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Description of `c1susy3l.m`

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In the Mathematica file `c1susy3l.m` one can find the results for the matching coefficient C_1, decoupling constant ζ_3^0 and renormalization constant $\delta\Lambda_\varepsilon^2$ listed in the following table:

`Mathematica` expression	notation in paper
`C1h1`	$C_1^{\overline{\rm DR},({\rm h1})}$
`C1h2`	$C_1^{\overline{\rm DR},({\rm h2})}$
`C1h3`	$C_1^{\overline{\rm DR},({\rm h3})}$
`C1exact`	$C_1^{\overline{\rm DR}}$
`zeta30h1`	$\zeta_3^{0,({\rm h1})}$
`zeta30h2`	$\zeta_3^{0,({\rm h2})}$
`zeta30h3`	$\zeta_3^{0,({\rm h3})}$
`deltaLambdaeph1tst`	$\left(\delta\Lambda_{\varepsilon,\tilde{t}}^{({\rm h1})}\right)^2$
`deltaLambdaeph1sq`	$\left(\delta\Lambda_{\varepsilon,\tilde{q}}^{({\rm h1})}\right)^2$
`deltaLambdaeph2tst`	$\left(\delta\Lambda_{\varepsilon,\tilde{t}}^{({\rm h2})}\right)^2$
`deltaLambdaeph2sq`	$\left(\delta\Lambda_{\varepsilon,\tilde{q}}^{({\rm h2})}\right)^2$
`deltaLambdaeph3tst`	$\left(\delta\Lambda_{\varepsilon,\tilde{t}}^{({\rm h3})}\right)^2$
`deltaLambdaeph3sq`	$\left(\delta\Lambda_{\varepsilon,\tilde{q}}^{({\rm h3})}\right)^2$

- The superscripts (h1), (h2) and (h3) indicate that the corresponding quantity has been computed in a certain hierarchy (see Ref. [1]) for details.
- $C_1^{\overline{\rm DR},({\rm hi})}$ is expanded in terms of $\alpha_s^{(5),\overline{\rm MS}}(\mu_R) = \alpha_s^{(5)}(\mu_R)$ up to three-loop order.
- $C_1^{\overline{\rm DR}}$ is the exact result up to two loops.
- ζ_3^0 is the bare decoupling constant for the gluon field expressed in terms of $\overline{\rm DR}$ renormalized parameters. It is expanded in $\alpha_s^{(\rm SQCD)}(\mu_R)$.
- $\left(\delta\Lambda_\varepsilon\right)^2$ is the two-loop renormalization constant of the $h\varepsilon\varepsilon$ coupling and depends on $\alpha_s^{(\rm SQCD)}$.

In the expressions listed in the above table the following variables are used:

symbol	meaning	symbol	numerical value/meaning
apifull	$\alpha_s^{(\mathrm{SQCD})}/\pi$	tr	$\frac{1}{2}$
api5	$\alpha_s^{(5),\overline{\mathrm{MS}}}/\pi$	cf	$\frac{4}{3}$
Mes	M_ε	ca	3
mst1	$m_{\tilde{t}_1}$	na	8
mst2	$m_{\tilde{t}_2}$	d33	$\frac{5}{6}$
msq	$m_{\tilde{q}}$	nq	5
mgl	$m_{\tilde{g}}$	nt	1
mt	m_t	lm‘M’	$\ln \frac{\mu_R^2}{\text{‘M’}^2}$
Sthetat	$\sin\theta_t$	Dm2‘X’‘Y’	$\Delta^Q_{\text{‘X’,‘y’}} = \text{m‘X’}^2 - \text{m‘Y’}^2$
Cthetat	$\cos\theta_t$	Dm1‘X’‘Y’	$\Delta_{\text{‘X’,‘y’}} = \text{m‘X’} - \text{m‘Y’}$
Salpha	$\sin\alpha$	Sbeta	$\sin\beta$
Calpha	$\cos\alpha$	Cbeta	$\cos\beta$
Sw	$\sin\theta_W$	Mz	M_Z
ep	ϵ	muSUSY	μ_{susy}

In C1h‘i’ the basis masses are given by $m_R = m_{\tilde{t}_1}$ (h1), $m_R = m_{\tilde{g}}$ (h2), $m_{R_1} = m_{\tilde{g}}$ and $m_{R_2} = m_t$ (h3). The expressions contain the following mass differences:
Dm1glst1, Dm2st1st2, Dm2sqst1 (h1)
Dm2glst2, Dm2sqgl (h2)
Dm2st1t, Dm2glst2, Dm2sqgl (h3)
For further details on the meaning and definition of the parameters we refer to Ref. [1].

References

[1] A. Pak, M. Steinhauser and N. Zerf “Supersymmetric next-to-next-to-leading order corrections to Higgs boson production in gluon fusion” SFB/CPP-12-57, TTP12-26, LPN12-087.