{64\left(m^2-t\right)^2 \xi^2} + \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^4 \cos^2(\theta)}{128\left(m^2-t\right)^2 \xi^2} +$$
$$\frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^4 \cos^2(\theta)}{128\left(m^2-t\right)^2 \xi^2} - \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^4 \cos^2(\theta)}{64\left(m^2-t\right)^2 \xi^2} - \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2\, \omega \xi}{64\left(m^2-t\right)^2 \xi^2} +$$
$$\frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2\, \omega \xi}{64\left(m^2-t\right)^2 \xi^2} + \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^4 \cos(\theta)}{64\left(m^2-t\right)^2 \xi^2} + \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^4 \cos(\theta)}{64\left(m^2-t\right)^2 \xi^2} -$$
$$\frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^4 \cos(\theta)}{32\left(m^2-t\right)^2 \xi^2} - \frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2 \cos(\theta)}{256\left(m^2-t\right)^2 \xi^2} -$$
$$\frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2 \cos(\theta)}{256\left(m^2-t\right)^2 \xi^2} + \frac{\pi^2\, t^4\, u\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \kappa^4\, \omega^2 \cos(\theta)}{128\left(m^2-t\right)^2 \xi^2} -$$
$$\frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 3^2\, \Delta 3^2\, \kappa^4\, \omega^2\, \omega \xi \cos(\theta)}{64\left(m^2-t\right)^2 \xi^2} + \frac{\pi^2\, t^4\, \mathrm{U1}^4\, \mathrm{U2}^4\, \delta 4^2\, \Delta 4^2\, \kappa^4\, \omega^2\, \omega \xi \cos(\theta)}{64\left(m^2-t\right)^2 \xi^2}$$

FullSimplify[%]

simplifica completamente

$$\frac{1}{512\, \xi^2 \left(m^2-t\right)^2} \kappa^4\, \mathrm{U1}^4\, \mathrm{U2}^4 \Big(2\, \pi^2\, \omega^2 \left(m^4-t^2\right)^2 (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)$$
$$\left(\omega^2 \cos(2\,\theta)\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4) + \cos(\theta) \left(\left(m^2 - u + 4\, \omega^2\right) (\delta 3\, \Delta 3 - \delta 4\, \Delta 4) - 4\, \omega \xi\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4)\right)\right) +$$
$$\left(m^2+t\right)^2 \Big(9\, \pi^2\, m^8\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2 +$$
$$\pi^2\, m^6 \left(7\, \delta 3^2\, \Delta 3^2\, \xi^2 + 2\, \delta 3^2\, \Delta 3^2\, \omega^2 - 16\, \delta 3^2\, \Delta 3^2\, \omega \xi + 14\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \xi^2 - 4\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4\, \omega^2 + \right.$$
$$\left. 7\, \delta 4^2\, \Delta 4^2\, \xi^2 + 2\, \delta 4^2\, \Delta 4^2\, \omega^2 + 16\, \delta 4^2\, \Delta 4^2\, \omega \xi - 18\, t\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2 - u\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2\right) +$$
$$m^4 \Big(\pi^2 \Big(6\, \omega^4\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2 - 8\, \omega^2\, \omega \xi\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4) +$$
$$4\, \omega \xi^2\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4)^2 + 9\, t^2\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2 + 2\, t \left(\delta 3^2\, \Delta 3^2 \left(-7\, \xi^2 - 2\, \omega^2 + 16\, \omega \xi\right) + \right.$$
$$\left. 2\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4 \left(2\, \omega^2 - 7\, \xi^2\right) - \delta 4^2\, \Delta 4^2 \left(7\, \xi^2 + 2\, \omega^2 + 16\, \omega \xi\right) + u\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2\right) +$$
$$\xi^2\, u\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4)^2 - 2\, u\, \omega^2\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2\Big) - 4\, \xi^2\Big) -$$
$$m^2 \Big(\pi^2\, t \Big(t \left(\delta 3^2\, \Delta 3^2 \left(-7\, \xi^2 - 2\, \omega^2 + 16\, \omega \xi\right) + 2\, \delta 3\, \Delta 3\, \delta 4\, \Delta 4 \left(2\, \omega^2 - 7\, \xi^2\right) - \right.$$
$$\left. \delta 4^2\, \Delta 4^2 \left(7\, \xi^2 + 2\, \omega^2 + 16\, \omega \xi\right) + u\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2\right) + 2 \Big(6\, \omega^4\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2 -$$
$$8\, \omega^2\, \omega \xi\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4) + 4\, \omega \xi^2\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4)^2 +$$
$$\xi^2\, u\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4)^2 - 2\, u\, \omega^2\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2\Big) - 4\, \xi^2\, (3\, s + 5\, t + 2\, u)\Big) +$$
$$t \Big(\pi^2\, t \Big(6\, \omega^4\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2 - 8\, \omega^2\, \omega \xi\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4) +$$
$$4\, \omega \xi^2\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4)^2 + \xi^2\, u\, (\delta 3\, \Delta 3 + \delta 4\, \Delta 4)^2 - 2\, u\, \omega^2\, (\delta 3\, \Delta 3 - \delta 4\, \Delta 4)^2\Big) - 4\, \xi^2\, s\Big)\Big)\Big)$$

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Limit[%, m → 0]
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limite

$$\frac{1}{512\,\xi^2\,t^2}\kappa^4\,\mathrm{U1}^4\,\mathrm{U2}^4\left(t^3\left(\pi^2\,t\left(6\,\omega^4\,(\delta3\,\Delta3-\delta4\,\Delta4)^2-8\,\omega^2\,\omega\xi\,(\delta3\,\Delta3-\delta4\,\Delta4)\,(\delta3\,\Delta3+\delta4\,\Delta4)+4\,\omega\xi^2\,(\delta3\,\Delta3+\delta4\,\Delta4)^2+\xi^2\,u\,(\delta3\,\Delta3+\delta4\,\Delta4)^2-2\,u\,\omega^2\,(\delta3\,\Delta3-\delta4\,\Delta4)^2\right)-4\,\xi^2\,s\right)+2\,\pi^2\,t^4\,\omega^2\,(\delta3\,\Delta3-\delta4\,\Delta4)\left(\omega^2\cos(2\,\theta)\,(\delta3\,\Delta3-\delta4\,\Delta4)+\cos(\theta)\left(\left(4\,\omega^2-u\right)(\delta3\,\Delta3-\delta4\,\Delta4)-4\,\omega\xi\,(\delta3\,\Delta3+\delta4\,\Delta4)\right)\right)\right)$$

```
(1/2) (κ^2 U1^2 U2^2/16) * (κ^2 U1^2 U2^2/16)
 ((2 FV[pi, ν] + FV[ki, ν]) (2 FV[pf, β] + FV[kf, β])
   (2 FV[pf, σ] - FV[ki, σ]) (2 FV[pi, ξ] - FV[kf, ξ]) (1/4)
   (MT[ν, β] MT[μ, α] + MT[ν, α] MT[μ, β] - MT[ν, μ] MT[β, α])
   (MT[σ, ξ] MT[ρ, λ] + MT[σ, λ] MT[ρ, ξ] - MT[σ, ρ] MT[ξ, λ]))
```

$$\frac{1}{2048}\kappa^4\,\mathrm{U1}^4\,\mathrm{U2}^4\left(\overline{\mathrm{kf}}^{\beta}+2\,\overline{\mathrm{pf}}^{\beta}\right)\left(2\,\overline{\mathrm{pi}}^{\xi}-\overline{\mathrm{kf}}^{\xi}\right)\left(2\,\overline{\mathrm{pf}}^{\sigma}-\overline{\mathrm{ki}}^{\sigma}\right)\left(\overline{\mathrm{ki}}^{\nu}+2\,\overline{\mathrm{pi}}^{\nu}\right)\left(\overline{g}^{\alpha\,\nu}\,\overline{g}^{\beta\,\mu}+\overline{g}^{\alpha\,\mu}\,\overline{g}^{\beta\,\nu}-\overline{g}^{\alpha\,\beta}\,\overline{g}^{\mu\,\nu}\right)\left(\overline{g}^{\lambda\,\sigma}\,\overline{g}^{\xi\,\rho}+\overline{g}^{\lambda\,\rho}\,\overline{g}^{\xi\,\sigma}-\overline{g}^{\lambda\,\xi}\,\overline{g}^{\rho\,\sigma}\right)$$

```
DiracTrace[
  (GS[pi] + m).GA[μ].(-S2 - S1 + S0).GA[α].(GS[pf] + m).GA[ρ].(S5 + S3 + S4).GA[λ]]
```

$$\mathrm{tr}\left(\left(\overline{\gamma}\cdot\overline{\mathrm{pi}}+m\right).\overline{\gamma}^{\mu}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{kf}}+\overline{\mathrm{pf}}\right)+m}{s-m^2}-\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\mathrm{Q1}}+m}{2\,\xi}.\Delta1.\delta1-\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\mathrm{Q2}}-m}{2\,\xi}.\Delta2.\delta2\right).\overline{\gamma}^{\alpha}.\left(\overline{\gamma}\cdot\overline{\mathrm{pf}}+m\right).\overline{\gamma}^{\rho}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{pi}}-\overline{\mathrm{kf}}\right)+m}{t-m^2}+(i\,\pi).\frac{\overline{\gamma}\cdot\overline{\mathrm{Q3}}+m}{2\,\xi}.\Delta3.\delta3+(i\,\pi).\frac{\overline{\gamma}\cdot\overline{\mathrm{Q4}}-m}{2\,\xi}.\Delta4.\delta4\right).\overline{\gamma}^{\lambda}\right)$$

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%57 * %58
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$$\frac{1}{2048}\kappa^4\,\mathrm{U1}^4\,\mathrm{U2}^4\left(\overline{\mathrm{kf}}^{\beta}+2\,\overline{\mathrm{pf}}^{\beta}\right)\left(2\,\overline{\mathrm{pi}}^{\xi}-\overline{\mathrm{kf}}^{\xi}\right)\left(2\,\overline{\mathrm{pf}}^{\sigma}-\overline{\mathrm{ki}}^{\sigma}\right)\left(\overline{\mathrm{ki}}^{\nu}+2\,\overline{\mathrm{pi}}^{\nu}\right)\left(\overline{g}^{\alpha\,\nu}\,\overline{g}^{\beta\,\mu}+\overline{g}^{\alpha\,\mu}\,\overline{g}^{\beta\,\nu}-\overline{g}^{\alpha\,\beta}\,\overline{g}^{\mu\,\nu}\right)\left(\overline{g}^{\lambda\,\sigma}\,\overline{g}^{\xi\,\rho}+\overline{g}^{\lambda\,\rho}\,\overline{g}^{\xi\,\sigma}-\overline{g}^{\lambda\,\xi}\,\overline{g}^{\rho\,\sigma}\right)\mathrm{tr}\left(\left(\overline{\gamma}\cdot\overline{\mathrm{pi}}+m\right).\overline{\gamma}^{\mu}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{kf}}+\overline{\mathrm{pf}}\right)+m}{s-m^2}-\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\mathrm{Q1}}+m}{2\,\xi}.\Delta1.\delta1-\frac{2\,i\,\pi}{e^{\beta\,\omega}+1}.\frac{\overline{\gamma}\cdot\overline{\mathrm{Q2}}-m}{2\,\xi}.\Delta2.\delta2\right).\overline{\gamma}^{\alpha}.\left(\overline{\gamma}\cdot\overline{\mathrm{pf}}+m\right).\overline{\gamma}^{\rho}.\left(\frac{\overline{\gamma}\cdot\left(\overline{\mathrm{pi}}-\overline{\mathrm{kf}}\right)+m}{t-m^2}+(i\,\pi).\frac{\overline{\gamma}\cdot\overline{\mathrm{Q3}}+m}{2\,\xi}.\Delta3.\delta3+(i\,\pi).\frac{\overline{\gamma}\cdot\overline{\mathrm{Q4}}-m}{2\,\xi}.\Delta4.\delta4\right).\overline{\gamma}^{\lambda}\right)$$

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Contract[%]
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$$\frac{1}{2048}\left(2\,m^2-2\,s+\frac{5}{2}\left(m^2-u\right)\right)\left(2\,m^2-2\,t+\frac{5}{2}\left(m^2-u\right)\right)\mathrm{U1}^4\,\mathrm{U2}^4\,\mathrm{tr}\left(\left(m+\overline{\gamma}\cdot\overline{\mathrm{pi}}\right).\overline{\gamma}^{\mu}.\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\mathrm{kf}}+\overline{\mathrm{pf}}\right)}{s-m^2}-\frac{i\,\pi\,\delta1\,\Delta1\left(m+\overline{\gamma}\cdot\overline{\mathrm{Q1}}\right)}{\left(1+e^{\beta\,\omega}\right)\xi}-\frac{i\,\pi\,\delta2\,\Delta2\left(\overline{\gamma}\cdot\overline{\mathrm{Q2}}-m\right)}{\left(1+e^{\beta\,\omega}\right)\xi}\right).\overline{\gamma}^{\mu}.\left(m+\overline{\gamma}\cdot\overline{\mathrm{pf}}\right).\overline{\gamma}^{\rho}.\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\mathrm{pi}}-\overline{\mathrm{kf}}\right)}{t-m^2}+\frac{i\,\pi\,\delta3\,\Delta3\left(m+\overline{\gamma}\cdot\overline{\mathrm{Q3}}\right)}{2\,\xi}+\frac{i\,\pi\,\delta4\,\Delta4\left(\overline{\gamma}\cdot\overline{\mathrm{Q4}}-m\right)}{2\,\xi}\right).\overline{\gamma}^{\rho}\right)\kappa^4-\frac{1}{2048}\left(2\,m^2-2\,t+\frac{5}{2}\left(m^2-u\right)\right)\mathrm{U1}^4\,\mathrm{U2}^4\,\mathrm{tr}\left(\left(m+\overline{\gamma}\cdot\overline{\mathrm{pi}}\right).\overline{\gamma}^{\mu}.\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\mathrm{kf}}+\overline{\mathrm{pf}}\right)}{s-m^2}-\frac{i\,\pi\,\delta1\,\Delta1\left(m+\overline{\gamma}\cdot\overline{\mathrm{Q1}}\right)}{\left(1+e^{\beta\,\omega}\right)\xi}-\frac{i\,\pi\,\delta2\,\Delta2\left(\overline{\gamma}\cdot\overline{\mathrm{Q2}}-m\right)}{\left(1+e^{\beta\,\omega}\right)\xi}\right).\overline{\gamma}^{\mu}.\left(m+\overline{\gamma}\cdot\overline{\mathrm{pf}}\right).$$

$$\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pf}}-\overline{\text{ki}}\right)\right).\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{pi}}-\overline{\text{kf}}\right)}{t-m^2}+\frac{i\,\pi\,\delta 3\,\Delta 3\left(m+\overline{\gamma}\cdot\overline{\text{Q3}}\right)}{2\,\xi}+\frac{i\,\pi\,\delta 4\,\Delta 4\left(\overline{\gamma}\cdot\overline{\text{Q4}}-m\right)}{2\,\xi}\right).\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pi}}-\overline{\text{kf}}\right)\right)\Bigg)$$

$$\kappa^4+\frac{1}{2048}\left(2\,m^2-2\,t+\frac{5}{2}\left(m^2-u\right)\right)\text{U1}^4\,\text{U2}^4$$

$$\text{tr}\Bigg(\left(m+\overline{\gamma}\cdot\overline{\text{pi}}\right).\overline{\gamma}^{\mu}.\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)}{s-m^2}-\frac{i\,\pi\,\delta 1\,\Delta 1\left(m+\overline{\gamma}\cdot\overline{\text{Q1}}\right)}{\left(1+e^{\beta\,\omega}\right)\xi}-\frac{i\,\pi\,\delta 2\,\Delta 2\left(\overline{\gamma}\cdot\overline{\text{Q2}}-m\right)}{\left(1+e^{\beta\,\omega}\right)\xi}\right).\overline{\gamma}^{\mu}.\left(m+\overline{\gamma}\cdot\overline{\text{pf}}\right).$$

$$\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pi}}-\overline{\text{kf}}\right)\right).\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{pi}}-\overline{\text{kf}}\right)}{t-m^2}+\frac{i\,\pi\,\delta 3\,\Delta 3\left(m+\overline{\gamma}\cdot\overline{\text{Q3}}\right)}{2\,\xi}+\frac{i\,\pi\,\delta 4\,\Delta 4\left(\overline{\gamma}\cdot\overline{\text{Q4}}-m\right)}{2\,\xi}\right).\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pf}}-\overline{\text{ki}}\right)\right)\Bigg)\kappa^4+$$

$$\frac{1}{2048}\left(2\,m^2-2\,s+\frac{5}{2}\left(m^2-u\right)\right)\text{U1}^4\,\text{U2}^4\,\text{tr}\Bigg(\left(m+\overline{\gamma}\cdot\overline{\text{pi}}\right).\left(\overline{\gamma}\cdot\left(\overline{\text{kf}}+2\,\overline{\text{pf}}\right)\right).$$

$$\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)}{s-m^2}-\frac{i\,\pi\,\delta 1\,\Delta 1\left(m+\overline{\gamma}\cdot\overline{\text{Q1}}\right)}{\left(1+e^{\beta\,\omega}\right)\xi}-\frac{i\,\pi\,\delta 2\,\Delta 2\left(\overline{\gamma}\cdot\overline{\text{Q2}}-m\right)}{\left(1+e^{\beta\,\omega}\right)\xi}\right).\left(\overline{\gamma}\cdot\left(\overline{\text{ki}}+2\,\overline{\text{pi}}\right)\right).\left(m+\overline{\gamma}\cdot\overline{\text{pf}}\right).$$

$$\overline{\gamma}^{\rho}.\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{pi}}-\overline{\text{kf}}\right)}{t-m^2}+\frac{i\,\pi\,\delta 3\,\Delta 3\left(m+\overline{\gamma}\cdot\overline{\text{Q3}}\right)}{2\,\xi}+\frac{i\,\pi\,\delta 4\,\Delta 4\left(\overline{\gamma}\cdot\overline{\text{Q4}}-m\right)}{2\,\xi}\right).\overline{\gamma}^{\rho}\Bigg)\kappa^4-\frac{1}{2048}$$

$$\text{U1}^4\,\text{U2}^4\,\text{tr}\Bigg(\left(m+\overline{\gamma}\cdot\overline{\text{pi}}\right).\left(\overline{\gamma}\cdot\left(\overline{\text{kf}}+2\,\overline{\text{pf}}\right)\right).\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)}{s-m^2}-\frac{i\,\pi\,\delta 1\,\Delta 1\left(m+\overline{\gamma}\cdot\overline{\text{Q1}}\right)}{\left(1+e^{\beta\,\omega}\right)\xi}-\frac{i\,\pi\,\delta 2\,\Delta 2\left(\overline{\gamma}\cdot\overline{\text{Q2}}-m\right)}{\left(1+e^{\beta\,\omega}\right)\xi}\right).$$

$$\left(\overline{\gamma}\cdot\left(\overline{\text{ki}}+2\,\overline{\text{pi}}\right)\right).\left(m+\overline{\gamma}\cdot\overline{\text{pf}}\right).\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pf}}-\overline{\text{ki}}\right)\right).$$

$$\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{pi}}-\overline{\text{kf}}\right)}{t-m^2}+\frac{i\,\pi\,\delta 3\,\Delta 3\left(m+\overline{\gamma}\cdot\overline{\text{Q3}}\right)}{2\,\xi}+\frac{i\,\pi\,\delta 4\,\Delta 4\left(\overline{\gamma}\cdot\overline{\text{Q4}}-m\right)}{2\,\xi}\right).\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pi}}-\overline{\text{kf}}\right)\right)\Bigg)\kappa^4+\frac{1}{2048}$$

$$\text{U1}^4\,\text{U2}^4\,\text{tr}\Bigg(\left(m+\overline{\gamma}\cdot\overline{\text{pi}}\right).\left(\overline{\gamma}\cdot\left(\overline{\text{kf}}+2\,\overline{\text{pf}}\right)\right).\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)}{s-m^2}-\frac{i\,\pi\,\delta 1\,\Delta 1\left(m+\overline{\gamma}\cdot\overline{\text{Q1}}\right)}{\left(1+e^{\beta\,\omega}\right)\xi}-\frac{i\,\pi\,\delta 2\,\Delta 2\left(\overline{\gamma}\cdot\overline{\text{Q2}}-m\right)}{\left(1+e^{\beta\,\omega}\right)\xi}\right).$$

$$\left(\overline{\gamma}\cdot\left(\overline{\text{ki}}+2\,\overline{\text{pi}}\right)\right).\left(m+\overline{\gamma}\cdot\overline{\text{pf}}\right).\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pi}}-\overline{\text{kf}}\right)\right).\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{pi}}-\overline{\text{kf}}\right)}{t-m^2}+\frac{i\,\pi\,\delta 3\,\Delta 3\left(m+\overline{\gamma}\cdot\overline{\text{Q3}}\right)}{2\,\xi}+\frac{i\,\pi\,\delta 4\,\Delta 4\left(\overline{\gamma}\cdot\overline{\text{Q4}}-m\right)}{2\,\xi}\right).$$

$$\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pf}}-\overline{\text{ki}}\right)\right)\Bigg)\kappa^4-\frac{1}{2048}\left(2\,m^2-2\,s+\frac{5}{2}\left(m^2-u\right)\right)\text{U1}^4\,\text{U2}^4$$

$$\text{tr}\Bigg(\left(m+\overline{\gamma}\cdot\overline{\text{pi}}\right).\left(\overline{\gamma}\cdot\left(\overline{\text{ki}}+2\,\overline{\text{pi}}\right)\right).\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)}{s-m^2}-\frac{i\,\pi\,\delta 1\,\Delta 1\left(m+\overline{\gamma}\cdot\overline{\text{Q1}}\right)}{\left(1+e^{\beta\,\omega}\right)\xi}-\frac{i\,\pi\,\delta 2\,\Delta 2\left(\overline{\gamma}\cdot\overline{\text{Q2}}-m\right)}{\left(1+e^{\beta\,\omega}\right)\xi}\right).$$

$$\left(\overline{\gamma}\cdot\left(\overline{\text{kf}}+2\,\overline{\text{pf}}\right)\right).\left(m+\overline{\gamma}\cdot\overline{\text{pf}}\right).\overline{\gamma}^{\rho}.\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{pi}}-\overline{\text{kf}}\right)}{t-m^2}+\frac{i\,\pi\,\delta 3\,\Delta 3\left(m+\overline{\gamma}\cdot\overline{\text{Q3}}\right)}{2\,\xi}+\frac{i\,\pi\,\delta 4\,\Delta 4\left(\overline{\gamma}\cdot\overline{\text{Q4}}-m\right)}{2\,\xi}\right).\overline{\gamma}^{\rho}\Bigg)\kappa^4+$$

$$\frac{1}{2048}\text{U1}^4\,\text{U2}^4\,\text{tr}\Bigg(\left(m+\overline{\gamma}\cdot\overline{\text{pi}}\right).\left(\overline{\gamma}\cdot\left(\overline{\text{ki}}+2\,\overline{\text{pi}}\right)\right).\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)}{s-m^2}-\frac{i\,\pi\,\delta 1\,\Delta 1\left(m+\overline{\gamma}\cdot\overline{\text{Q1}}\right)}{\left(1+e^{\beta\,\omega}\right)\xi}-\frac{i\,\pi\,\delta 2\,\Delta 2\left(\overline{\gamma}\cdot\overline{\text{Q2}}-m\right)}{\left(1+e^{\beta\,\omega}\right)\xi}\right).$$

$$\left(\overline{\gamma}\cdot\left(\overline{\text{kf}}+2\,\overline{\text{pf}}\right)\right).\left(m+\overline{\gamma}\cdot\overline{\text{pf}}\right).\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pf}}-\overline{\text{ki}}\right)\right).$$

$$\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{pi}}-\overline{\text{kf}}\right)}{t-m^2}+\frac{i\,\pi\,\delta 3\,\Delta 3\left(m+\overline{\gamma}\cdot\overline{\text{Q3}}\right)}{2\,\xi}+\frac{i\,\pi\,\delta 4\,\Delta 4\left(\overline{\gamma}\cdot\overline{\text{Q4}}-m\right)}{2\,\xi}\right).\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pi}}-\overline{\text{kf}}\right)\right)\Bigg)\kappa^4-\frac{1}{2048}$$

$$\text{U1}^4\,\text{U2}^4\,\text{tr}\Bigg(\left(m+\overline{\gamma}\cdot\overline{\text{pi}}\right).\left(\overline{\gamma}\cdot\left(\overline{\text{ki}}+2\,\overline{\text{pi}}\right)\right).\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{kf}}+\overline{\text{pf}}\right)}{s-m^2}-\frac{i\,\pi\,\delta 1\,\Delta 1\left(m+\overline{\gamma}\cdot\overline{\text{Q1}}\right)}{\left(1+e^{\beta\,\omega}\right)\xi}-\frac{i\,\pi\,\delta 2\,\Delta 2\left(\overline{\gamma}\cdot\overline{\text{Q2}}-m\right)}{\left(1+e^{\beta\,\omega}\right)\xi}\right).$$

$$\left(\overline{\gamma}\cdot\left(\overline{\text{kf}}+2\,\overline{\text{pf}}\right)\right).\left(m+\overline{\gamma}\cdot\overline{\text{pf}}\right).\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pi}}-\overline{\text{kf}}\right)\right).$$

$$\left(\frac{m+\overline{\gamma}\cdot\left(\overline{\text{pi}}-\overline{\text{kf}}\right)}{t-m^2}+\frac{i\,\pi\,\delta 3\,\Delta 3\left(m+\overline{\gamma}\cdot\overline{\text{Q3}}\right)}{2\,\xi}+\frac{i\,\pi\,\delta 4\,\Delta 4\left(\overline{\gamma}\cdot\overline{\text{Q4}}-m\right)}{2\,\xi}\right).\left(\overline{\gamma}\cdot\left(2\,\overline{\text{pf}}-\overline{\text{ki}}\right)\right)\kappa^4$$

DiracSimplify[%]

$$\frac{987\,\pi^2\,\text{U1}^4\,\text{U2}^4\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\kappa^4\,m^{12}}{2048\,(1+e^{\beta\omega})\,(m^2-s)\,(m^2-t)\,\xi^2}-\frac{987\,\pi^2\,\text{U1}^4\,\text{U2}^4\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\kappa^4\,m^{12}}{2048\,(1+e^{\beta\omega})\,(m^2-s)\,(m^2-t)\,\xi^2}-\frac{987\,\pi^2\,\text{U1}^4\,\text{U2}^4\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\kappa^4\,m^{12}}{2048\,(1+e^{\beta\omega})\,(m^2-s)\,(m^2-t)\,\xi^2}+$$
$$\frac{987\,\pi^2\,\text{U1}^4\,\text{U2}^4\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\kappa^4\,m^{12}}{2048\,(1+e^{\beta\omega})\,(m^2-s)\,(m^2-t)\,\xi^2}+\frac{81\,\pi^2\,\text{U1}^4\,\text{U2}^4\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\kappa^4\,m^{10}}{2048\,(1+e^{\beta\omega})\,(m^2-s)\,(m^2-t)}+\cdots 3262\cdots+\frac{5\,\pi^2\,s\,t^2\,u\,\text{U1}^4\,\text{U2}^4\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\kappa^4\,\omega^2\,\omega\xi\cos(\theta)}{128\,(1+e^{\beta\omega})\,(m^2-s)\,(m^2-t)\,\xi^2}+$$
$$\frac{11\,\pi^2\,s\,u\,\text{U1}^4\,\text{U2}^4\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\kappa^4\,\omega^2\,\omega\xi\cos(\theta)}{256\,(1+e^{\beta\omega})\,\xi^2}+\frac{5\,\pi^2\,s^2\,t\,u\,\text{U1}^4\,\text{U2}^4\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\kappa^4\,\omega^2\,\omega\xi\cos(\theta)}{128\,(1+e^{\beta\omega})\,(m^2-s)\,(m^2-t)\,\xi^2}+\frac{11\,\pi^2\,t\,u\,\text{U1}^4\,\text{U2}^4\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\kappa^4\,\omega^2\,\omega\xi\cos(\theta)}{256\,(1+e^{\beta\omega})\,\xi^2}$$

large output | **show less** | **show more** | **show all** | **set size limit...**

Simplify[%]

simplifica

$$\frac{1}{2048\,(1+e^{\beta\omega})\,(m^2-s)\,(m^2-t)\,\xi^2}\,\text{U1}^4\,\text{U2}^4\,\kappa^4\left(987\,\pi^2\,(\delta 1\,\Delta 1-\delta 2\,\Delta 2)\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)\,m^{12}-\right.$$
$$\pi\left(\pi\left(154\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\xi^2+154\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\xi^2+154\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\xi^2+154\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\xi^2-\right.\right.$$
$$548\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega^2+\cdots 12\cdots+1336\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega\xi-240\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\omega\xi+$$
$$240\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\omega\xi-1336\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\omega\xi\Big)-516\,i\left(\cdots 1\cdots\right)\xi\Big)\,m^{10}+$$
$$\left.\cdots 300\cdots+67\,i\,\pi\,s^2\,t\,u\,\delta 4\,\Delta 4\,\xi\,\omega\xi+\pi\left(m^2-t\right)\cdots 3\cdots\cos(\theta)\right)$$

large output | **show less** | **show more** | **show all** | **set size limit...**

Limit[%, m → 0]

limite

$$\frac{1}{2048\,(1+e^{\beta\omega})\,s\,t\,\xi^2}$$
$$\text{U1}^4\,\text{U2}^4\,\kappa^4\left(-5\,e^{\beta\omega}\,\xi^2\,s^4-8\,\pi^2\,t\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\xi^2\,s^4-8\,\pi^2\,t\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\xi^2\,s^4-8\,\pi^2\,t\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\xi^2\,s^4-\right.$$
$$8\,\pi^2\,t\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\xi^2\,s^4-5\,\xi^2\,s^4+10\,i\,\pi\,\delta 1\,\Delta 1\,\xi\,\omega\xi\,s^4+10\,i\,\pi\,\delta 2\,\Delta 2\,\xi\,\omega\xi\,s^4-7\,e^{\beta\omega}\,u\,\xi^2\,s^3-$$
$$7\,u\,\xi^2\,s^3+8\,\pi^2\,t^2\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\xi^2\,s^3-2\,\pi^2\,t\,u\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\xi^2\,s^3+8\,\pi^2\,t^2\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\xi^2\,s^3-$$
$$2\,\pi^2\,t\,u\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\xi^2\,s^3+8\,\pi^2\,t^2\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\xi^2\,s^3-2\,\pi^2\,t\,u\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\xi^2\,s^3+8\,\pi^2\,t^2\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\xi^2\,s^3-$$
$$2\,\pi^2\,t\,u\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\xi^2\,s^3-5\,i\,e^{\beta\omega}\,\pi\,t\,\delta 3\,\Delta 3\,\xi\,\omega^2\,s^3-5\,i\,\pi\,t\,\delta 3\,\Delta 3\,\xi\,\omega^2\,s^3+5\,i\,e^{\beta\omega}\,\pi\,t\,\delta 4\,\Delta 4\,\xi\,\omega^2\,s^3+$$
$$5\,i\,\pi\,t\,\delta 4\,\Delta 4\,\xi\,\omega^2\,s^3+92\,\pi^2\,t\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega\xi^2\,s^3+92\,\pi^2\,t\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\omega\xi^2\,s^3+92\,\pi^2\,t\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\omega\xi^2\,s^3+$$
$$92\,\pi^2\,t\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\omega\xi^2\,s^3-20\,\pi^2\,t\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega^2\,\omega\xi\,s^3-20\,\pi^2\,t\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\omega^2\,\omega\xi\,s^3+$$
$$20\,\pi^2\,t\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\omega^2\,\omega\xi\,s^3+20\,\pi^2\,t\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\omega^2\,\omega\xi\,s^3+42\,i\,\pi\,t\,\delta 1\,\Delta 1\,\xi\,\omega\xi\,s^3+94\,i\,\pi\,u\,\delta 1\,\Delta 1\,\xi\,\omega\xi\,s^3+$$
$$42\,i\,\pi\,t\,\delta 2\,\Delta 2\,\xi\,\omega\xi\,s^3+94\,i\,\pi\,u\,\delta 2\,\Delta 2\,\xi\,\omega\xi\,s^3+7\,i\,e^{\beta\omega}\,\pi\,t\,\delta 3\,\Delta 3\,\xi\,\omega\xi\,s^3+7\,i\,\pi\,t\,\delta 3\,\Delta 3\,\xi\,\omega\xi\,s^3+$$
$$7\,i\,e^{\beta\omega}\,\pi\,t\,\delta 4\,\Delta 4\,\xi\,\omega\xi\,s^3+7\,i\,\pi\,t\,\delta 4\,\Delta 4\,\xi\,\omega\xi\,s^3+42\,e^{\beta\omega}\,t^2\,\xi^2\,s^2+42\,t^2\,\xi^2\,s^2+5\,e^{\beta\omega}\,u^2\,\xi^2\,s^2+$$
$$5\,u^2\,\xi^2\,s^2+63\,e^{\beta\omega}\,t\,u\,\xi^2\,s^2+63\,t\,u\,\xi^2\,s^2+8\,\pi^2\,t^3\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\xi^2\,s^2+72\,\pi^2\,t\,u^2\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\xi^2\,s^2+$$
$$64\,\pi^2\,t^2\,u\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\xi^2\,s^2+8\,\pi^2\,t^3\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\xi^2\,s^2+72\,\pi^2\,t\,u^2\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\xi^2\,s^2+$$
$$64\,\pi^2\,t^2\,u\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\xi^2\,s^2+8\,\pi^2\,t^3\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\xi^2\,s^2+72\,\pi^2\,t\,u^2\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\xi^2\,s^2+$$
$$64\,\pi^2\,t^2\,u\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\xi^2\,s^2+8\,\pi^2\,t^3\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\xi^2\,s^2+72\,\pi^2\,t\,u^2\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\xi^2\,s^2+$$
$$64\,\pi^2\,t^2\,u\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\xi^2\,s^2-21\,i\,e^{\beta\omega}\,\pi\,t^2\,\delta 3\,\Delta 3\,\xi\,\omega^2\,s^2-21\,i\,\pi\,t^2\,\delta 3\,\Delta 3\,\xi\,\omega^2\,s^2-37\,i\,e^{\beta\omega}\,\pi\,t\,u\,\delta 3\,\Delta 3\,\xi\,\omega^2\,s^2-$$
$$37\,i\,\pi\,t\,u\,\delta 3\,\Delta 3\,\xi\,\omega^2\,s^2+21\,i\,e^{\beta\omega}\,\pi\,t^2\,\delta 4\,\Delta 4\,\xi\,\omega^2\,s^2+21\,i\,\pi\,t^2\,\delta 4\,\Delta 4\,\xi\,\omega^2\,s^2+37\,i\,e^{\beta\omega}\,\pi\,t\,u\,\delta 4\,\Delta 4\,\xi\,\omega^2\,s^2+$$
$$37\,i\,\pi\,t\,u\,\delta 4\,\Delta 4\,\xi\,\omega^2\,s^2+152\,\pi^2\,t^2\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega\xi^2\,s^2+376\,\pi^2\,t\,u\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega\xi^2\,s^2+$$
$$152\,\pi^2\,t^2\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\omega\xi^2\,s^2+376\,\pi^2\,t\,u\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\omega\xi^2\,s^2+152\,\pi^2\,t^2\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\omega\xi^2\,s^2+$$
$$376\,\pi^2\,t\,u\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\omega\xi^2\,s^2+152\,\pi^2\,t^2\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\omega\xi^2\,s^2+376\,\pi^2\,t\,u\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\omega\xi^2\,s^2-$$

$$104\,\pi^2\,t^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s^2 - 168\,\pi^2\,t\,u\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s^2 - 104\,\pi^2\,t^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s^2 -$$
$$168\,\pi^2\,t\,u\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s^2 + 104\,\pi^2\,t^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s^2 + 168\,\pi^2\,t\,u\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s^2 +$$
$$104\,\pi^2\,t^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s^2 + 168\,\pi^2\,t\,u\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s^2 - 42\,i\,\pi\,t^2\,\delta1\,\Delta1\,\xi\,\omega\xi\,s^2 +$$
$$182\,i\,\pi\,u^2\,\delta1\,\Delta1\,\xi\,\omega\xi\,s^2 + 52\,i\,\pi\,t\,u\,\delta1\,\Delta1\,\xi\,\omega\xi\,s^2 - 42\,i\,\pi\,t^2\,\delta2\,\Delta2\,\xi\,\omega\xi\,s^2 + 182\,i\,\pi\,u^2\,\delta2\,\Delta2\,\xi\,\omega\xi\,s^2 +$$
$$52\,i\,\pi\,t\,u\,\delta2\,\Delta2\,\xi\,\omega\xi\,s^2 + 31\,i\,e^{\beta\,\omega}\,\pi\,t^2\,\delta3\,\Delta3\,\xi\,\omega\xi\,s^2 + 31\,i\,\pi\,t^2\,\delta3\,\Delta3\,\xi\,\omega\xi\,s^2 + 67\,i\,e^{\beta\,\omega}\,\pi\,t\,u\,\delta3\,\Delta3\,\xi\,\omega\xi\,s^2 +$$
$$67\,i\,\pi\,t\,u\,\delta3\,\Delta3\,\xi\,\omega\xi\,s^2 + 31\,i\,e^{\beta\,\omega}\,\pi\,t^2\,\delta4\,\Delta4\,\xi\,\omega\xi\,s^2 + 31\,i\,\pi\,t^2\,\delta4\,\Delta4\,\xi\,\omega\xi\,s^2 + 67\,i\,e^{\beta\,\omega}\,\pi\,t\,u\,\delta4\,\Delta4\,\xi\,\omega\xi\,s^2 +$$
$$67\,i\,\pi\,t\,u\,\delta4\,\Delta4\,\xi\,\omega\xi\,s^2 + 7\,e^{\beta\,\omega}\,u^3\,\xi^2\,s + 7\,u^3\,\xi^2\,s + 98\,e^{\beta\,\omega}\,t\,u^2\,\xi^2\,s + 98\,t\,u^2\,\xi^2\,s + 63\,e^{\beta\,\omega}\,t^2\,u\,\xi^2\,s +$$
$$63\,t^2\,u\,\xi^2\,s - 8\,\pi^2\,t^4\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,s + 82\,\pi^2\,t\,u^3\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,s + 72\,\pi^2\,t^2\,u^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,s -$$
$$2\,\pi^2\,t^3\,u\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,s - 8\,\pi^2\,t^4\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,s + 82\,\pi^2\,t\,u^3\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,s + 72\,\pi^2\,t^2\,u^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,s -$$
$$2\,\pi^2\,t^3\,u\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,s - 8\,\pi^2\,t^4\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,s + 82\,\pi^2\,t\,u^3\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,s + 72\,\pi^2\,t^2\,u^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,s -$$
$$2\,\pi^2\,t^3\,u\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,s - 8\,\pi^2\,t^4\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,s + 82\,\pi^2\,t\,u^3\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,s + 72\,\pi^2\,t^2\,u^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,s -$$
$$2\,\pi^2\,t^3\,u\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,s + 21\,i\,e^{\beta\,\omega}\,\pi\,t^3\,\delta3\,\Delta3\,\xi\,\omega^2\,s + 21\,i\,\pi\,t^3\,\delta3\,\Delta3\,\xi\,\omega^2\,s - 7\,i\,e^{\beta\,\omega}\,\pi\,t\,u^2\,\delta3\,\Delta3\,\xi\,\omega^2\,s -$$
$$7\,i\,\pi\,t\,u^2\,\delta3\,\Delta3\,\xi\,\omega^2\,s + 26\,i\,e^{\beta\,\omega}\,\pi\,t^2\,u\,\delta3\,\Delta3\,\xi\,\omega^2\,s + 26\,i\,\pi\,t^2\,u\,\delta3\,\Delta3\,\xi\,\omega^2\,s - 21\,i\,e^{\beta\,\omega}\,\pi\,t^3\,\delta4\,\Delta4\,\xi\,\omega^2\,s -$$
$$21\,i\,\pi\,t^3\,\delta4\,\Delta4\,\xi\,\omega^2\,s + 7\,i\,e^{\beta\,\omega}\,\pi\,t\,u^2\,\delta4\,\Delta4\,\xi\,\omega^2\,s + 7\,i\,\pi\,t\,u^2\,\delta4\,\Delta4\,\xi\,\omega^2\,s - 26\,i\,e^{\beta\,\omega}\,\pi\,t^2\,u\,\delta4\,\Delta4\,\xi\,\omega^2\,s -$$
$$26\,i\,\pi\,t^2\,u\,\delta4\,\Delta4\,\xi\,\omega^2\,s - 4\,\pi^2\,t^3\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi^2\,s + 348\,\pi^2\,t\,u^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi^2\,s +$$
$$232\,\pi^2\,t^2\,u\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi^2\,s - 4\,\pi^2\,t^3\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi^2\,s + 348\,\pi^2\,t\,u^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi^2\,s +$$
$$232\,\pi^2\,t^2\,u\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi^2\,s - 4\,\pi^2\,t^3\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi^2\,s + 348\,\pi^2\,t\,u^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi^2\,s +$$
$$232\,\pi^2\,t^2\,u\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi^2\,s - 4\,\pi^2\,t^3\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi^2\,s + 348\,\pi^2\,t\,u^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi^2\,s +$$
$$232\,\pi^2\,t^2\,u\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi^2\,s - 20\,\pi^2\,t^3\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s - 196\,\pi^2\,t\,u^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s -$$
$$168\,\pi^2\,t^2\,u\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s - 20\,\pi^2\,t^3\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s - 196\,\pi^2\,t\,u^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s -$$
$$168\,\pi^2\,t^2\,u\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega^2\,\omega\xi\,s + 20\,\pi^2\,t^3\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s + 196\,\pi^2\,t\,u^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s +$$
$$168\,\pi^2\,t^2\,u\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s + 20\,\pi^2\,t^3\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s + 196\,\pi^2\,t\,u^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s +$$
$$168\,\pi^2\,t^2\,u\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega^2\,\omega\xi\,s - 10\,i\,\pi\,t^3\,\delta1\,\Delta1\,\xi\,\omega\xi\,s + 98\,i\,\pi\,u^3\,\delta1\,\Delta1\,\xi\,\omega\xi\,s - 14\,i\,\pi\,t\,u^2\,\delta1\,\Delta1\,\xi\,\omega\xi\,s -$$
$$74\,i\,\pi\,t^2\,u\,\delta1\,\Delta1\,\xi\,\omega\xi\,s - 10\,i\,\pi\,t^3\,\delta2\,\Delta2\,\xi\,\omega\xi\,s + 98\,i\,\pi\,u^3\,\delta2\,\Delta2\,\xi\,\omega\xi\,s - 14\,i\,\pi\,t\,u^2\,\delta2\,\Delta2\,\xi\,\omega\xi\,s -$$
$$74\,i\,\pi\,t^2\,u\,\delta2\,\Delta2\,\xi\,\omega\xi\,s - 23\,i\,e^{\beta\,\omega}\,\pi\,t^3\,\delta3\,\Delta3\,\xi\,\omega\xi\,s - 23\,i\,\pi\,t^3\,\delta3\,\Delta3\,\xi\,\omega\xi\,s + 137\,i\,e^{\beta\,\omega}\,\pi\,t\,u^2\,\delta3\,\Delta3\,\xi\,\omega\xi\,s +$$
$$137\,i\,\pi\,t\,u^2\,\delta3\,\Delta3\,\xi\,\omega\xi\,s + 54\,i\,e^{\beta\,\omega}\,\pi\,t^2\,u\,\delta3\,\Delta3\,\xi\,\omega\xi\,s + 54\,i\,\pi\,t^2\,u\,\delta3\,\Delta3\,\xi\,\omega\xi\,s -$$
$$23\,i\,e^{\beta\,\omega}\,\pi\,t^3\,\delta4\,\Delta4\,\xi\,\omega\xi\,s - 23\,i\,\pi\,t^3\,\delta4\,\Delta4\,\xi\,\omega\xi\,s + 137\,i\,e^{\beta\,\omega}\,\pi\,t\,u^2\,\delta4\,\Delta4\,\xi\,\omega\xi\,s + 137\,i\,\pi\,t\,u^2\,\delta4\,\Delta4\,\xi\,\omega\xi\,s +$$
$$54\,i\,e^{\beta\,\omega}\,\pi\,t^2\,u\,\delta4\,\Delta4\,\xi\,\omega\xi\,s + 54\,i\,\pi\,t^2\,u\,\delta4\,\Delta4\,\xi\,\omega\xi\,s - 5\,e^{\beta\,\omega}\,t^4\,\xi^2 - 5\,t^4\,\xi^2 + 7\,e^{\beta\,\omega}\,t\,u^3\,\xi^2 + 7\,t\,u^3\,\xi^2 +$$
$$5\,e^{\beta\,\omega}\,t^2\,u^2\,\xi^2 + 5\,t^2\,u^2\,\xi^2 - 7\,e^{\beta\,\omega}\,t^3\,u\,\xi^2 - 7\,t^3\,u\,\xi^2 + 5\,i\,e^{\beta\,\omega}\,\pi\,t^4\,\delta3\,\Delta3\,\xi\,\omega^2 + 5\,i\,\pi\,t^4\,\delta3\,\Delta3\,\xi\,\omega^2 +$$
$$49\,i\,e^{\beta\,\omega}\,\pi\,t\,u^3\,\delta3\,\Delta3\,\xi\,\omega^2 + 49\,i\,\pi\,t\,u^3\,\delta3\,\Delta3\,\xi\,\omega^2 + 91\,i\,e^{\beta\,\omega}\,\pi\,t^2\,u^2\,\delta3\,\Delta3\,\xi\,\omega^2 + 91\,i\,\pi\,t^2\,u^2\,\delta3\,\Delta3\,\xi\,\omega^2 +$$
$$47\,i\,e^{\beta\,\omega}\,\pi\,t^3\,u\,\delta3\,\Delta3\,\xi\,\omega^2 + 47\,i\,\pi\,t^3\,u\,\delta3\,\Delta3\,\xi\,\omega^2 - 5\,i\,e^{\beta\,\omega}\,\pi\,t^4\,\delta4\,\Delta4\,\xi\,\omega^2 - 5\,i\,\pi\,t^4\,\delta4\,\Delta4\,\xi\,\omega^2 -$$
$$49\,i\,e^{\beta\,\omega}\,\pi\,t\,u^3\,\delta4\,\Delta4\,\xi\,\omega^2 - 49\,i\,\pi\,t\,u^3\,\delta4\,\Delta4\,\xi\,\omega^2 - 91\,i\,e^{\beta\,\omega}\,\pi\,t^2\,u^2\,\delta4\,\Delta4\,\xi\,\omega^2 - 91\,i\,\pi\,t^2\,u^2\,\delta4\,\Delta4\,\xi\,\omega^2 -$$
$$47\,i\,e^{\beta\,\omega}\,\pi\,t^3\,u\,\delta4\,\Delta4\,\xi\,\omega^2 - 47\,i\,\pi\,t^3\,u\,\delta4\,\Delta4\,\xi\,\omega^2 - 15\,i\,e^{\beta\,\omega}\,\pi\,t^4\,\delta3\,\Delta3\,\xi\,\omega\xi - 15\,i\,\pi\,t^4\,\delta3\,\Delta3\,\xi\,\omega\xi +$$
$$77\,i\,e^{\beta\,\omega}\,\pi\,t\,u^3\,\delta3\,\Delta3\,\xi\,\omega\xi + 77\,i\,\pi\,t\,u^3\,\delta3\,\Delta3\,\xi\,\omega\xi - i\,e^{\beta\,\omega}\,\pi\,t^2\,u^2\,\delta3\,\Delta3\,\xi\,\omega\xi - i\,\pi\,t^2\,u^2\,\delta3\,\Delta3\,\xi\,\omega\xi -$$
$$61\,i\,e^{\beta\,\omega}\,\pi\,t^3\,u\,\delta3\,\Delta3\,\xi\,\omega\xi - 61\,i\,\pi\,t^3\,u\,\delta3\,\Delta3\,\xi\,\omega\xi - 15\,i\,e^{\beta\,\omega}\,\pi\,t^4\,\delta4\,\Delta4\,\xi\,\omega\xi - 15\,i\,\pi\,t^4\,\delta4\,\Delta4\,\xi\,\omega\xi +$$
$$77\,i\,e^{\beta\,\omega}\,\pi\,t\,u^3\,\delta4\,\Delta4\,\xi\,\omega\xi + 77\,i\,\pi\,t\,u^3\,\delta4\,\Delta4\,\xi\,\omega\xi - i\,e^{\beta\,\omega}\,\pi\,t^2\,u^2\,\delta4\,\Delta4\,\xi\,\omega\xi - i\,\pi\,t^2\,u^2\,\delta4\,\Delta4\,\xi\,\omega\xi -$$
$$61\,i\,e^{\beta\,\omega}\,\pi\,t^3\,u\,\delta4\,\Delta4\,\xi\,\omega\xi - 61\,i\,\pi\,t^3\,u\,\delta4\,\Delta4\,\xi\,\omega\xi - \pi\,t\,\big(5\,s^2 + 26\,t\,s + 42\,u\,s + 5\,t^2 + 49\,u^2 + 42\,t\,u\big)$$
$$(\delta3\,\Delta3 - \delta4\,\Delta4)\,\omega^2\,(i\,(1 + e^{\beta\,\omega})\,s\,\xi - i\,(1 + e^{\beta\,\omega})\,(t + u)\,\xi + 4\,\pi\,s\,(\delta1\,\Delta1 + \delta2\,\Delta2)\,\omega\xi)\cos(\theta)\big)$$

```
s = (2 ω)^2
t = -2 ω^2 (1 - Cos[θ])
          cosseno
u = -2 ω^2 (1 + Cos[θ])
          cosseno
```

$$4\,\omega^2$$

$$-2\,\omega^2\,(1 - \cos(\theta))$$

$$-2\,\omega^2\,(\cos(\theta)+1)$$

%45

$$\frac{1}{128}\,\kappa^4\,\mathrm{U1}^4\,\mathrm{U2}^4\,\left(m^2+4\,\omega^2\right)^2$$
$$\left(\frac{1}{\xi^2\,\left(e^{\beta\,\omega}+1\right)^2}\pi^2\,\left((\delta 1\,\Delta 1+\delta 2\,\Delta 2)^2\,\left(4\,\omega\xi^2-2\,\xi^2\,\omega^2\,(\cos(\theta)+1)\right)+9\,m^4\,(\delta 1\,\Delta 1-\delta 2\,\Delta 2)^2+m^2\,\left(2\,\omega^2\,(\cos(\theta)+1)\right.\right.\right.$$
$$\left.\left.\left.(\delta 1\,\Delta 1-\delta 2\,\Delta 2)^2+(\delta 1\,\Delta 1+\delta 2\,\Delta 2)\,\left(7\,\xi^2\,(\delta 1\,\Delta 1+\delta 2\,\Delta 2)+16\,\omega\xi\,(\delta 2\,\Delta 2-\delta 1\,\Delta 1)\right)\right)\right)-$$
$$\left.\frac{1}{\left(m^2-4\,\omega^2\right)^2}\left(-8\,\omega^4\,(1-\cos(\theta))+m^4-m^2\,\left(-6\,\omega^2\,(1-\cos(\theta))-4\,\omega^2\,(\cos(\theta)+1)+20\,\omega^2\right)\right)\right)$$

%55

$$\frac{1}{512\,\xi^2\,\left(m^2+2\,\omega^2\,(1-\cos(\theta))\right)^2}$$
$$\mathrm{U1}^4\,\mathrm{U2}^4\,\kappa^4\,\left(\left(9\,\pi^2\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,m^8+\pi^2\,\left(7\,\delta 3^2\,\xi^2\,\Delta 3^2+2\,\delta 3^2\,\omega^2\,\Delta 3^2-16\,\delta 3^2\,\omega\xi\,\Delta 3^2+\right.\right.\right.$$
$$14\,\delta 3\,\delta 4\,\Delta 4\,\xi^2\,\Delta 3-4\,\delta 3\,\delta 4\,\Delta 4\,\omega^2\,\Delta 3+7\,\delta 4^2\,\Delta 4^2\,\xi^2+2\,\delta 4^2\,\Delta 4^2\,\omega^2+16\,\delta 4^2\,\Delta 4^2\,\omega\xi+$$
$$\left.36\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,\omega^2\,(1-\cos(\theta))+2\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,\omega^2\,(\cos(\theta)+1)\right)\,m^6+$$
$$\left(\pi^2\,\left(6\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,\omega^4+36\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,(1-\cos(\theta))^2\,\omega^4+\right.\right.$$
$$4\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,(\cos(\theta)+1)\,\omega^4-8\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)\,\omega\xi\,\omega^2-$$
$$2\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)^2\,\xi^2\,(\cos(\theta)+1)\,\omega^2-4\,(1-\cos(\theta))\,\left(\delta 3^2\,\left(-7\,\xi^2-2\,\omega^2+16\,\omega\xi\right)\,\Delta 3^2+\right.$$
$$2\,\delta 3\,\delta 4\,\Delta 4\,\left(2\,\omega^2-7\,\xi^2\right)\,\Delta 3-\delta 4^2\,\Delta 4^2\,\left(7\,\xi^2+2\,\omega^2+16\,\omega\xi\right)-$$
$$\left.\left.2\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,\omega^2\,(\cos(\theta)+1)\right)\,\omega^2+4\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)^2\,\omega\xi^2\right)-4\,\xi^2\Big)\,m^4-$$
$$\left(-4\,\left(-10\,(1-\cos(\theta))\,\omega^2-4\,(\cos(\theta)+1)\,\omega^2+12\,\omega^2\right)\,\xi^2-2\,\pi^2\,\omega^2\,(1-\cos(\theta))\right.$$
$$\left(2\,\left(6\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,\omega^4+4\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,(\cos(\theta)+1)\,\omega^4-\right.\right.$$
$$8\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)\,\omega\xi\,\omega^2-$$
$$2\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)^2\,\xi^2\,(\cos(\theta)+1)\,\omega^2+4\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)^2\,\omega\xi^2\Big)-$$
$$2\,\omega^2\,(1-\cos(\theta))\,\left(\delta 3^2\,\left(-7\,\xi^2-2\,\omega^2+16\,\omega\xi\right)\,\Delta 3^2+2\,\delta 3\,\delta 4\,\Delta 4\,\left(2\,\omega^2-7\,\xi^2\right)\,\Delta 3-\right.$$
$$\left.\left.\left.\delta 4^2\,\Delta 4^2\,\left(7\,\xi^2+2\,\omega^2+16\,\omega\xi\right)-2\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,\omega^2\,(\cos(\theta)+1)\right)\right)\right)\,m^2-$$
$$2\,\omega^2\,(1-\cos(\theta))\,\left(-16\,\xi^2\,\omega^2-2\,\pi^2\,(1-\cos(\theta))\,\left(6\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,\omega^4+\right.\right.$$
$$4\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,(\cos(\theta)+1)\,\omega^4-8\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)\,\omega\xi\,\omega^2-$$
$$\left.\left.2\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)^2\,\xi^2\,(\cos(\theta)+1)\,\omega^2+4\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)^2\,\omega\xi^2\right)\,\omega^2\right)\Big)$$
$$\left(m^2-2\,\omega^2\,(1-\cos(\theta))\right)^2+2\,\pi^2\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)$$
$$\omega^2$$
$$\left(m^4-4\,\omega^4\,(1-\cos(\theta))^2\right)^2$$
$$\left((\delta 3\,\Delta 3-\delta 4\,\Delta 4)\,\cos(2\,\theta)\,\omega^2+\right.$$
$$\left.\cos(\theta)\,\left((\delta 3\,\Delta 3-\delta 4\,\Delta 4)\,\left(m^2+4\,\omega^2+2\,\omega^2\,(\cos(\theta)+1)\right)-4\,(\delta 3\,\Delta 3+\delta 4\,\Delta 4)\,\omega\xi\right)\right)$$

%62

$$\Big(\mathrm{U1}^4\,\mathrm{U2}^4\,\kappa^4\Big(\cdots 332 \cdots + \pi\,(\delta 3\,\Delta 3 - \delta 4\,\Delta 4)\,\omega^2\Big(\cdots 1 \cdots\Big)\cos(\theta)\Big(\cdots 6 \cdots + \big(20\,(1-\cos(\theta))^2\,\omega^4 + 196\,(\cos(\theta)+1)^2\,\omega^4 - 208\,(1-\cos(\theta))\,\omega^4 + 168\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^4 - 336\,(\cos(\theta)+1)\,\omega^4 + 80\,\omega^4\big)\Big(4\,i\,(1+e^{\beta\,\omega})\,\xi\,\omega^2 + 16\,\pi\,\big(\delta 1\,\Delta 1 + \cdots 1 \cdots\big)\,\omega\xi\,\omega^2 - i\Big(1+e^{\cdots 1 \cdots}\Big)\,\xi\,\big(-2\,(1-\cos(\theta))\,\omega^2 - 2\,(\cos(\theta)+1)\,\omega^2\big)\Big)\Big)\Big)\Big/ \big(2048\,(1+e^{\beta\,\omega})\,\xi^2\,\big(m^2-4\,\omega^2\big)\big(m^2+2\,\omega^2\,(1-\cos(\theta))\big)\big)$$

large output | **show less** | **show more** | **show all** | **set size limit...**

FullSimplify[%67]

simplifica completamente

$$\frac{1}{128}\,\kappa^4\,\mathrm{U1}^4\,\mathrm{U2}^4\,\big(m^2+4\,\omega^2\big)^2\left(\frac{1}{\xi^2\,(e^{\beta\,\omega}+1)^2}\pi^2\,\big((\delta 1\,\Delta 1+\delta 2\,\Delta 2)^2\,\big(4\,\omega\xi^2 - 2\,\xi^2\,\omega^2\,(\cos(\theta)+1)\big) + 9\,m^4\,(\delta 1\,\Delta 1-\delta 2\,\Delta 2)^2 + m^2\,\big(2\,\omega^2\,(\cos(\theta)+1)\,(\delta 1\,\Delta 1-\delta 2\,\Delta 2)^2 + (\delta 1\,\Delta 1+\delta 2\,\Delta 2)\,\big(7\,\xi^2\,(\delta 1\,\Delta 1+\delta 2\,\Delta 2) + 16\,\omega\xi\,(\delta 2\,\Delta 2-\delta 1\,\Delta 1)\big)\big)\big) + \frac{-m^4 + 2\,\omega^2\cos(\theta)\,\big(m^2-4\,\omega^2\big) + 10\,m^2\,\omega^2 + 8\,\omega^4}{\big(m^2-4\,\omega^2\big)^2}\right)$$

FullSimplify[%68]

simplifica completamente

$Aborted

%67 + %68 + %69

$$\frac{1}{128}\,\mathrm{U1}^4\,\mathrm{U2}^4\,\big(m^2+4\,\omega^2\big)^2\Big(\frac{1}{(1+e^{\beta\,\omega})^2\,\xi^2}\pi^2\,\big(9\,(\delta 1\,\Delta 1-\delta 2\,\Delta 2)^2\,m^4 + \big(2\,(\delta 1\,\Delta 1-\delta 2\,\Delta 2)^2\,(\cos(\theta)+1)\,\omega^2 + (\delta 1\,\Delta 1+\delta 2\,\Delta 2)\,\big(7\,(\delta 1\,\Delta 1+\delta 2\,\Delta 2)\,\xi^2 + 16\,(\delta 2\,\Delta 2-\delta 1\,\Delta 1)\,\omega\xi\big)\big)\,m^2 + (\delta 1\,\Delta 1+\delta 2\,\Delta 2)^2\,\big(4\,\omega\xi^2 - 2\,\xi^2\,\omega^2\,(\cos(\theta)+1)\big)\big) - \frac{m^4-\big(-6\,(1-\cos(\theta))\,\omega^2-4\,(\cos(\theta)+1)\,\omega^2+20\,\omega^2\big)\,m^2-8\,\omega^4\,(1-\cos(\theta))}{\big(m^2-4\,\omega^2\big)^2}\Big)\kappa^4 + \frac{\mathrm{U1}^4\,\mathrm{U2}^4\,\big(\cdots 332 \cdots + \pi\,\cdots 4 \cdots\,\big(\cdots 1 \cdots\big)\big)\,\kappa^4}{2048\,(1+e^{\beta\,\omega})\,\xi^2\,\big(m^2-4\,\omega^2\big)\big(m^2+2\,\omega^2\,(1-\cos(\theta))\big)} + \Big(\mathrm{U1}^4\,\mathrm{U2}^4\,\Big(\big(9\,\pi^2\,(\delta 3\,\Delta 3-\delta 4\,\Delta 4)^2\,m^8 + \cdots 6 \cdots\big)\,\big(m^2-2\,\omega^2\,(1-\cos(\theta))\big)^2 + 2\,\pi^2\,\cdots 2 \cdots\,\cdots 1 \cdots^2\,\big((\delta 3\,\Delta 3-\delta 4\,\Delta 4)\cos(2\,\theta)\,\omega^2 + \cos(\theta)\,\big(\big(\cdots 1 \cdots\big)\big(\cdots 1 \cdots\big) - \cdots 1 \cdots\big)\big)\Big)\,\kappa^4\Big)\Big/\Big(512\,\xi^2\,\big(m^2+2\,\omega^2\,(1-\cos(\theta))\big)^2\Big)$$

large output | **show less** | **show more** | **show all** | **set size limit...**

Limit[%, m → 0]

limite

$$\frac{1}{8}\,\mathrm{U1}^4\,\mathrm{U2}^4\,\omega^4\left(\frac{\pi^2\,\big(4\,\omega\xi^2 - 2\,\xi^2\,\omega^2\,(\cos(\theta)+1)\big)\,(\delta 1\,\Delta 1+\delta 2\,\Delta 2)^2}{(1+e^{\beta\,\omega})^2\,\xi^2} + \frac{1}{2}\,(1-\cos(\theta))\right)\kappa^4 - \frac{1}{16\,384\,(1+e^{\beta\,\omega})\,\xi^2\,\omega^4\,(1-\cos(\theta))}$$

$$
\begin{aligned}
&U1^4\,U2^4\,\big(-512\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^4\,\omega^{10} - 512\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^4\,\omega^{10} - \\
&\quad 512\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^4\,\omega^{10} - 512\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^4\,\omega^{10} + \\
&\quad 80\,i\,e^{\beta\,\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^4\,\omega^{10} + 80\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^4\,\omega^{10} - 80\,i\,e^{\beta\,\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^4\,\omega^{10} - \\
&\quad 80\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^4\,\omega^{10} - 1024\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^3\,\omega^{10} - \\
&\quad 1024\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^3\,\omega^{10} - 1024\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^3\,\omega^{10} - \\
&\quad 1024\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^3\,\omega^{10} - 672\,i\,e^{\beta\,\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^3\,\omega^{10} - \\
&\quad 672\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^3\,\omega^{10} + 672\,i\,e^{\beta\,\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^3\,\omega^{10} + 672\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^3\,\omega^{10} + \\
&\quad 640\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))^3\,\omega^{10} + 640\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))^3\,\omega^{10} - \\
&\quad 640\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))^3\,\omega^{10} - 640\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))^3\,\omega^{10} + \\
&\quad 5248\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^{10} + 5248\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2 \\
&\qquad (1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^{10} + 5248\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^{10} + \\
&\quad 5248\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^{10} + 784\,i\,e^{\beta\,\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^{10} + \\
&\quad 784\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^{10} - 784\,i\,e^{\beta\,\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^{10} - \\
&\quad 784\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^{10} + 2048\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^2\,\omega^{10} + \\
&\quad 2048\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^2\,\omega^{10} + 2048\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^2\,\omega^{10} + \\
&\quad 2048\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^2\,\omega^{10} - 1344\,i\,e^{\beta\,\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^2\,\omega^{10} - \\
&\quad 1344\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^2\,\omega^{10} + 1344\,i\,e^{\beta\,\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^2\,\omega^{10} + \\
&\quad 1344\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^2\,\omega^{10} - 6656\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))^2\,\omega^{10} - \\
&\quad 6656\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))^2\,\omega^{10} + 6656\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))^2\,\omega^{10} + \\
&\quad 6656\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))^2\,\omega^{10} + 4608\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^{10} + 4608\,\pi^2 \\
&\qquad \delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^{10} + 4608\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^{10} + \\
&\quad 4608\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^{10} + 1456\,i\,e^{\beta\,\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^{10} + \\
&\quad 1456\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^{10} - 1456\,i\,e^{\beta\,\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^{10} - \\
&\quad 1456\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^{10} - 9216\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} - \\
&\quad 9216\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} - \\
&\quad 9216\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} - \\
&\quad 9216\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} + 224\,i\,e^{\beta\,\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} + \\
&\quad 224\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} - 224\,i\,e^{\beta\,\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} - \\
&\quad 224\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} + 6272\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} + \\
&\quad 6272\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} - 6272\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2 \\
&\qquad \omega^{10} - 6272\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^{10} + 4096\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))\,\omega^{10} + \\
&\quad 4096\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))\,\omega^{10} + 4096\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))\,\omega^{10} + \\
&\quad 4096\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))\,\omega^{10} + 640\,i\,e^{\beta\,\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))\,\omega^{10} + \\
&\quad 640\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))\,\omega^{10} - 640\,i\,e^{\beta\,\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))\,\omega^{10} - 640\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))\,\omega^{10} + \\
&\quad 2560\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))\,\omega^{10} + 2560\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))\,\omega^{10} - \\
&\quad 2560\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))\,\omega^{10} - 2560\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))\,\omega^{10} - \\
&\quad 128\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^{10} - 128\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^{10} - \\
&\quad 128\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^{10} - 128\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^{10} + \\
&\quad 752\,i\,e^{\beta\,\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^{10} + 752\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^{10} - \\
&\quad 752\,i\,e^{\beta\,\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^{10} - 752\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^{10} - \\
&\quad 8192\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} - 8192\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2 \\
&\qquad (1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} - 8192\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} - \\
&\quad 8192\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} - 832\,i\,e^{\beta\,\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} - \\
&\quad 832\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} + 832\,i\,e^{\beta\,\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} + \\
&\quad 832\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} + 5376\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} + 5376 \\
&\qquad \pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} - 5376\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} -
\end{aligned}
$$

$$5376\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^{10} - 512\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} -$$
$$512\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} - 512\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} -$$
$$512\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} - 2368\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} -$$
$$2368\,i\,\pi\,\delta3\,\Delta3\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} + 2368\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} +$$
$$2368\,i\,\pi\,\delta4\,\Delta4\,\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} - 10\,752\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} -$$
$$10\,752\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} + 10\,752\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))$$
$$(\cos(\theta)+1)\,\omega^{10} + 10\,752\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^{10} - 80\,e^{\beta\omega}\,\xi^2\,(1-\cos(\theta))^4\,\omega^8 -$$
$$80\,\xi^2\,(1-\cos(\theta))^4\,\omega^8 - 240\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^4\,\omega^8 - 240\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^4\,\omega^8 -$$
$$240\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^4\,\omega^8 - 240\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^4\,\omega^8 +$$
$$128\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))^3\,\omega^8 + 128\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))^3\,\omega^8 +$$
$$128\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))^3\,\omega^8 + 128\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))^3\,\omega^8 +$$
$$320\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,\omega^8 + 320\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,\omega^8 +$$
$$736\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,\omega^8 + 736\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,\omega^8 +$$
$$736\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,\omega^8 + 736\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,\omega^8 - 224\,e^{\beta\omega}\,\xi^2\,(\cos(\theta)+1)^3\,\omega^8 -$$
$$224\,\xi^2\,(\cos(\theta)+1)^3\,\omega^8 - 3136\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,(\cos(\theta)+1)^3\,\omega^8 - 3136\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,(\cos(\theta)+1)^3\,\omega^8 +$$
$$112\,e^{\beta\omega}\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^8 + 112\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^8 +$$
$$1232\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^8 + 1232\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^8 +$$
$$1232\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^8 + 1232\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^3\,\omega^8 -$$
$$1280\,e^{\beta\omega}\,\xi^2\,\omega^8 - 1280\,\xi^2\,\omega^8 + 2688\,e^{\beta\omega}\,\xi^2\,(1-\cos(\theta))^2\,\omega^8 + 2688\,\xi^2\,(1-\cos(\theta))^2\,\omega^8 +$$
$$9728\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))^2\,\omega^8 + 9728\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))^2\,\omega^8 +$$
$$9728\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))^2\,\omega^8 + 9728\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))^2\,\omega^8 -$$
$$2688\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,\omega^8 - 2688\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,\omega^8 +$$
$$1984\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,\omega^8 + 1984\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,\omega^8 +$$
$$1984\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,\omega^8 + 1984\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,\omega^8 +$$
$$320\,e^{\beta\omega}\,\xi^2\,(\cos(\theta)+1)^2\,\omega^8 + 320\,\xi^2\,(\cos(\theta)+1)^2\,\omega^8 + 80\,e^{\beta\omega}\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^8 +$$
$$80\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^8 - 16\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^8 -$$
$$16\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^8 - 16\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^8 -$$
$$16\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)^2\,\omega^8 + 11\,648\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,(\cos(\theta)+1)^2\,\omega^8 +$$
$$11\,648\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,(\cos(\theta)+1)^2\,\omega^8 - 3136\,e^{\beta\omega}\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 -$$
$$3136\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 - 11\,136\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 -$$
$$11\,136\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 -$$
$$11\,136\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 -$$
$$11\,136\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 + 448\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 +$$
$$448\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 - 4384\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 -$$
$$4384\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 - 4384\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 -$$
$$4384\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)^2\,\omega^8 + 2560\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,\omega^8 + 2560\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,\omega^8 -$$
$$11\,776\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))\,\omega^8 - 11\,776\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))\,\omega^8 -$$
$$11\,776\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))\,\omega^8 - 11\,776\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))\,\omega^8 -$$
$$5376\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,(1-\cos(\theta))\,\omega^8 - 5376\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,(1-\cos(\theta))\,\omega^8 -$$
$$896\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))\,\omega^8 - 896\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))\,\omega^8 -$$
$$896\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))\,\omega^8 - 896\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))\,\omega^8 -$$
$$112\,e^{\beta\omega}\,\xi^2\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^8 - 112\,\xi^2\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^8 -$$
$$976\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^8 - 976\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^8 -$$
$$976\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^8 - 976\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^3\,(\cos(\theta)+1)\,\omega^8 +$$
$$896\,e^{\beta\omega}\,\xi^2\,(\cos(\theta)+1)\,\omega^8 + 896\,\xi^2\,(\cos(\theta)+1)\,\omega^8 - 2016\,e^{\beta\omega}\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 -$$
$$2016\,\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 - 7424\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 -$$

$$7424\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 -$$
$$7424\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 -$$
$$7424\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 + 2368\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 +$$
$$2368\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 - 1728\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 -$$
$$1728\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 - 1728\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 -$$
$$1728\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))^2\,(\cos(\theta)+1)\,\omega^8 - 12\,032\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,(\cos(\theta)+1)\,\omega^8 -$$
$$12\,032\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,(\cos(\theta)+1)\,\omega^8 + 4032\,e^{\beta\omega}\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 +$$
$$4032\,\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 + 24\,064\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 +$$
$$24\,064\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 + 24\,064\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi^2$$
$$(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 + 24\,064\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi^2\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 +$$
$$3328\,i\,\pi\,\delta1\,\Delta1\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 + 3328\,i\,\pi\,\delta2\,\Delta2\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 +$$
$$4288\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 + 4288\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 +$$
$$4288\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 + 4288\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega\xi\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^8 +$$
$$2\,\pi\,(\delta3\,\Delta3-\delta4\,\Delta4)\,(1-\cos(\theta))\,\cos(\theta)\,\big(20\,(1-\cos(\theta))^2\,\omega^4 + 196\,(\cos(\theta)+1)^2\,\omega^4 - 208\,(1-\cos(\theta))\,\omega^4 +$$
$$168\,(1-\cos(\theta))\,(\cos(\theta)+1)\,\omega^4 - 336\,(\cos(\theta)+1)\,\omega^4 + 80\,\omega^4\big)\big(4\,i\,(1+e^{\beta\omega})\,\xi\,\omega^2 +$$
$$16\,\pi\,(\delta1\,\Delta1+\delta2\,\Delta2)\,\omega\xi\,\omega^2 - i\,(1+e^{\beta\omega})\,\xi\,\big(-2\,(1-\cos(\theta))\,\omega^2 - 2\,(\cos(\theta)+1)\,\omega^2\big)\big)\,\omega^4\big)\,\kappa^4 +$$
$$\frac{1}{2048\,\xi^2\,\omega^4\,(1-\cos(\theta))^2}\,U1^4\,U2^4\,\big(32\,\pi^2\,(\delta3\,\Delta3-\delta4\,\Delta4)\,\omega^{10}\,(1-\cos(\theta))^4\,\big((\delta3\,\Delta3-\delta4\,\Delta4)\cos(2\,\theta)\,\omega^2 +$$
$$\cos(\theta)\,\big((\delta3\,\Delta3-\delta4\,\Delta4)\,\big(2\,(\cos(\theta)+1)\,\omega^2+4\,\omega^2\big) - 4\,(\delta3\,\Delta3+\delta4\,\Delta4)\,\omega\xi\big)\big) -$$
$$8\,\omega^6\,(1-\cos(\theta))^3\,\big(-16\,\xi^2\,\omega^2 - 2\,\pi^2\,(1-\cos(\theta))\,\big(6\,(\delta3\,\Delta3-\delta4\,\Delta4)^2\,\omega^4 +$$
$$4\,(\delta3\,\Delta3-\delta4\,\Delta4)^2\,(\cos(\theta)+1)\,\omega^4 - 8\,(\delta3\,\Delta3-\delta4\,\Delta4)\,(\delta3\,\Delta3+\delta4\,\Delta4)\,\omega\xi\,\omega^2 -$$
$$2\,(\delta3\,\Delta3+\delta4\,\Delta4)^2\,\xi^2\,(\cos(\theta)+1)\,\omega^2 + 4\,(\delta3\,\Delta3+\delta4\,\Delta4)^2\,\omega\xi^2\big)\,\omega^2\big)\big)\,\kappa^4$$

Simplify[%]

simplifica

$$-\frac{1}{256\,(1+e^{\beta\omega})^2\,\xi^2}$$
$$U1^4\,U2^4\,\kappa^4\,\omega^4\,\big(-12\,e^{\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\,\omega^4 - 6\,e^{2\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\,\omega^4 - 6\,\pi^2\,\delta3^2\,\Delta3^2\,\omega^4 - 12\,e^{\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\,\omega^4 -$$
$$6\,e^{2\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\,\omega^4 - 6\,\pi^2\,\delta4^2\,\Delta4^2\,\omega^4 + 24\,e^{\beta\omega}\,\pi^2\,\delta3\,\Delta3\,\delta4\,\Delta4\,\omega^4 + 12\,e^{2\beta\omega}\,\pi^2\,\delta3\,\Delta3\,\delta4\,\Delta4\,\omega^4 +$$
$$12\,\pi^2\,\delta3\,\Delta3\,\delta4\,\Delta4\,\omega^4 - 4\,e^{\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\cos(4\,\theta)\,\omega^4 - 2\,e^{2\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\cos(4\,\theta)\,\omega^4 -$$
$$2\,\pi^2\,\delta3^2\,\Delta3^2\cos(4\,\theta)\,\omega^4 - 4\,e^{\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\cos(4\,\theta)\,\omega^4 - 2\,e^{2\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\cos(4\,\theta)\,\omega^4 -$$
$$2\,\pi^2\,\delta4^2\,\Delta4^2\cos(4\,\theta)\,\omega^4 + 8\,e^{\beta\omega}\,\pi^2\,\delta3\,\Delta3\,\delta4\,\Delta4\cos(4\,\theta)\,\omega^4 + 4\,e^{2\beta\omega}\,\pi^2\,\delta3\,\Delta3\,\delta4\,\Delta4\cos(4\,\theta)\,\omega^4 +$$
$$4\,\pi^2\,\delta3\,\Delta3\,\delta4\,\Delta4\cos(4\,\theta)\,\omega^4 + 64\,\pi^2\,\delta1^2\,\Delta1^2\,\xi^2\,\omega^2 + 64\,\pi^2\,\delta2^2\,\Delta2^2\,\xi^2\,\omega^2 + 4\,e^{\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\,\xi^2\,\omega^2 +$$
$$2\,e^{2\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\,\xi^2\,\omega^2 + 2\,\pi^2\,\delta3^2\,\Delta3^2\,\xi^2\,\omega^2 + 4\,e^{\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\,\xi^2\,\omega^2 + 2\,e^{2\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\,\xi^2\,\omega^2 +$$
$$2\,\pi^2\,\delta4^2\,\Delta4^2\,\xi^2\,\omega^2 + 128\,\pi^2\,\delta1\,\Delta1\,\delta2\,\Delta2\,\xi^2\,\omega^2 + 4\,e^{\beta\omega}\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,\omega^2 + 4\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\,\omega^2 +$$
$$4\,e^{\beta\omega}\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,\omega^2 + 4\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\,\omega^2 + 4\,e^{\beta\omega}\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,\omega^2 + 4\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\xi^2\,\omega^2 +$$
$$4\,e^{\beta\omega}\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,\omega^2 + 4\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\xi^2\,\omega^2 + 8\,e^{\beta\omega}\,\pi^2\,\delta3\,\Delta3\,\delta4\,\Delta4\,\xi^2\,\omega^2 +$$
$$4\,e^{2\beta\omega}\,\pi^2\,\delta3\,\Delta3\,\delta4\,\Delta4\,\xi^2\,\omega^2 + 4\,\pi^2\,\delta3\,\Delta3\,\delta4\,\Delta4\,\xi^2\,\omega^2 + 28\,i\,e^{\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega^2 + 14\,i\,e^{2\beta\omega}\,\pi\,\delta3\,\Delta3\,\xi\,\omega^2 +$$
$$14\,i\,\pi\,\delta3\,\Delta3\,\xi\,\omega^2 - 28\,i\,e^{\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega^2 - 14\,i\,e^{2\beta\omega}\,\pi\,\delta4\,\Delta4\,\xi\,\omega^2 - 14\,i\,\pi\,\delta4\,\Delta4\,\xi\,\omega^2 +$$
$$16\,e^{\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\,\omega\xi\,\omega^2 + 8\,e^{2\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\,\omega\xi\,\omega^2 + 8\,\pi^2\,\delta3^2\,\Delta3^2\,\omega\xi\,\omega^2 - 16\,e^{\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\,\omega\xi\,\omega^2 -$$
$$8\,e^{2\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\,\omega\xi\,\omega^2 - 8\,\pi^2\,\delta4^2\,\Delta4^2\,\omega\xi\,\omega^2 + 28\,e^{\beta\omega}\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi\,\omega^2 + 28\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\omega\xi\,\omega^2 +$$
$$28\,e^{\beta\omega}\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi\,\omega^2 + 28\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\omega\xi\,\omega^2 - 28\,e^{\beta\omega}\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi\,\omega^2 -$$
$$28\,\pi^2\,\delta1\,\Delta1\,\delta4\,\Delta4\,\omega\xi\,\omega^2 - 28\,e^{\beta\omega}\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi\,\omega^2 - 28\,\pi^2\,\delta2\,\Delta2\,\delta4\,\Delta4\,\omega\xi\,\omega^2 +$$
$$2\,e^{\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\,\xi^2\cos(3\,\theta)\,\omega^2 + e^{2\beta\omega}\,\pi^2\,\delta3^2\,\Delta3^2\,\xi^2\cos(3\,\theta)\,\omega^2 + \pi^2\,\delta3^2\,\Delta3^2\,\xi^2\cos(3\,\theta)\,\omega^2 +$$
$$2\,e^{\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\,\xi^2\cos(3\,\theta)\,\omega^2 + e^{2\beta\omega}\,\pi^2\,\delta4^2\,\Delta4^2\,\xi^2\cos(3\,\theta)\,\omega^2 + \pi^2\,\delta4^2\,\Delta4^2\,\xi^2\cos(3\,\theta)\,\omega^2 +$$
$$4\,e^{\beta\omega}\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\cos(3\,\theta)\,\omega^2 + 4\,\pi^2\,\delta1\,\Delta1\,\delta3\,\Delta3\,\xi^2\cos(3\,\theta)\,\omega^2 + 4\,e^{\beta\omega}\,\pi^2\,\delta2\,\Delta2\,\delta3\,\Delta3\,\xi^2\cos(3\,\theta)\,\omega^2 +$$

$$4\,\pi^2\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\xi^2\cos(3\,\theta)\,\omega^2 + 4\,e^{\beta\,\omega}\,\pi^2\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\xi^2\cos(3\,\theta)\,\omega^2 + 4\,\pi^2\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\xi^2\cos(3\,\theta)\,\omega^2 +$$
$$4\,e^{\beta\,\omega}\,\pi^2\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\xi^2\cos(3\,\theta)\,\omega^2 + 4\,\pi^2\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\xi^2\cos(3\,\theta)\,\omega^2 + 4\,e^{\beta\,\omega}\,\pi^2\,\delta 3\,\Delta 3\,\delta 4\,\Delta 4\,\xi^2\cos(3\,\theta)\,\omega^2 +$$
$$2\,e^{2\,\beta\,\omega}\,\pi^2\,\delta 3\,\Delta 3\,\delta 4\,\Delta 4\,\xi^2\cos(3\,\theta)\,\omega^2 + 2\,\pi^2\,\delta 3\,\Delta 3\,\delta 4\,\Delta 4\,\xi^2\cos(3\,\theta)\,\omega^2 + 6\,i\,e^{\beta\,\omega}\,\pi\,\delta 3\,\Delta 3\,\xi\cos(3\,\theta)\,\omega^2 +$$
$$3\,i\,e^{2\,\beta\,\omega}\,\pi\,\delta 3\,\Delta 3\,\xi\cos(3\,\theta)\,\omega^2 + 3\,i\,\pi\,\delta 3\,\Delta 3\,\xi\cos(3\,\theta)\,\omega^2 - 6\,i\,e^{\beta\,\omega}\,\pi\,\delta 4\,\Delta 4\,\xi\cos(3\,\theta)\,\omega^2 -$$
$$3\,i\,e^{2\,\beta\,\omega}\,\pi\,\delta 4\,\Delta 4\,\xi\cos(3\,\theta)\,\omega^2 - 3\,i\,\pi\,\delta 4\,\Delta 4\,\xi\cos(3\,\theta)\,\omega^2 + 8\,e^{\beta\,\omega}\,\pi^2\,\delta 3^2\,\Delta 3^2\,\omega\xi\cos(3\,\theta)\,\omega^2 +$$
$$4\,e^{2\,\beta\,\omega}\,\pi^2\,\delta 3^2\,\Delta 3^2\,\omega\xi\cos(3\,\theta)\,\omega^2 + 4\,\pi^2\,\delta 3^2\,\Delta 3^2\,\omega\xi\cos(3\,\theta)\,\omega^2 - 8\,e^{\beta\,\omega}\,\pi^2\,\delta 4^2\,\Delta 4^2\,\omega\xi\cos(3\,\theta)\,\omega^2 -$$
$$4\,e^{2\,\beta\,\omega}\,\pi^2\,\delta 4^2\,\Delta 4^2\,\omega\xi\cos(3\,\theta)\,\omega^2 - 4\,\pi^2\,\delta 4^2\,\Delta 4^2\,\omega\xi\cos(3\,\theta)\,\omega^2 + 6\,e^{\beta\,\omega}\,\pi^2\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega\xi\cos(3\,\theta)\,\omega^2 +$$
$$6\,\pi^2\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega\xi\cos(3\,\theta)\,\omega^2 + 6\,e^{\beta\,\omega}\,\pi^2\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\omega\xi\cos(3\,\theta)\,\omega^2 +$$
$$6\,\pi^2\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\omega\xi\cos(3\,\theta)\,\omega^2 - 6\,e^{\beta\,\omega}\,\pi^2\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\omega\xi\cos(3\,\theta)\,\omega^2 - 6\,\pi^2\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\omega\xi\cos(3\,\theta)\,\omega^2 -$$
$$6\,e^{\beta\,\omega}\,\pi^2\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\omega\xi\cos(3\,\theta)\,\omega^2 - 6\,\pi^2\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\omega\xi\cos(3\,\theta)\,\omega^2 - 36\,e^{\beta\,\omega}\,\xi^2 -$$
$$18\,e^{2\,\beta\,\omega}\,\xi^2 - 18\,\xi^2 - 128\,\pi^2\,\delta 1^2\,\Delta 1^2\,\omega\xi^2 - 128\,\pi^2\,\delta 2^2\,\Delta 2^2\,\omega\xi^2 - 24\,e^{\beta\,\omega}\,\pi^2\,\delta 3^2\,\Delta 3^2\,\omega\xi^2 -$$
$$12\,e^{2\,\beta\,\omega}\,\pi^2\,\delta 3^2\,\Delta 3^2\,\omega\xi^2 - 12\,\pi^2\,\delta 3^2\,\Delta 3^2\,\omega\xi^2 - 24\,e^{\beta\,\omega}\,\pi^2\,\delta 4^2\,\Delta 4^2\,\omega\xi^2 - 12\,e^{2\,\beta\,\omega}\,\pi^2\,\delta 4^2\,\Delta 4^2\,\omega\xi^2 -$$
$$12\,\pi^2\,\delta 4^2\,\Delta 4^2\,\omega\xi^2 - 256\,\pi^2\,\delta 1\,\Delta 1\,\delta 2\,\Delta 2\,\omega\xi^2 + 28\,e^{\beta\,\omega}\,\pi^2\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega\xi^2 + 28\,\pi^2\,\delta 1\,\Delta 1\,\delta 3\,\Delta 3\,\omega\xi^2 +$$
$$28\,e^{\beta\,\omega}\,\pi^2\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\omega\xi^2 + 28\,\pi^2\,\delta 2\,\Delta 2\,\delta 3\,\Delta 3\,\omega\xi^2 + 28\,e^{\beta\,\omega}\,\pi^2\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\omega\xi^2 + 28\,\pi^2\,\delta 1\,\Delta 1\,\delta 4\,\Delta 4\,\omega\xi^2 +$$
$$28\,e^{\beta\,\omega}\,\pi^2\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\omega\xi^2 + 28\,\pi^2\,\delta 2\,\Delta 2\,\delta 4\,\Delta 4\,\omega\xi^2 - 48\,e^{\beta\,\omega}\,\pi^2\,\delta 3\,\Delta 3\,\delta 4\,\Delta 4\,\omega\xi^2 -$$
$$24\,e^{2\,\beta\,\omega}\,\pi^2\,\delta 3\,\Delta 3\,\delta 4\,\Delta 4\,\omega\xi^2 - 24\,\pi^2\,\delta 3\,\Delta 3\,\delta 4\,\Delta 4\,\omega\xi^2 - 28\,i\,e^{\beta\,\omega}\,\pi\,\delta 1\,\Delta 1\,\xi\,\omega\xi - 28\,i\,\pi\,\delta 1\,\Delta 1\,\xi\,\omega\xi -$$
$$28\,i\,e^{\beta\,\omega}\,\pi\,\delta 2\,\Delta 2\,\xi\,\omega\xi - 28\,i\,\pi\,\delta 2\,\Delta 2\,\xi\,\omega\xi + 32\,i\,e^{\beta\,\omega}\,\pi\,\delta 3\,\Delta 3\,\xi\,\omega\xi + 16\,i\,e^{2\,\beta\,\omega}\,\pi\,\delta 3\,\Delta 3\,\xi\,\omega\xi +$$
$$16\,i\,\pi\,\delta 3\,\Delta 3\,\xi\,\omega\xi + 32\,i\,e^{\beta\,\omega}\,\pi\,\delta 4\,\Delta 4\,\xi\,\omega\xi + 16\,i\,e^{2\,\beta\,\omega}\,\pi\,\delta 4\,\Delta 4\,\xi\,\omega\xi + 16\,i\,\pi\,\delta 4\,\Delta 4\,\xi\,\omega\xi -$$
$$\Big(\big(-\pi^2\,\big(64\,\delta 1^2\,\Delta 1^2 + 4\,\delta 1\,(32\,\delta 2\,\Delta 2 + 15\,(\delta 3\,\Delta 3 + \delta 4\,\Delta 4))\,\Delta 1 + 64\,\delta 2^2\,\Delta 2^2 - (\delta 3\,\Delta 3 + \delta 4\,\Delta 4)^2 +$$
$$60\,\delta 2\,\Delta 2\,(\delta 3\,\Delta 3 + \delta 4\,\Delta 4)\big)\,\omega^2 + e^{\beta\,\omega}\,\big(48 - 2\,\pi^2\,(30\,\delta 1\,\Delta 1 + 30\,\delta 2\,\Delta 2 - \delta 3\,\Delta 3 - \delta 4\,\Delta 4)$$
$$(\delta 3\,\Delta 3 + \delta 4\,\Delta 4)\,\omega^2\big) + e^{2\,\beta\,\omega}\,\big(\pi^2\,(\delta 3\,\Delta 3 + \delta 4\,\Delta 4)^2\,\omega^2 + 24\big) + 24\big)\,\xi^2 - i\,(1 + e^{\beta\,\omega})\,\pi$$
$$\big((1 + e^{\beta\,\omega})\,\delta 3\,\Delta 3\,\big(45\,\omega^2 - 34\,\omega\xi\big) + 112\,(\delta 1\,\Delta 1 + \delta 2\,\Delta 2)\,\omega\xi - (1 + e^{\beta\,\omega})\,\delta 4\,\Delta 4\,\big(45\,\omega^2 + 34\,\omega\xi\big)\big)\,\xi -$$
$$2\,(1 + e^{\beta\,\omega})\,\pi^2\,\omega\xi\,\big(-2\,(1 + e^{\beta\,\omega})\,(\delta 3\,\Delta 3 + \delta 4\,\Delta 4)\,\big(\delta 3\,\Delta 3\,\big(\omega^2 - 4\,\omega\xi\big) - \delta 4\,\Delta 4\,\big(\omega^2 + 4\,\omega\xi\big)\big) +$$
$$\delta 1\,\Delta 1\,\big(\delta 3\,\Delta 3\,\big(45\,\omega^2 - 64\,\omega\xi\big) - \delta 4\,\Delta 4\,\big(45\,\omega^2 + 64\,\omega\xi\big)\big) +$$
$$\delta 2\,\Delta 2\,\big(\delta 3\,\Delta 3\,\big(45\,\omega^2 - 64\,\omega\xi\big) - \delta 4\,\Delta 4\,\big(45\,\omega^2 + 64\,\omega\xi\big)\big)\big)\big)\cos(\theta) - 2\,(1 + e^{\beta\,\omega})$$
$$\big(\big(-\pi^2\,(30\,\delta 1\,\Delta 1 + 30\,\delta 2\,\Delta 2 - \delta 3\,\Delta 3 - \delta 4\,\Delta 4)\,(\delta 3\,\Delta 3 + \delta 4\,\Delta 4)\,\omega^2 + e^{\beta\,\omega}\,\big(\pi^2\,(\delta 3\,\Delta 3 + \delta 4\,\Delta 4)^2\,\omega^2 + 3\big) + 3\big)$$
$$\xi^2 - i\,\pi\,\big(-(1 + e^{\beta\,\omega})\,\delta 4\,\Delta 4\,\big(17\,\omega^2 - 8\,\omega\xi\big) + 6\,(\delta 1\,\Delta 1 + \delta 2\,\Delta 2)\,\omega\xi + (1 + e^{\beta\,\omega})\,\delta 3\,\Delta 3\,\big(17\,\omega^2 + 8\,\omega\xi\big)\big)$$
$$\xi + 2\,\pi^2\,\big(-(1 + e^{\beta\,\omega})\,\delta 3^2\,\big(2\,\omega^4 - 2\,\omega\xi\,\omega^2 - \omega\xi^2\big)\,\Delta 3^2 +$$
$$\delta 3\,\big(2\,(1 + e^{\beta\,\omega})\,\delta 4\,\Delta 4\,\big(2\,\omega^4 + \omega\xi^2\big) - (\delta 1\,\Delta 1 + \delta 2\,\Delta 2)\,\big(17\,\omega^2 - 7\,\omega\xi\big)\,\omega\xi\big)\,\Delta 3 -$$
$$\delta 4\,\Delta 4\,\big((1 + e^{\beta\,\omega})\,\delta 4\,\Delta 4\,\big(2\,\omega^4 + 2\,\omega\xi\,\omega^2 - \omega\xi^2\big) - (\delta 1\,\Delta 1 + \delta 2\,\Delta 2)\,\omega\xi\,\big(17\,\omega^2 + 7\,\omega\xi\big)\big)\big)\big)\cos(2\,\theta) +$$
$$4\,i\,e^{\beta\,\omega}\,\pi\,\delta 3\,\Delta 3\,\xi\,\omega\xi\cos(3\,\theta) + 2\,i\,e^{2\,\beta\,\omega}\,\pi\,\delta 3\,\Delta 3\,\xi\,\omega\xi\cos(3\,\theta) + 2\,i\,\pi\,\delta 3\,\Delta 3\,\xi\,\omega\xi\cos(3\,\theta) +$$
$$4\,i\,e^{\beta\,\omega}\,\pi\,\delta 4\,\Delta 4\,\xi\,\omega\xi\cos(3\,\theta) + 2\,i\,e^{2\,\beta\,\omega}\,\pi\,\delta 4\,\Delta 4\,\xi\,\omega\xi\cos(3\,\theta) + 2\,i\,\pi\,\delta 4\,\Delta 4\,\xi\,\omega\xi\cos(3\,\theta)\big)$$