The $h^0(125)$ ***decays to*** $c\bar{c}, b\bar{b}, \gamma\gamma$ and $g\,g$ ***in the light of the MSSM with quark flavor violation***

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Collaboration with
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References:

Phys. Rev. D 91 (2015) 015007 [arXiv:1411.2840 [hep-ph]]
JHEP 1606 (2016) 143 [arXiv:1604.02366 [hep-ph]]]
H. Eberl, E. Ginina, K.H., in preparation

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Contents

1. Introduction

2. MSSM with QFV

3. Constraints on the MSSM

4. Parameter scan in the MSSM

5. $h^0 \rightarrow$ photon photon & gluon gluon

6. Theoretical Errors

7. Conclusion

$\tilde{u}_{1,2}$

1. Introduction

- ***What is the SM-like Higgs boson discovered at LHC?***
- ***It can be the SM Higgs boson.***
- ***It can be a Higgs boson of New Physics.***
- ***This is one of the most important issues in the present particle physics field!***
- ***Here we study a possibility that it is the lightest Higgs boson*** h^0 ***of the Minimal Supersymmetric Standard Model (MSSM), focusing on the decays*** $h^0(125) \to c\bar{c}, b\bar{b}, \gamma\gamma$ and $g\,g$.

2. MSSM with QFV

The basic parameters of the MSSM with QFV:

$\{\tan\beta, m_A, M_1, M_2, M_3, \mu, M^2_{Q,\alpha\beta}, M^2_{U,\alpha\beta}, M^2_{D,\alpha\beta}, T_{U\alpha\beta}, T_{D\alpha\beta}\}$

(at $Q = 1$ TeV scale) ($\alpha,\beta = 1,2,3 =$ u, c, t or d, s, b)

$\tan\beta$: ratio of VEV of the two Higgs doublets $\langle H^0{}_2\rangle/\langle H^0{}_1\rangle$

m_A: CP odd Higgs boson mass (pole mass)

M_1, M_2, M_3: U(1), SU(2),SU(3) gaugino masses

μ: higgsino mass parameter

$M^2_{Q,\alpha\beta}$: left squark soft mass matrix

$M^2_{U\alpha\beta}$: right up-type squark soft mass matrix

$M^2_{D\alpha\beta}$: right down-type squark soft mass matrix

$T_{U\alpha\beta}$: trilinear coupling matrix of up-type squark and Higgs boson

$T_{D\alpha\beta}$: trilinear coupling matrix of down-type squark and Higgs boson

Key parameters in this study are:

QFV parameters: δ^{LL}_{23} , δ^{uRR}_{23} , δ^{uRL}_{23} , δ^{uLR}_{23}

QFC parameter: δ^{uRL}_{33}

$$\delta^{LL}_{23}\ (\sim M^2_{Q_{23}}) = (\tilde{c}_L - \tilde{t}_L\ \text{ mixing parameter})$$

$$\delta^{uRR}_{23}\ (\sim M^2_{U_{23}}) = (\tilde{c}_R - \tilde{t}_R\ \text{ mixing parameter})$$

$$\delta^{uRL}_{23}\ (\sim T_{U_{23}}) = (\tilde{c}_R - \tilde{t}_L\ \text{ mixing parameter})$$

$$\delta^{uLR}_{23}\ (\sim T_{U_{32}}) = (\tilde{c}_L - \tilde{t}_R\ \text{ mixing parameter})$$

$$\delta^{uRL}_{33}\ (\sim T_{U_{33}}) = (\tilde{t}_L - \tilde{t}_R\ \text{ mixing parameter})$$

3. ***Constraints on the MSSM***

We respect the following experimental and theoretical constraints:

(1) The recent LHC limits on the masses of squarks, sleptons, gluino, charginos and neutralinos.

(2) The constraint on ($m_{A/H+}$, $\tan\beta$) from recent MSSM Higgs boson search at LHC.

(3) The constraints on the QFV parameters from the B meson data.

$B(b \to s\gamma)$ ΔM_{Bs} $B(B_s \to \mu^+\mu^-)$ $B(B_u^+ \to \tau^+\nu)$ ***etc.***

(4) The constraints from the observed Higgs boson mass at LHC (allowing for theoretical uncertainty): 121.6 GeV < m_{h^0} < 128.6 GeV.

(5) Theoretical constraints from the vacuum stability conditions for the trilinear couplings T_{Uab} and T_{Dab}.

(6) The experimental limit on SUSY contributions to the electroweak ρ parameter $\Delta\rho$(SUSY) < 0.0012.

4. Parameter scan in the MSSM

- We compute the loop-induced decay widths $\Gamma(h^0 \to$ photon photon$)$ and $\Gamma(h^0 \to$ gluon gluon$)$ in the MSSM with QFV.

- Parameter points are generated by using random numbers in the following ranges (in units of GeV or GeV^2):

1 TeV < M_{SUSY} < 5 TeV

10 < $\tan\beta$ < 30
2500 < M_3 < 5000
200 < M_2 < 2500
200 < M_1 < 2500
(without assuming the GUT relation for M_1, M_2, M_3)
200 < mu < 2500
800 < m_A(pole) < 3000;

MQ2_11 = 4500^2 (fixed)
2500^2 < MQ2_22 < 4000^2
2500^2 < MQ2_33 < 4000^2
|MQ2_23| < 1000.^2 <=== *QFV param.*
MU2_11 = 4500^2 (fixed)
1000.^2 < MU2_22 < 4000.^2
600.^2 < MU2_33 < 3000.^2
|MU2_23| < 1200.^2 <=== *QFV param.*
MD2_11 = 4500^2 (fixed)
2500.^2 < MD2_22 < 4000.^2
1000.^2 < MD2_33 < 3000.^2
|MD2_23| < 1000.^2
ML2_11 = 1500^2 (fixed)
ML2_22 = 1500^2 (fixed)
ML2_33 = 1500^2 (fixed)
ML2_23 = 0. (fixed)

ME2_11 = 1500^2 (fixed)

ME2_22 = 1500^2 (fixed)

ME2_33 = 1500^2 (fixed)

ME2_23 = 0. (fixed)

|TU_23| < 4000 <=== QFV param

|TU_32| < 4000 <=== QFV param

|TU_33| < 4000 <=== QFC param.

|TD_23| < 1000

|TD_32| < 1000

|TD_33| < 1000

TE_23 = 0. (fixed)

TE_32 = 0. (fixed)

|TE_33| < 500

- In the parameter scan, all of the relevant experimental and theoretical constraints are imposed.

- The number of generated parameter points satisfying all the constraints is 285000.

5. $h^0 \rightarrow$ photon photon & gluon gluon

- *We compute the loop-induced decay widths $\Gamma(h^0$ -> photon photon) and $\Gamma(h^0$ -> gluon gluon).*

M. Spira et al., Nucl. Phys. B453(1995) 17 [hep-ph/9504378].

- *The computation includes*

(LO 1-loop contributions) + (gluonic 2-loop corrections).

(LO 1-loop contributions) = (SM particle loops) + (SUSY particle loops)
= (top-loop + ...) + (stop-loop + ...).

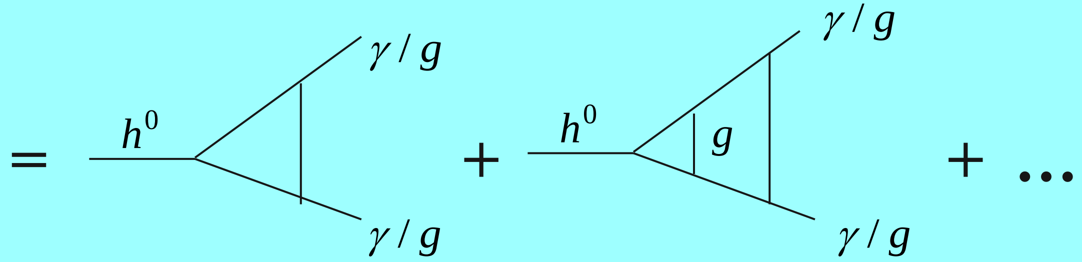
- *Main contributions to h^0 -> photon photon: W / top / stop - loops*
[(stop - loops) = (stop-scharm mixture loops)]

- *Main contributions to h^0 -> gluon gluon: top / stop - loops*

- *The width $\Gamma(h^0$ -> gluon gluon) can be measured very precisely at ILC, but it can not be measured directly at LHC.*

- ***Decay amplitude*** $M(h^0 \to \gamma\gamma / g\,g)$:

$M = M^{1\text{-}loop} + M^{2\text{-}loop} + \ldots$



$M^{1\text{-}loop}(h^0 \to \gamma\gamma) =$

$= M(W\text{-}loop) + M(top\text{-}loop) + M(stop\text{-}loop) + \ldots$

$M^{1\text{-}loop}(h^0 \to g\,g) =$

$= M(top\text{-}loop) + M(stop\text{-}loop) + \ldots$

5.1. Impact of QFV on h^0 decay

Main features of our QFV scenario:

- Decoupling Higgs scenario
- Large scharm-stop mixing terms M^2_{Q23}, M^2_{U23}, T_{U23}, T_{U32}
- Large stop/scharm involved QFV/QFC trilinear couplings T_{U23}, T_{U32}, T_{U33}

The stop/scharm loop contributions to the widths $\Gamma(h^0 \to \gamma\gamma / g g)$ are enhanced! (see next page)

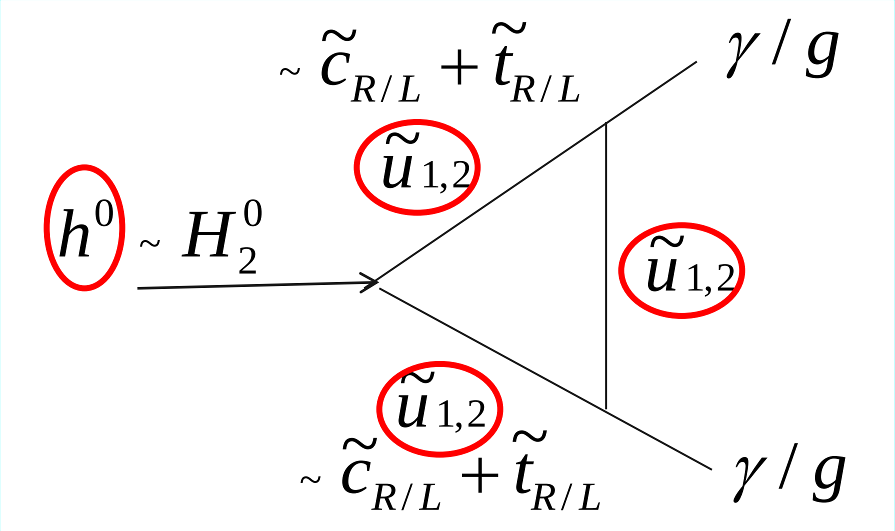
Large deviation of the MSSM prediction for $\Gamma(h^0 \to \gamma\gamma / g g)$ from the SM prediction!

This makes it easier to discover the QFV SUSY effects in these decays $h^0 \to \gamma\gamma / gg$!

In this large $\tilde{c}_{R/L} - \tilde{t}_{R/L}$ & $\tilde{t}_L - \tilde{t}_R$ *mixing scenario;*

$\tilde{u}_{1,2} \sim \tilde{c}_{R/L} + \tilde{t}_{R/L}$

$h^0 \sim H_2^0$



In our scenario "trilinear couplings" ($\tilde{c}_L - \tilde{t}_R - H_2^0$, $\tilde{c}_R - \tilde{t}_L - H_2^0$, $\tilde{t}_L - \tilde{t}_R - H_2^0$ **couplings)** *= (T_{U23} T_{U32}, T_{U33}) are large!*

$\tilde{u}_{1,2} - \tilde{u}_{1,2} - h^0$ ***couplings are large!***

Stop/scharm loop contributions can be large!

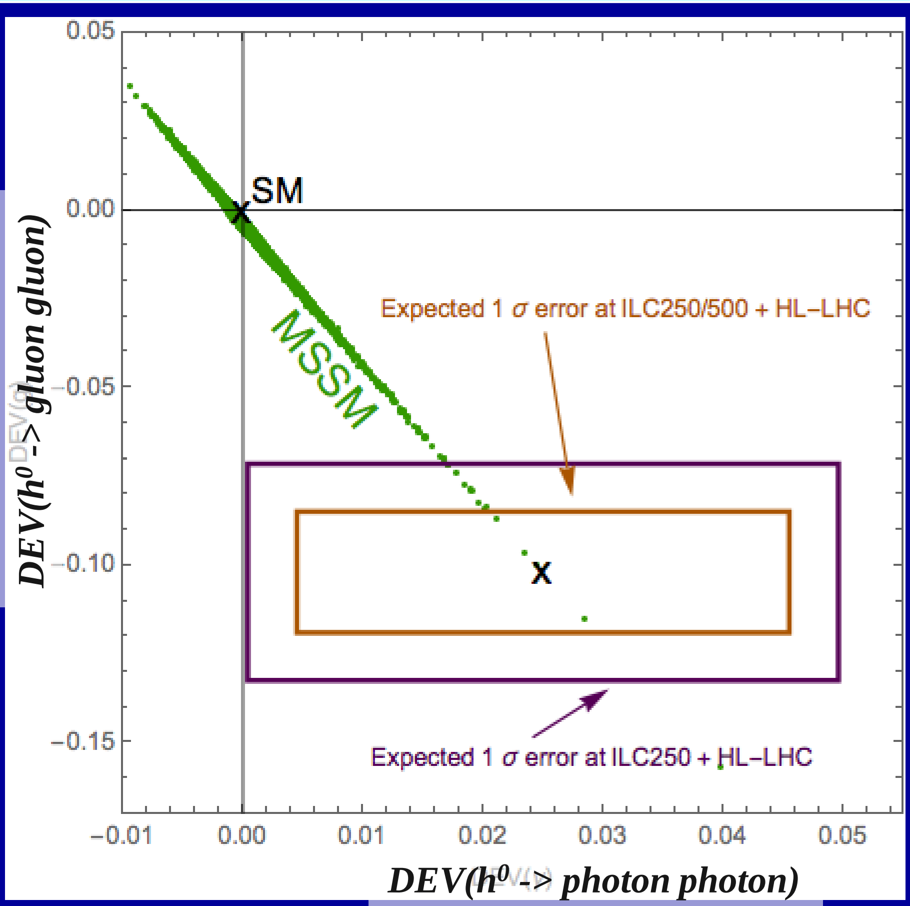
5.2 Deviation of the width from the SM prediction

- *The deviation of the width from the SM prediction:*

$$DEV(h^0 \to X\, X) = \Gamma(h^0 \to X\, X)_{MSSM} \,/\, \Gamma(h^0 \to X\, X)_{SM} - 1$$

X = photon, gluon

Scatter plot in DEV(h^0 -> photon photon) - DEV(h^0 -> gluon gluon) plane

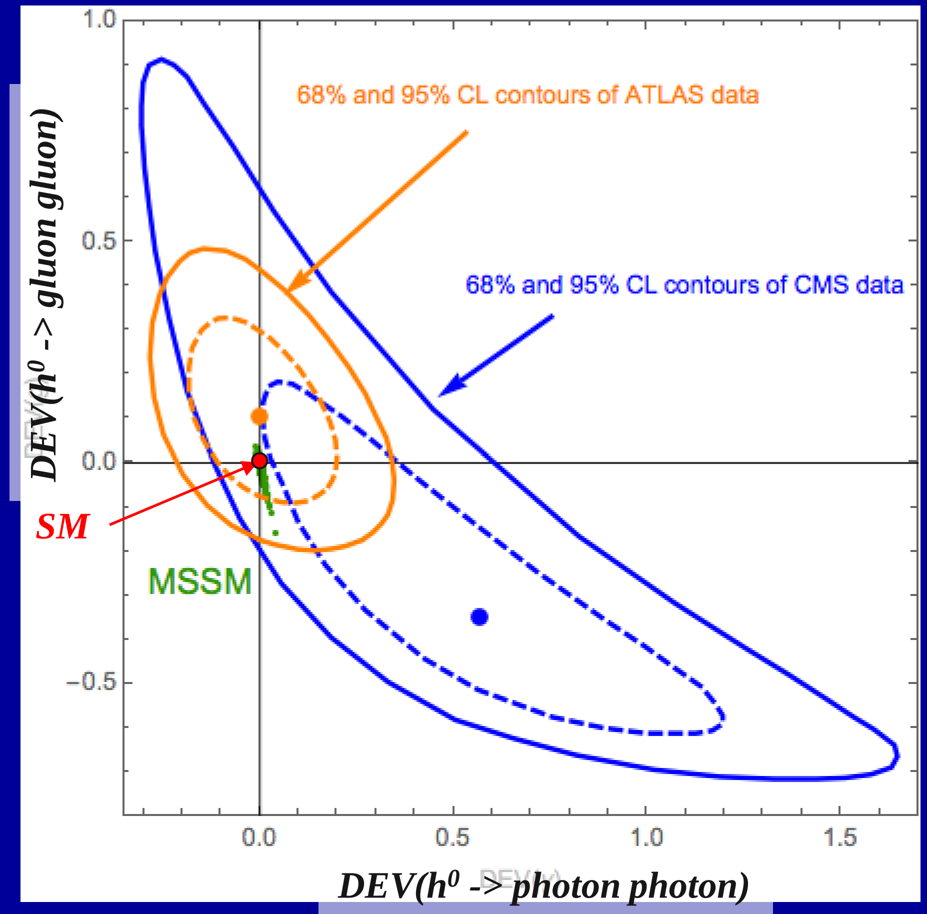


- *DEV(h^0 -> photon photon) and DEV(h^0 -> gluon gluon) can be sizable simultaneously!*

-*There is a strong correlation between DEV(h^0-> photon photon) and DEV(h^0 -> gluon gluon)!*

-*This correlation is due to the fact that the stop-loop (stop-scharm mixture loop) contributions dominate the two DEVs .*

Scatter plot in DEV(h^0 -> photon photon) - DEV(h^0 -> gluon gluon) plane



- *Both SM and MSSM are consistent with the recent ATLAS/CMS data!:*
  ATLAS: ATLAS-CONF-2018-031 (ICHEP2018)
  CMS: arXiv:1804.02716 (Submitted to JHEP)

- *The errors of the recent ATLAS/CMS data are too large!*

5.3 Deviation of width ratio from the SM prediction

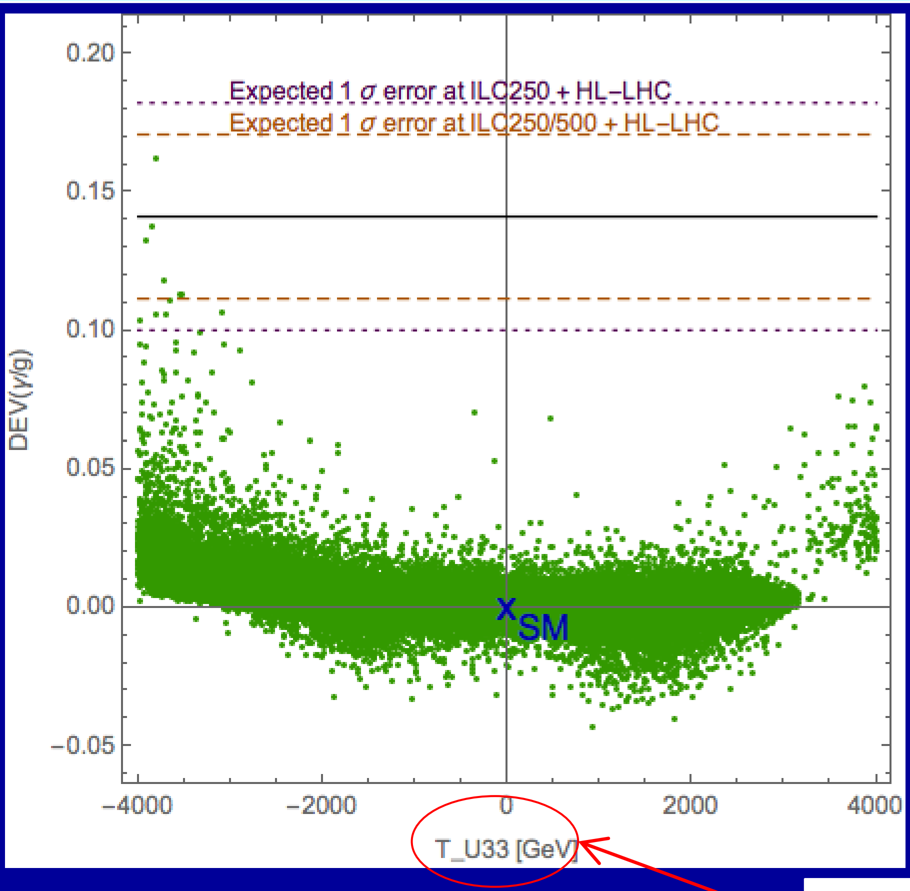
- The deviation of the width ratio from the SM prediction:

$$DEV(X/Y) = [\Gamma(X) / \Gamma(Y)]_{MSSM} \; / \; [\Gamma(X) / \Gamma(Y)]_{SM} - 1$$

$$\Gamma(X) = \Gamma(h^0 \to X\, X)$$

$(X = \text{photon}, Y = \text{gluon})$

Scatter plot in T_U33 - DEV(photon/gluon) plane

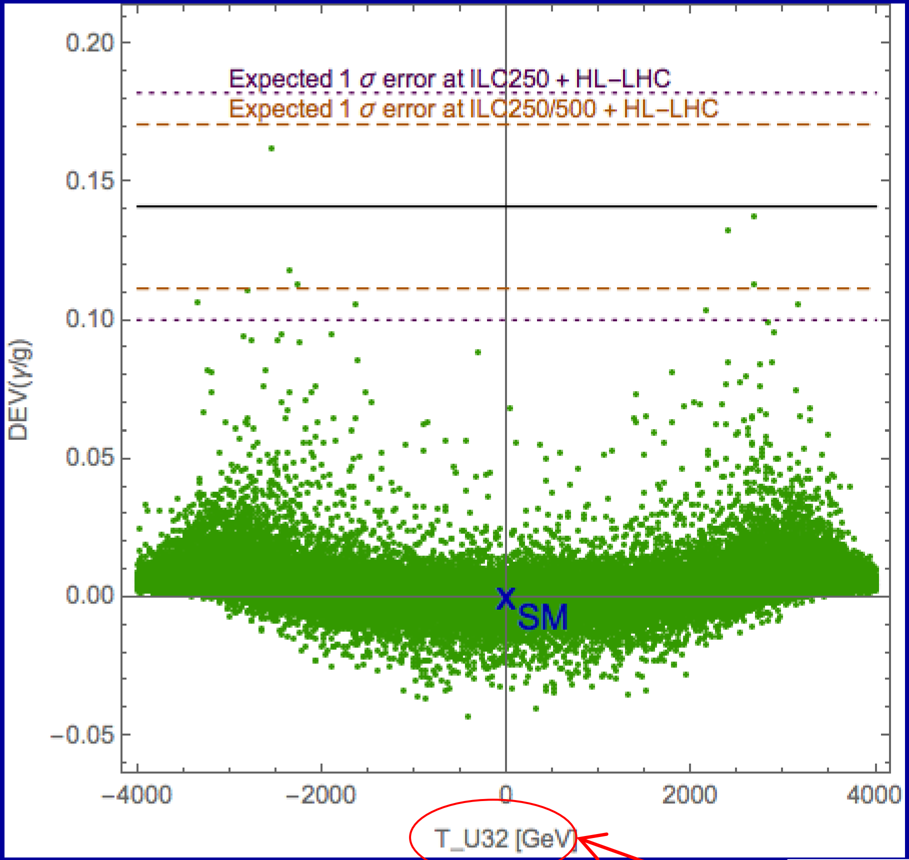


$$T_{U33} \approx (h^0 \tilde{t}_L \tilde{t}_R \text{ coupling})$$

-The deviation of the width ratio DEV(photon/gluon) from the SM value can be large (roughly -5% to +15%) in the scanned parameter ranges!

- ***The correlation between T_U33 and DEV(photon/gluon) is significant!***
- ***This indicates the stop-loop contributions to these decays are significant!***

Scatter plot in T_U32 - DEV(photon/gluon) plane



$$T_{U32} = (\tilde{c}_L - \tilde{t}_R \text{ mixing param.})$$

-The deviation of the width ratio DEV(photon/gluon) from the SM value can be large (roughly -5% to +15%) in the scanned parameter ranges!

- The correlation between the QFV parameter T_U32 and DEV(photon/gluon) is significant!

6. Theoretical Errors

Theoretical errors tend to cancel in the ratio

$$DEV(X) = \Gamma(h \to X\,X)_{MSSM} \,/\, \Gamma(h \to X\,X)_{SM} - 1.$$

(Ex 1);

Radiative correction effects on DEV(gluon) & DEV(photon) are quite small:

For bench1a scenario,

$DEV(gluon)_{LO} = -1.01883635E-01$
$DEV(gluon)_{LNO} = -1.01883575E-01$

$DEV(photon)_{LO} = 2.52426192E-02$
$DEV(photon)_{LNO} = 2.49977168E-02$

(Ex 2);

Uncertainties of DEVs due to scale dependence are very small:

For bench1a scenario,

$DEV(gluon)_{LNO}$ = -1.04874991E-01 ($Q = m_h/2$)

= -1.01883575E-01 ($Q = m_h = 125$ GeV)

= -0.992378294E-01 ($Q = 2m_h$)

$DEV(photon)_{LNO}$ = 2.55689900E-02 ($Q = m_h/2$)

= 2.49977168E-02 ($Q = m_h = 125$ GeV)

= 2.44694743E-02 ($Q = 2m_h$)

(Ex 3);

Uncertainties of DEVs due to errors of the SM input parameters

(parametric errors) should also be very small. (in progress)

7. Conclusion

- We have studied the correlation between the loop-induced decays h^0 (125GeV) -> photon photon & gluon gluon in the MSSM with QFV.

- Performing a parameter scan, we have found the followings:

  * DEV(h^0 -> photon photon) and DEV(h^0 -> gluon gluon) can be large simultaneously!: DEV(h^0 -> photon photon) can be as large as ~ + 4% and DEV(h^0 -> gluon gluon) can be as large as ~ - 15%.

  * There is a very strong correlation between DEV(h^0 -> photon photon) & DEV(h^0 -> gluon gluon)! This correlation is due to the fact that the stop-loop (stop-scharm mixture loop) contributions dominate the two DEVs .

  * The deviation of the width ratio Γ(h^0 -> photon photon) / Γ(h^0 -> gluon gluon) from the SM value can be as large as ~ +20%!

- *We have also performed similar studies for the decays h^0 -> c cbar and b bbar at full one-loop level in the MSSM with QFV and found the followings:*
[Phys. Rev. D 91 (2015) 015007 [arXiv:1411.2840 [hep-ph]];
JHEP 1606 (2016) 143 [arXiv:1604.02366 [hep-ph]]]

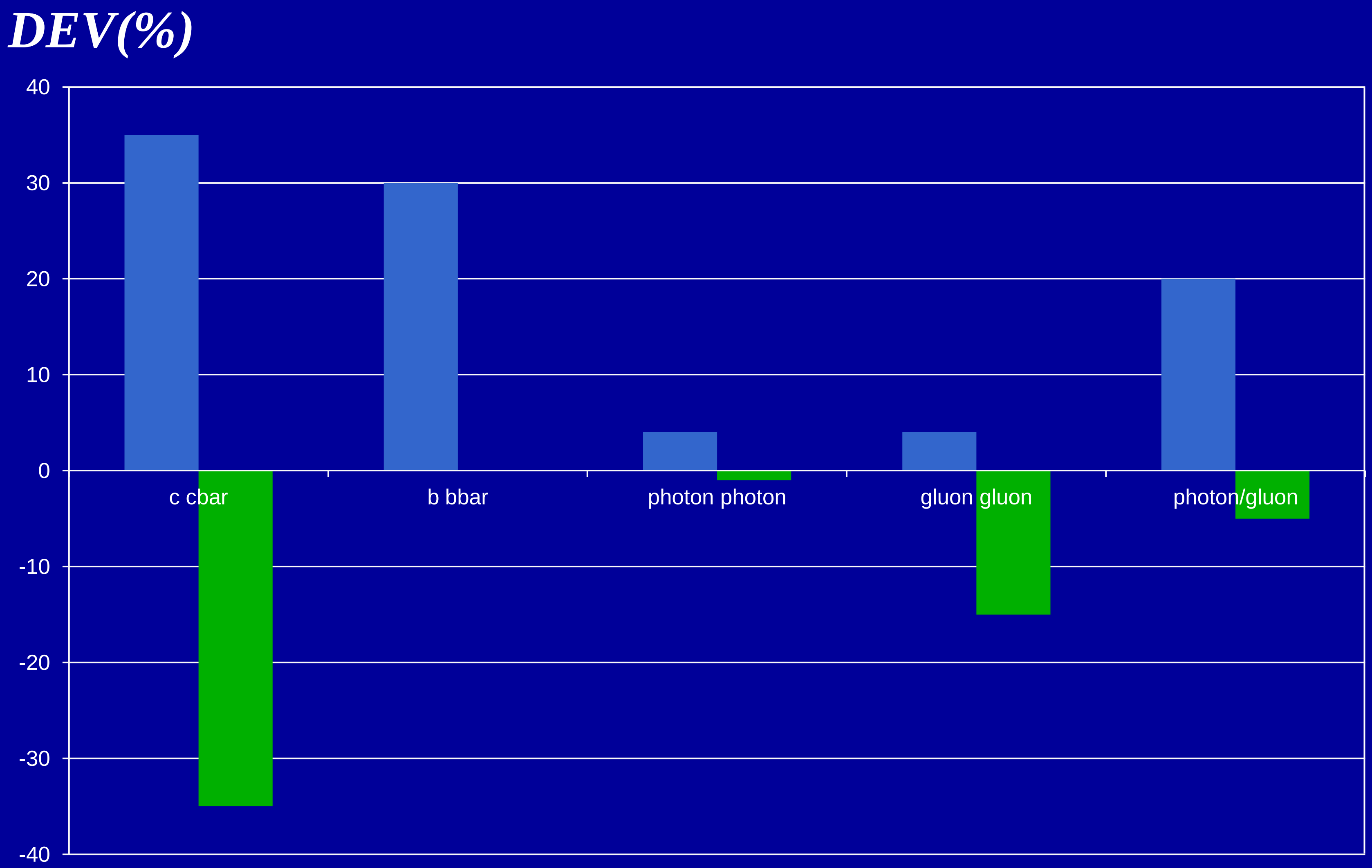
The deviation of these decay widths from the SM values can be quite significant!;
DEV(h^0 -> c cbar) can be as large as ~ +/-35% and DEV(h^0 -> b bbar) can be as large as ~ +30% !

- *All of these large deviations in h^0 -> c cbar, b bbar, photon photon, gluon gluon are due to large scharm-stop mixing & large stop/scharm involved trilinear couplings T_{U32}, T_{U23}, T_{U33} !*

- *In case the deviation pattern shown here is really observed at ILC, then it would strongly suggest the discovery of QFV SUSY (MSSM with QFV)!*

- *See next slide also.*

Deviation pattern in the MSSM with QFV



- *Our analysis suggests the following:*

PETRA/TRISTAN e- e+ collider discovered virtual Z^0 effect for the first time.

Later, CERN p pbar collider discovered the Z^0 boson.

Similarly, ILC could discover virtual Sparticle effects for the first time in h^0(125GeV) decays!

Later, HE-LHC/VLHC p p collider could discover the Sparticles!

END

Thank you!

Backup Slides

Constraints on the MSSM parameters from B meson data and mh^0 data:

Table 3: Constraints on the MSSM parameters from the B-meson data relevant mainly for the mixing between the second and the third generations of squarks and from the data on the h^0 mass. The fourth column shows constraints at 95% CL obtained by combining the experimental error quadratically with the theoretical uncertainty, except for m_{h^0}.

Observable	Exp. data	Theor. uncertainty	Constr. (95%CL)
ΔM_{B_s} [ps^{-1}]	17.757 ± 0.021 (68% CL) [23]	± 2.7 (68% CL) [24]	17.757 ± 5.29
$10^4 \times B(b \to s\gamma)$	3.49 ± 0.19 (68% CL) [14, 23]	± 0.23 (68% CL) [25]	3.49 ± 0.58
$10^6 \times B(b \to s\, l^+ l^-)$ ($l = e$ or μ)	$1.60\ ^{+0.48}_{-0.45}$ (68% CL) [26]	± 0.11 (68% CL) [27]	$1.60\ ^{+0.97}_{-0.91}$
$10^9 \times B(B_s \to \mu^+ \mu^-)$	$2.8\ ^{+0.7}_{-0.6}$ (68%CL) [28]	± 0.23 (68% CL) [29]	$2.80\ ^{+1.44}_{-1.26}$
$10^4 \times B(B^+ \to \tau^+ \nu)$	1.14 ± 0.27 (68%CL) [30, 31]	± 0.29 (68% CL) [32]	1.14 ± 0.78
m_{h^0} [GeV]	125.09 ± 0.24 (68% CL) [33]	± 3 [34]	125.09 ± 3.48

-The SM prediction:

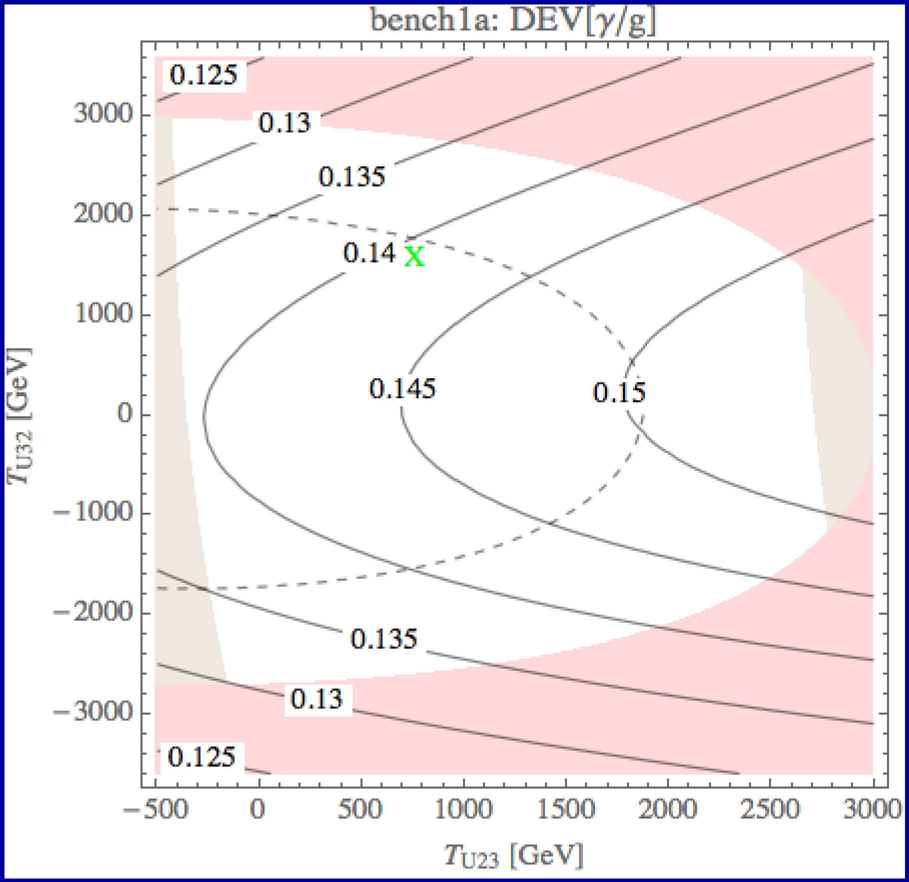
$\Gamma(h^0 \text{ -> photon photon})_{SM}$ = (1.064 +0.029/-0.021)X10^{-5} GeV

$\Gamma(h^0 \text{ -> gluon gluon})_{SM}$ = (3.56 +0.06/-0.06)X10^{-4} GeV

(Almeida et al., Phys. Rev. D 89 (2014) 033006 [arXiv:1311.6721v3])

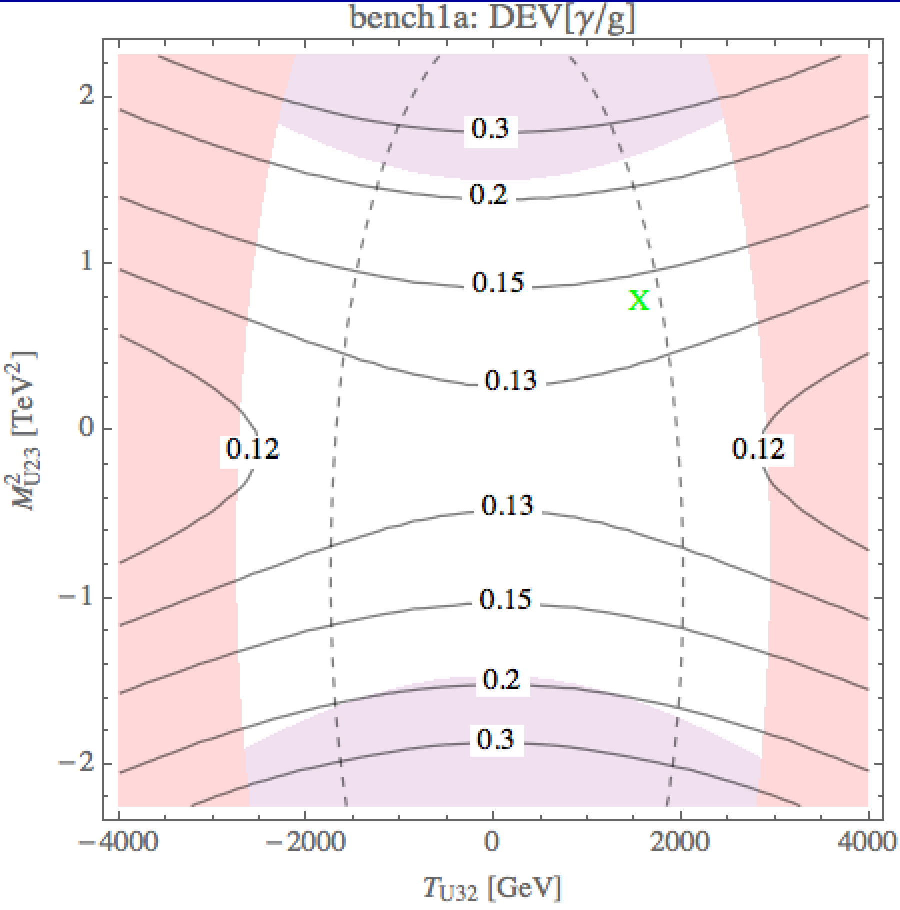
Contour plots of DEV(photon/gluon)

Contour plot of DEV(photon/gluon) in T_{U23} - T_{U32} plane for benchmark scenario "bench1a"



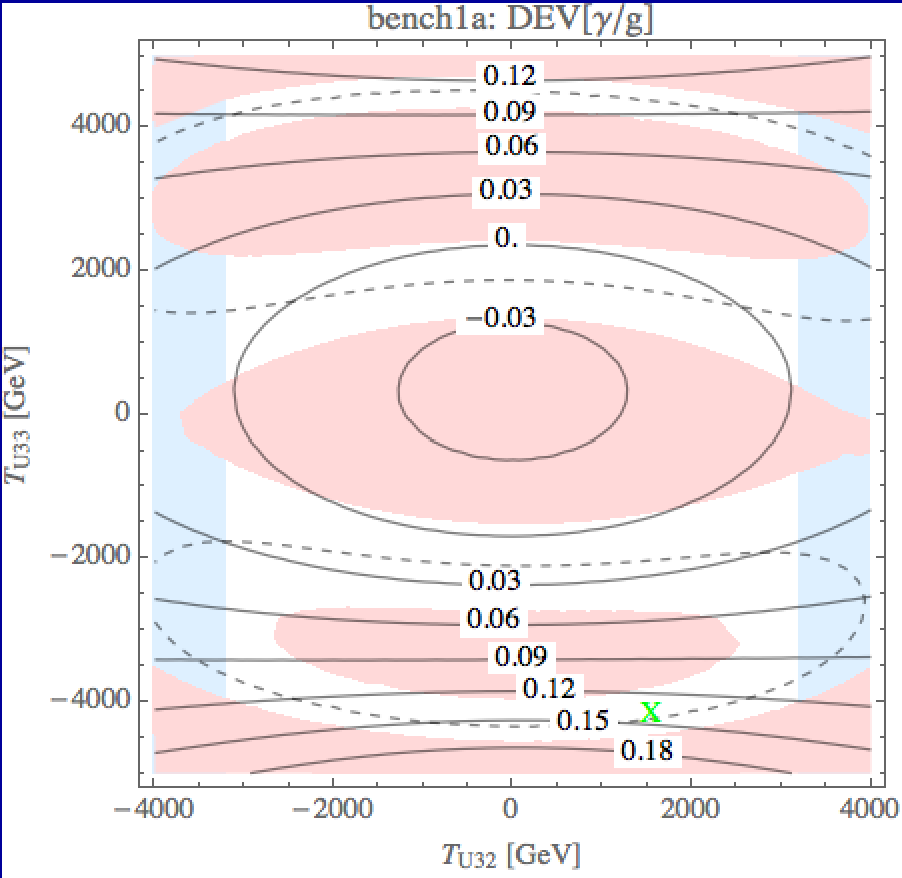
light red: m_h^0 constraint
light brown: B_s -> mu mu constraint

Contour plot of DEV(photon/gluon) in T_{U32} - M^2_{U23} plane for benchmark scenario "bench1a"



light red: m_h^0 constraint
light purple: m_su_1 constraint

Contour plot of DEV(photon/gluon) in T_{U32} - T_{U33} plane for benchmark scenario "bench1a"



light red: m_h^0 constraint
light blue: Vaccum stability constraint

Benchmark scenario "bench1a" for h^0 -> photon photon & gluon gluon:

```
 BLOCK EXTPAR                          #
0          1000.                       # Q_scale
1          1270.                       # M_1
2          500.                        # M_2
3          4800.                       # M_3
23         1260.                       # mu
25         16.                         # tanb = tanb(Q_scale = 1 TeV)
26         1960.                       # m_A(pole)
BLOCK MSQ2                             #
1          1          2.025e7          #
1          2          0.               #
1          3          0.               #
2          1          0.               #
2          2          1.33956e7        #
2          3          302500.          # <=== M2Q23
3          1          0.               #
3          2          302500.          # <=== M2Q32
3          3          6.3504e6         #
BLOCK MSU2                             #
1          1          2.025e7          #
1          2          0.               #
1          3          0.               #
2          1          0.               #
2          2          1.37641e7        #
2          3          765625.          # <=== M2U23
3          1          0.               #
3          2          765625.          # <=== M2U32
3          3          2.059225e6       #
```

BLOCK MSD2			#
1	*1*	*2.025e7*	#
1	*2*	*0.*	#
1	*3*	*0.*	#
2	*1*	*0.*	#
2	*2*	*1.31044e7*	#
2	*3*	*855625.*	#
3	*1*	*0.*	#
3	*2*	*855625.*	#
3	*3*	*7.3984e6*	#
BLOCK MSL2			#
1	*1*	*2.25e6*	#
1	*2*	*0.*	#
1	*3*	*0.*	#
2	*1*	*0.*	#
2	*2*	*2.25e6*	#
2	*3*	*0.*	#
3	*1*	*0.*	#
3	*2*	*0.*	#
3	*3*	*2.25e6*	#
BLOCK MSE2			#
1	*1*	*2.25e6*	#
1	*2*	*0.*	#
1	*3*	*0.*	#
2	*1*	*0.*	#
2	*2*	*2.25e6*	#
2	*3*	*0.*	#
3	*1*	*0.*	#
3	*2*	*0.*	#
3	*3*	*2.25e6*	#

```
BLOCK TU                #
1         1         0.00001             #
1         2         0.                  #
1         3         0.                  #
2         1         0.                  #
2         2         0.00001             #
2         3         760.                # <=== TU23
3         1         0.                  #
3         2         1560.               # <=== TU32
3         3         -4200.              # <=== TU33
BLOCK TD                #
1         1         0.00001             #
1         2         0.                  #
1         3         0.                  #
2         1         0.                  #
2         2         0.00001             #
2         3         -565.               #
3         1         0.                  #
3         2         690.                #
3         3         270.                #
BLOCK TE      #
1         1         0.                  #
1         2         0.                  #
1         3         0.                  #
2         1         0.                  #
2         2         0.                  #
2         3         0.                  #
3         1         0.                  #
3         2         0.                  #
3         3         -470.               #
```

$h^0(125) \rightarrow c\bar{c}$ *at full one-loop level in the MSSM with QFV*

[Phys. Rev. D 91 (2015) 015007 [arXiv:1411.2840 [hep-ph]]]

Main one-loop contributions with SUSY particles

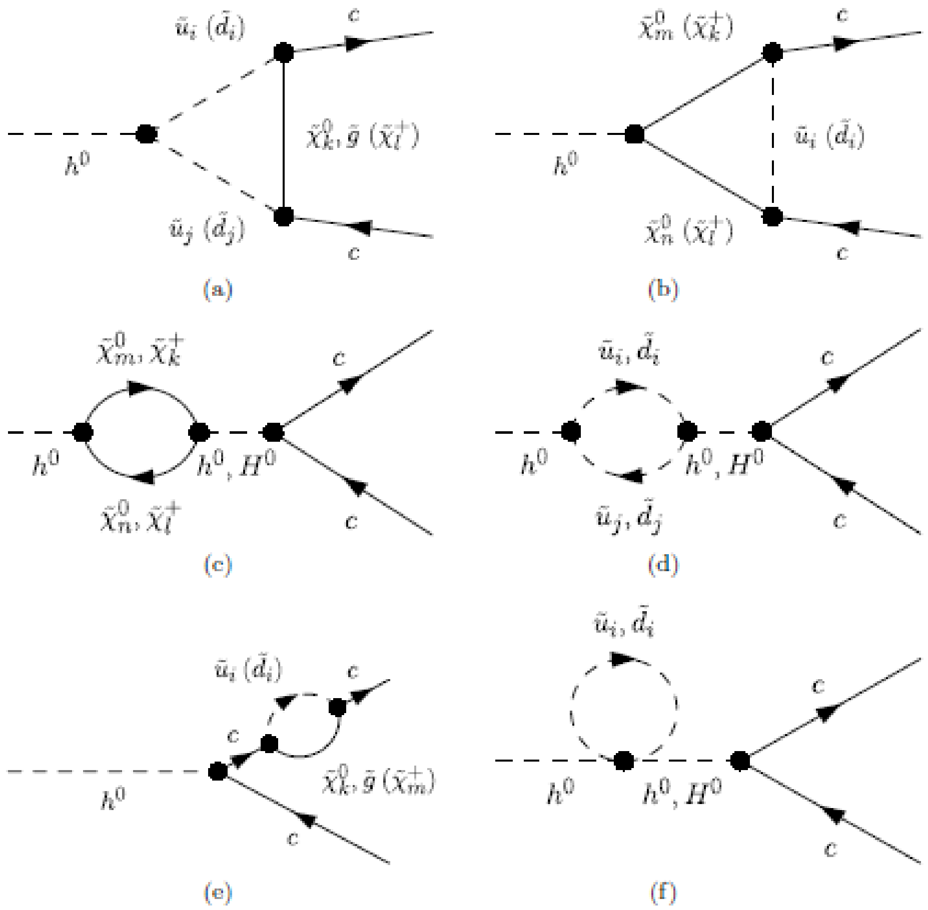
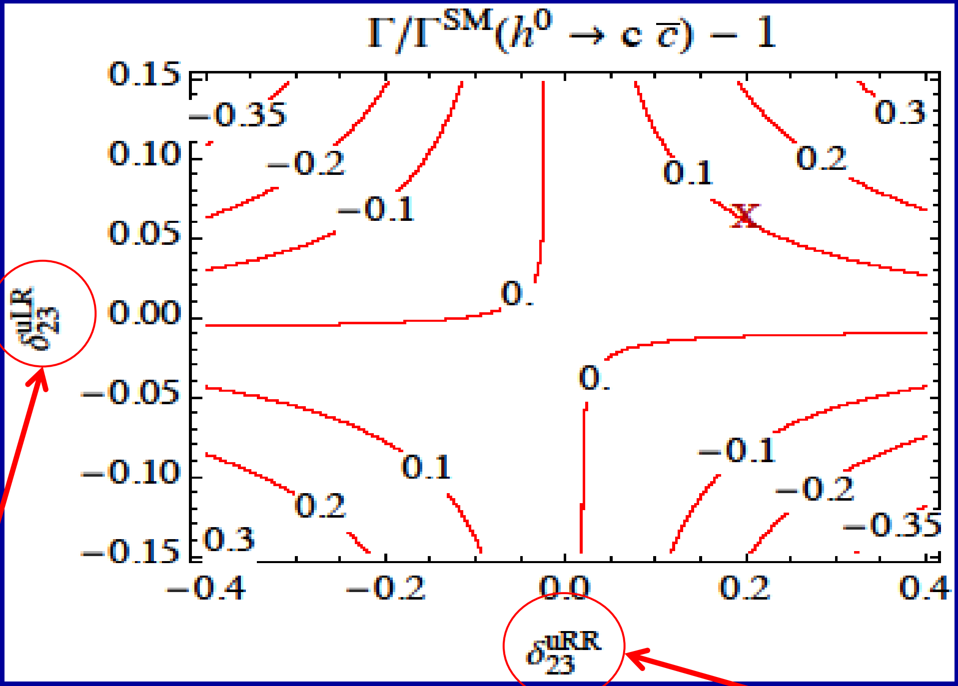


Figure 2: The main one-loop contributions with SUSY particles in $h^0 \to c\bar{c}$. The corresponding diagram to (e) with the self-energy contribution to the other charm quark is not shown explicitly.

Numerical results

Contour plot of the deviation of the MSSM prediction from the SM prediction
$\Gamma^{SM}(h^0 \to c\,\bar{c}) = 0.118 MeV$ *(PDG2014)* ***in*** $\delta^{uRR}_{23} - \delta^{uLR}_{23}$ ***plane***

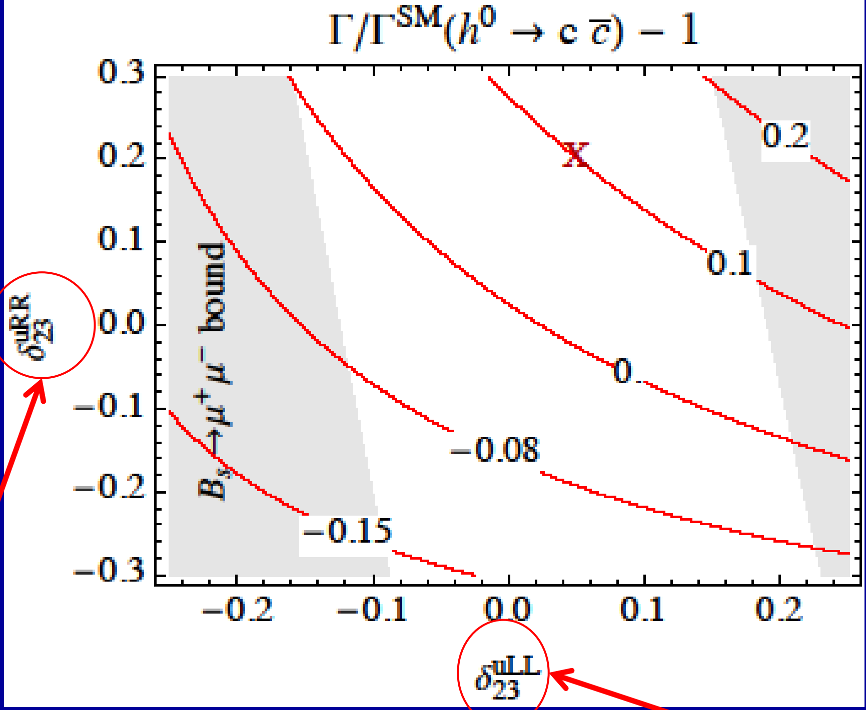


$\tilde{c}_L - \tilde{t}_R$ ***mixing parameter***

$\tilde{c}_R - \tilde{t}_R$ ***mixing parameter***

- ***The MSSM prediction*** $\Gamma(h^0 \to c\,\bar{c})^{full1-loop}$ ***is very sensitive to the QFV parameters*** $\delta^{uRR}_{23} - \delta^{uLR}_{23}$ ***!***
- ***The deviation of the MSSM prediction from the SM prediction can be very large (as large as ~ +/- 35%)!***

Contour plots of the deviation of the MSSM prediction from the SM prediction in δ_{23}^{uLL} – δ_{23}^{uRR} plane

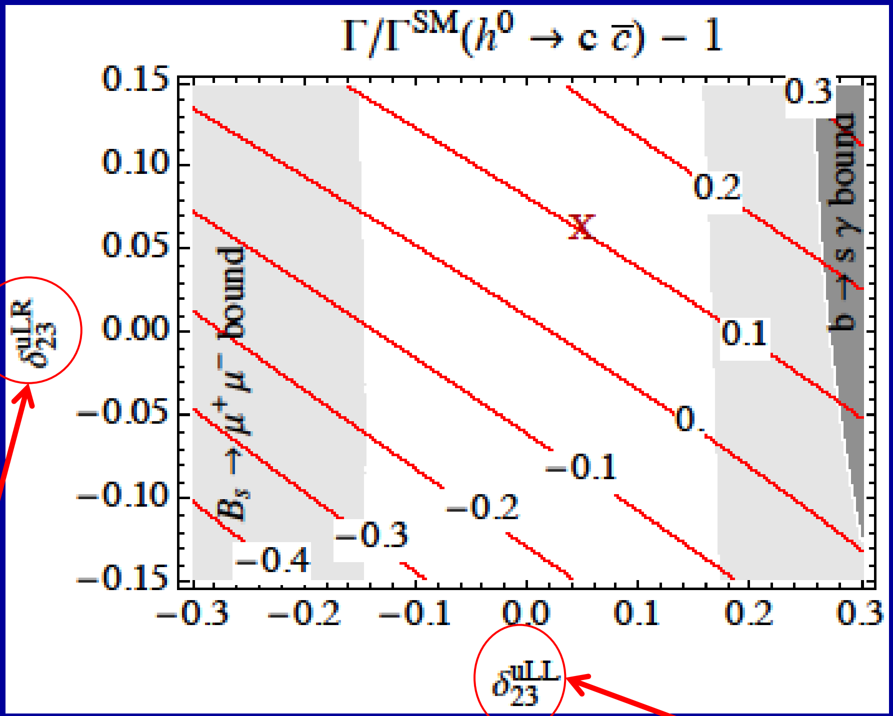


$\tilde{c}_R - \tilde{t}_R$ ***mixing parameter***

$\tilde{c}_L - \tilde{t}_L$ ***mixing parameter***

- ***The MSSM prediction*** $\Gamma(h^0 \to c\,\bar{c})^{full1-loop}$ ***is very sensitive to the QFV parameters*** δ_{23}^{uLL} – δ_{23}^{uRR} ***!***
- ***The deviation of the MSSM prediction from the SM prediction can be very large (as large as ~ +/- 20%)!***

Contour plots of the deviation of the MSSM prediction from the SM prediction in δ^{uLL}_{23} - δ^{uLR}_{23} plane



$\tilde{c}_L - \tilde{t}_R$ *mixing parameter*

$\tilde{c}_L - \tilde{t}_L$ *mixing parameter*

- *The MSSM prediction* $\Gamma(h^0 \to c\,\bar{c})^{full1-loop}$ *is very sensitive to the QFV parameters* δ^{uLL}_{23} - δ^{uLR}_{23} *!*
- *The deviation of the MSSM prediction from the SM prediction can be very large (as large as ~ +/- 30%)!*

$h^0(125) \to b\bar{b}$ *at full one-loop level in the MSSM with QFV*

[JHEP 1606 (2016) 143 [arXiv:1604.02366 [hep-ph]].]

Benchmark QFV Scenario

Table 1. Reference scenario: shown are the basic MSSM parameters at $Q = 1$ TeV, except for m_{A^0} which is the pole mass (i.e. the physical mass) of A^0, with $T_{U33} = 1450$ GeV (corresponding to $\delta_{33}^{uRL} = 0.1$). All other squark parameters not shown here are zero.

M_1	M_2	M_3
400 GeV	800 GeV	2000 GeV

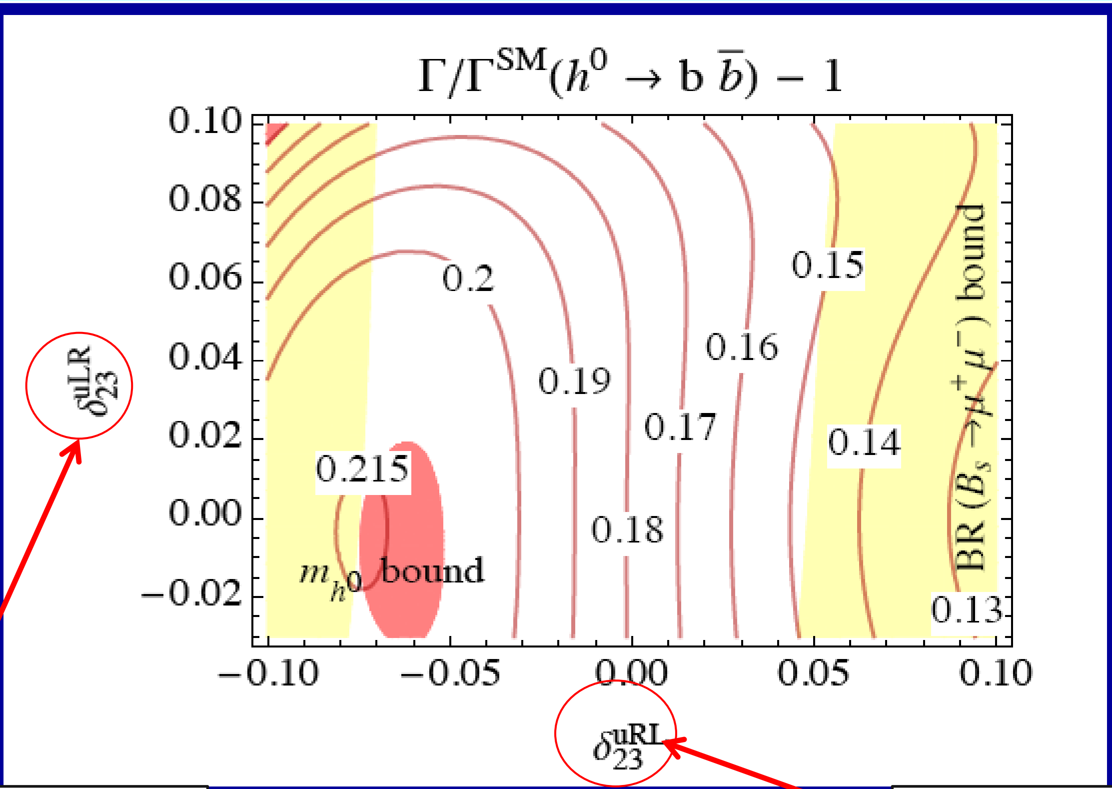
μ	$\tan\beta$	m_{A^0}
500 GeV	30	1500 GeV

	$\alpha = 1$	$\alpha = 2$	$\alpha = 3$
$M^2_{Q\alpha\alpha}$	3200^2 GeV^2	1550^2 GeV^2	1100^2 GeV^2
$M^2_{U\alpha\alpha}$	3200^2 GeV^2	2800^2 GeV^2	2050^2 GeV^2
$M^2_{D\alpha\alpha}$	3200^2 GeV^2	3000^2 GeV^2	2500^2 GeV^2

δ_{23}^{LL}	δ_{23}^{uRR}	δ_{23}^{uRL}	δ_{23}^{uLR}
0	0.8	0.02	0.02

Numerical results

Contour plot of the DEV(h^0 -> b bbar) in δ_{23}^{uRL} – δ_{23}^{uLR} plane

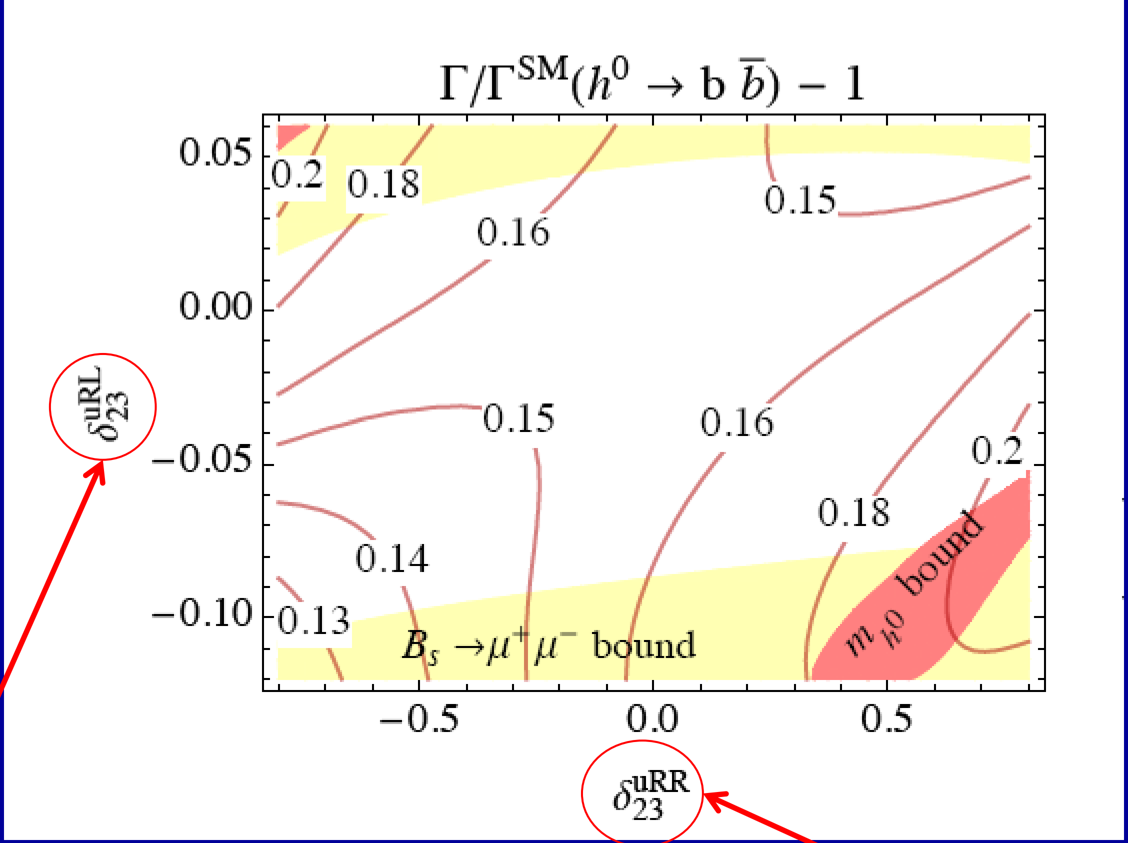


$\tilde{c}_L - \tilde{t}_R$ ***mixing parameter***

$\tilde{c}_R - \tilde{t}_L$ ***mixing parameter***

- ***The MSSM prediction*** $\Gamma(h^0 \to b\bar{b})^{full\,1\text{-}loop}$ ***is very sensitive to the QFV parameters*** δ_{23}^{uRL} – δ_{23}^{uLR} ***!***
- ***The deviation of the MSSM prediction from the SM prediction can be very large (as large as ~ +20%)!***

Contour plot of the DEV(h^0 -> b bbar) in $\delta_{23}^{uRR} - \delta_{23}^{uRL}$ plane



$\tilde{c}_R - \tilde{t}_L$ *mixing parameter*

$\tilde{c}_R - \tilde{t}_R$ *mixing parameter*

- *The MSSM prediction $\Gamma(h^0 \to b\bar{b})^{full\,1-loop}$ is very sensitive to the QFV parameters $\delta_{23}^{uRR} - \delta_{23}^{uRL}$!*
- *The deviation of the MSSM prediction from the SM prediction can be very large (as large as ~ +20%)!*