Muon g-2 and lepton flavor violation in SUSY-GUT theories

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Colaboration with A. Tiwari, Q. Shafi, C. Ün, J. Ellis, S. Lola, Ruiz de Austri,JHEP 07 (2020) 07, 096 JHEP 09 (2020), Eur. Phys. J. C (2022) 82:561 + work in progress.

OUTLINE

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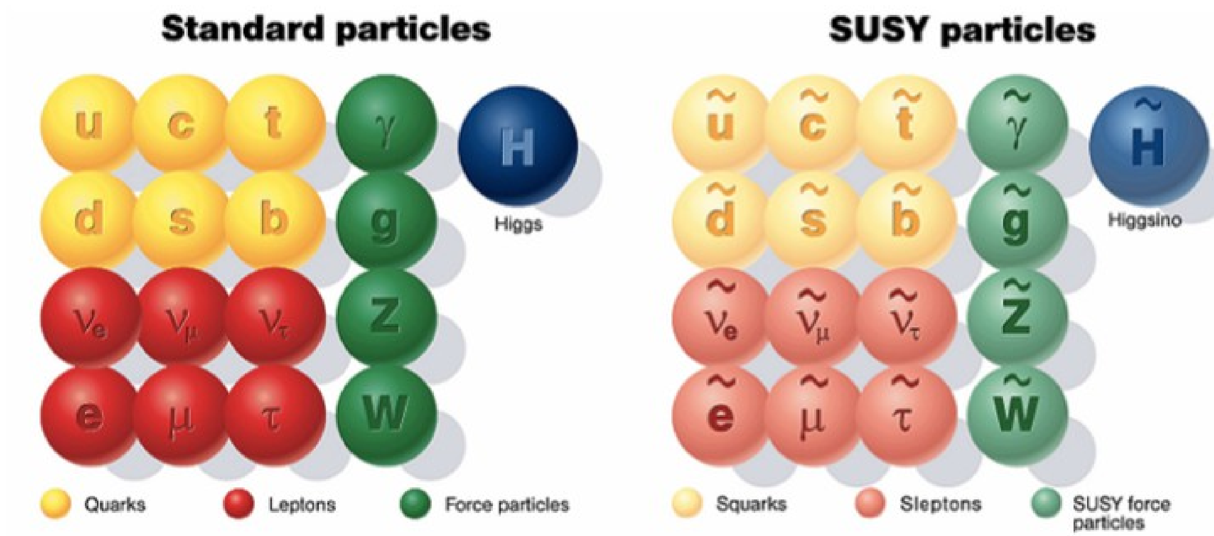
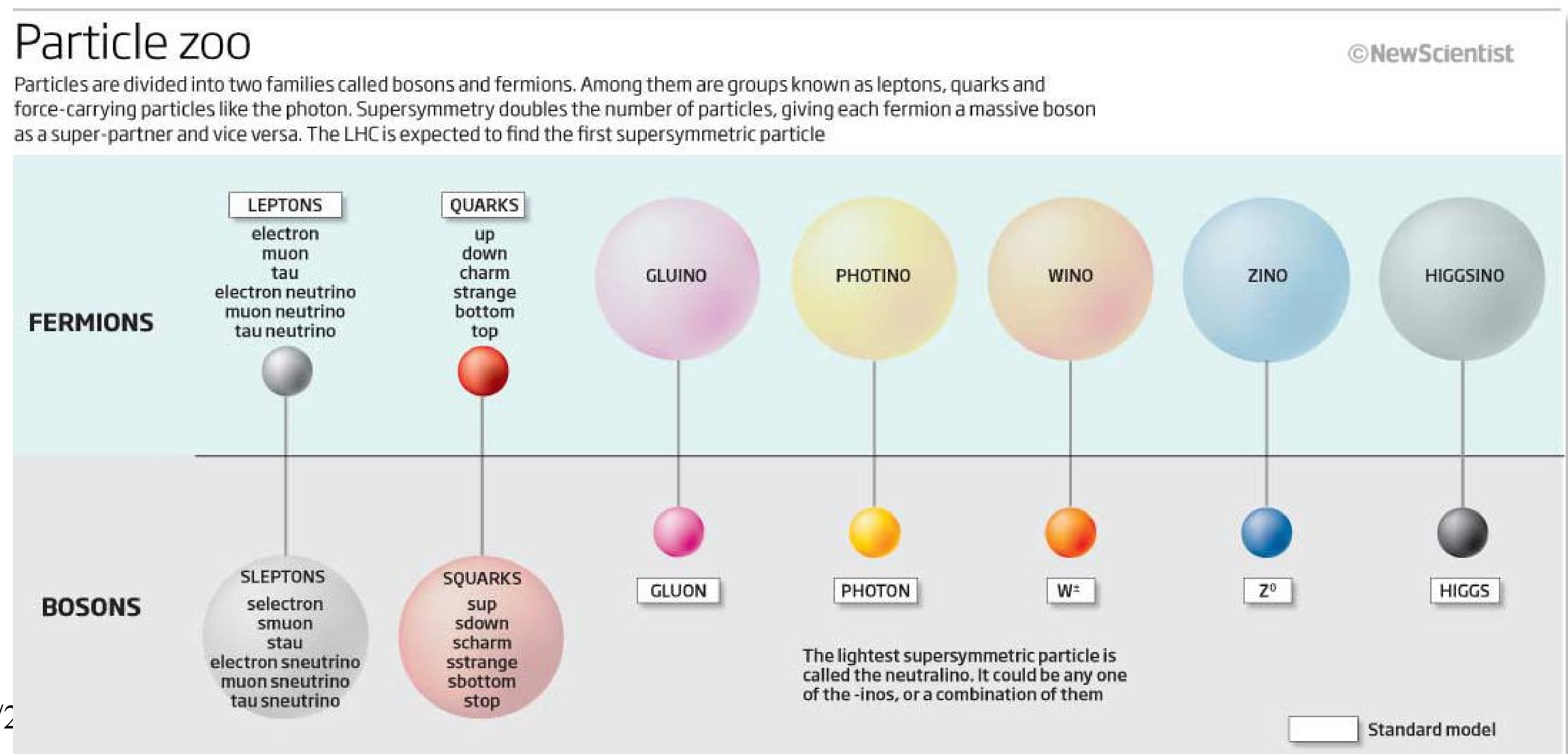
-GUT's and SUSY.
-PS: SU(4)xSU(2)xSU(2)

-Fitting muon (g-2) in SU(4)xSU(2)xSU(2) models

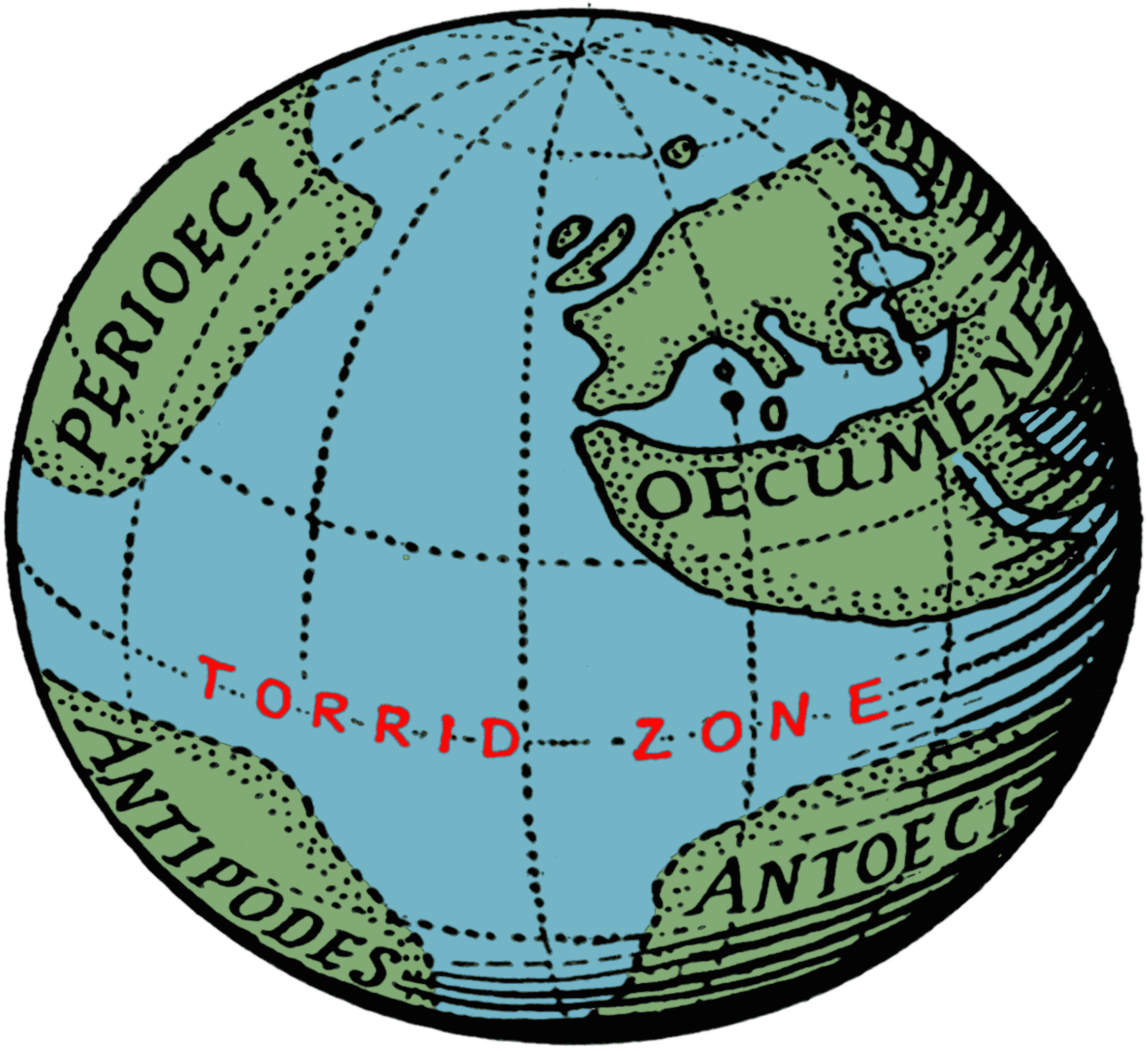
- Neutralino relic density and DM detection.
- LFV with a See-Saw mechanism.

Conclusions.


Standard particles
SUSY particles
u c t γ
d s b g
νe νμ ντ Z
e μ τ W
H
Higgs
Higgsino
Quarks
Leptons
Force particles
Squarks
Sleptons
SUSY force particles


Particle zoo
©NewScientist
Particles are divided into two families called bosons and fermions. Among them are groups known as leptons, quarks and force-carrying particles like the photon. Supersymmetry doubles the number of particles, giving each fermion a massive boson as a super-partner and vice versa. The LHC is expected to find the first supersymmetric particle
FERMIONS
LEPTONS
electron
muon
tau
electron neutrino
muon neutrino
tau neutrino
QUARKS
up
down
charm
strange
bottom
top
GLUINO
PHOTINO
WINO
ZINO
HIGGSINO
BOSONS
SLEPTONS
selectron
smuon
stau
electron sneutrino
muon sneutrino
tau sneutrino
SQUARKS
sup
sdown
scharm
sstrange
sbottom
stop
GLUON
PHOTON
W±
Z0
HIGGS
The lightest supersymmetric particle is called the neutralino. It could be any one of the -inos, or a combination of them
Standard model

Crates of Mallus 150 B.C.

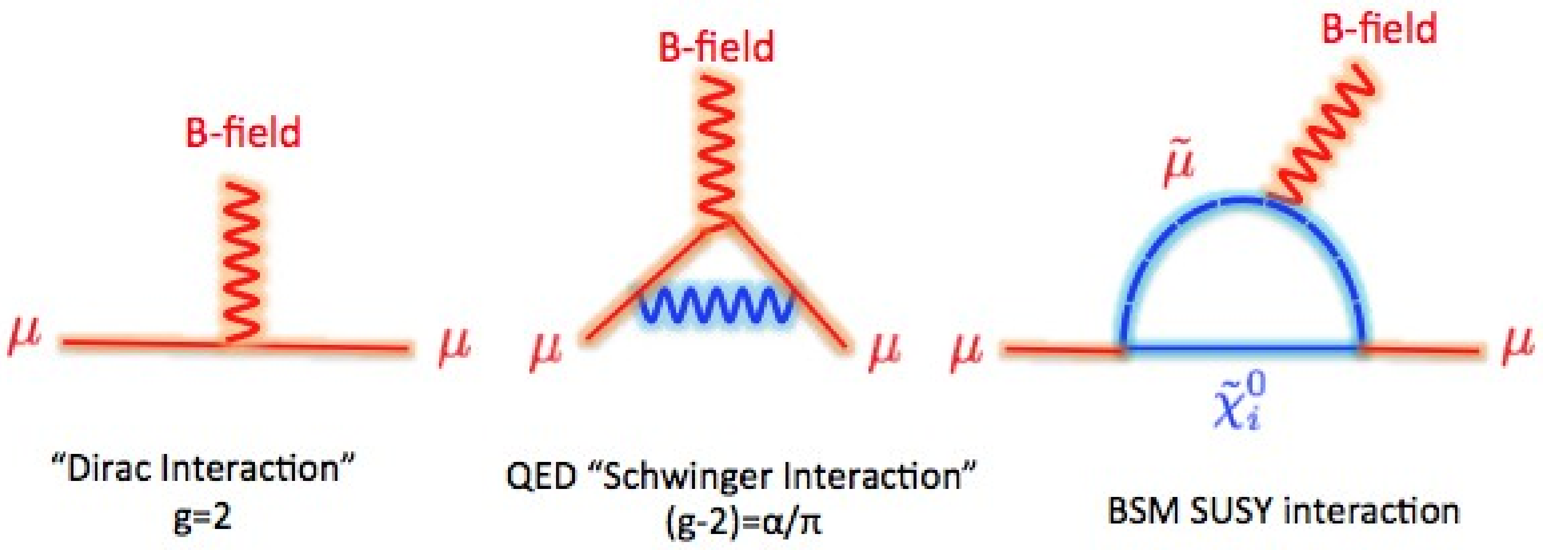


Antipodes theory:

Popular debate in the Middle age.

Probably referred in all explation trip proposals untill it was eliminated by direct observation.

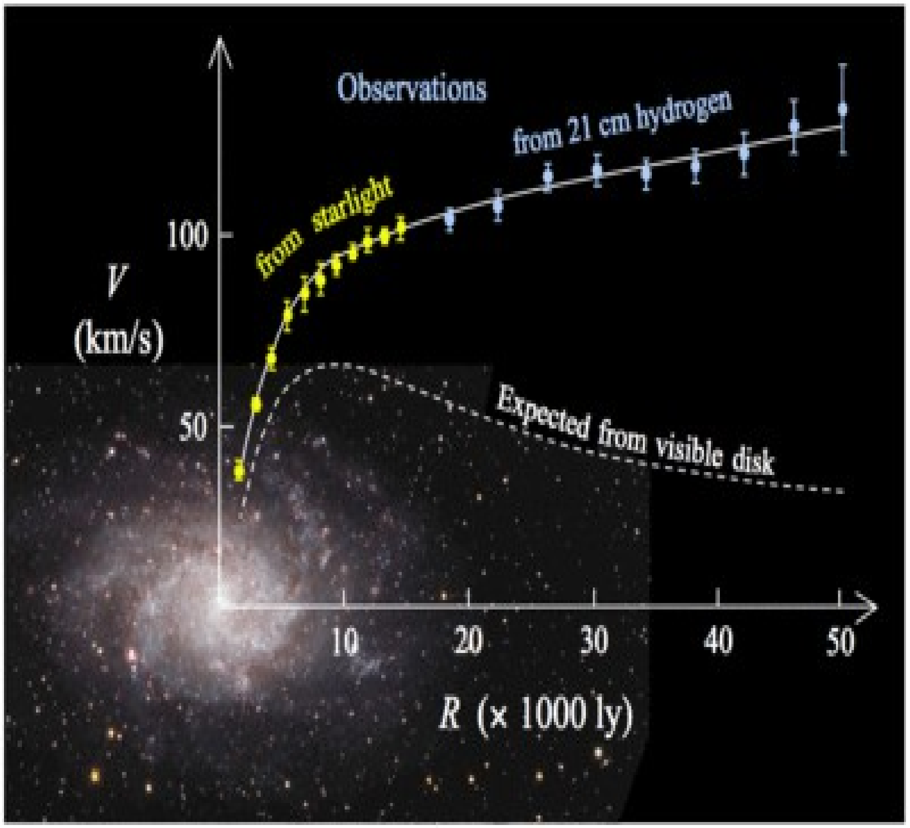
One loop contribution to SM proc.



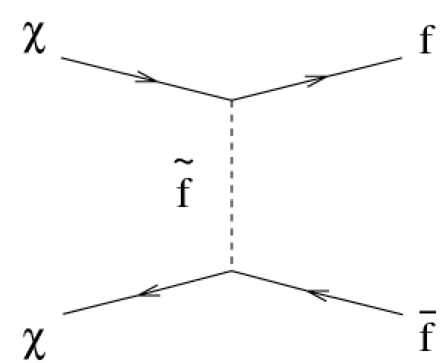
SM vs Experiment Discrepancies

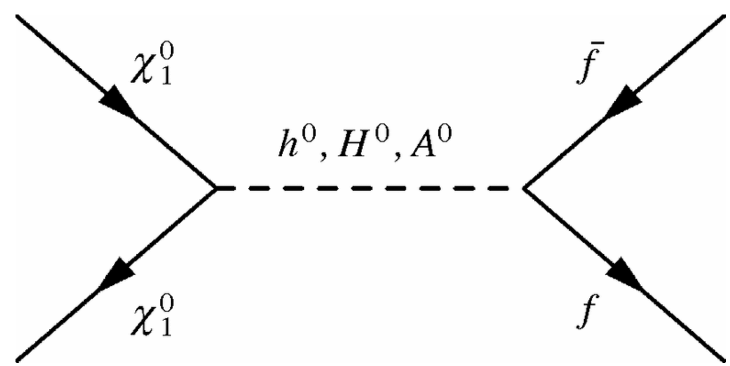
anomalous magnetic dipole moment (g_μ-2)

Dark Matter problem



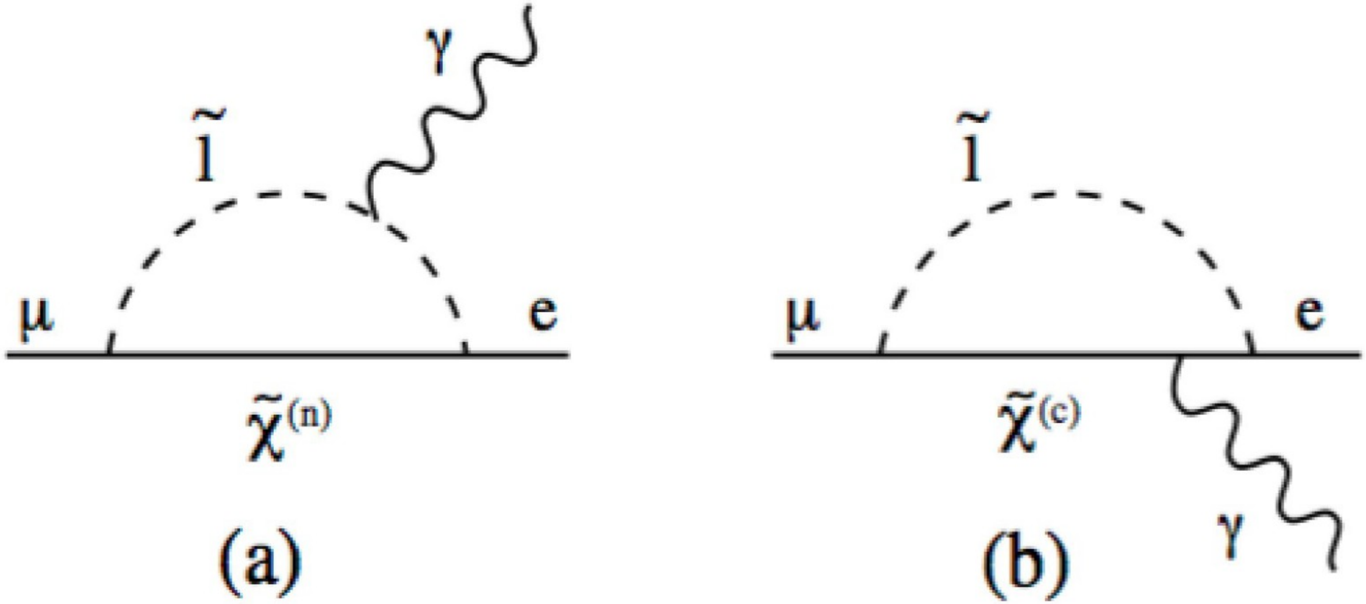
Rotation curve of spiral galaxy M 33 (yellow and blue points with error bars), and a predicted one from distribution of the visible matter (white line). The discrepancy between the two curves can be accounted for by adding a dark matter halo surrounding the galaxy





$$\Omega h^2 \sim \frac{3 \times 10^{-27} \mathrm{cm}^3 s^{-1}}{\langle \sigma_{\mathrm{ann}} v_{Mol} \rangle}$$

In SUSY flavor mixing lepton-slepton vertices can induce LFV diagrams:



Lepton-slepton flavor mixing is very constrained by the experimental limits:

$$BR(\mu \to e\gamma) < 5.7\, x\, 10^{-13}$$
$$BR(\tau \to \mu\gamma) < 4.4\, x\, 10^{-8}$$
$$BR(\tau \to e\gamma) < 3.3\, x\, 10^{-8}$$

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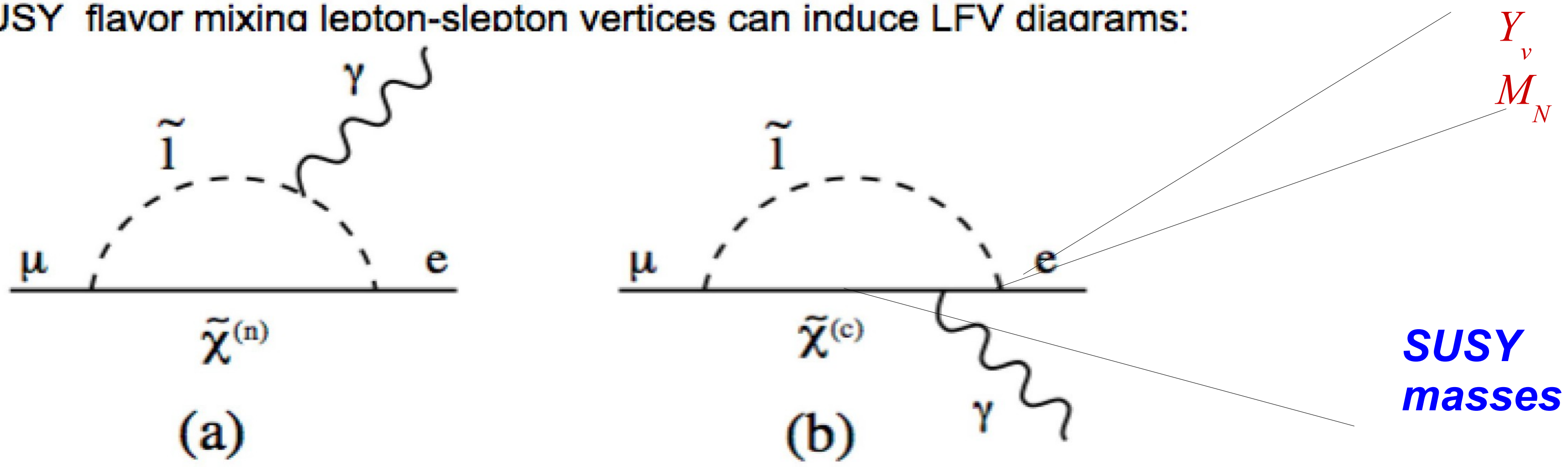


Lepton-slepton flavor mixing is very constrained by the experimental limits:

$$BR(\mu \rightarrow e\gamma) < 4.2\, x\, 10^{-13}$$
$$BR(\tau \rightarrow \mu\gamma) < 4.4\, x\, 10^{-8}$$
$$BR(\tau \rightarrow e\gamma) < 3.3\, x\, 10^{-8}$$

Soft SUSY Breaking Terms

The soft SUSY breaking masses

$$-\mathcal{L}_{\rm soft} = -\frac{1}{2}\left(M_3\,\lambda^a_{\tilde g}\lambda^a_{\tilde g} + M_2\,\lambda^i_{\widetilde W}\lambda^i_{\widetilde W} + M_1\,\lambda_{\widetilde B}\lambda_{\widetilde B} + \text{h.c.}\right)$$
$$+M_L^2\widetilde{L}^\dagger\widetilde{L} + M_Q^2\widetilde{Q}^\dagger\widetilde{Q} + M_U^2\widetilde{U}^*\widetilde{U} + M_D^2\widetilde{D}^*\widetilde{D} + M_E^2\widetilde{E}^*\widetilde{E} +$$
$$m^2_{H_d}\,\widetilde{H}_d^\dagger\widetilde{H}_d + m^2_{H_u}\,H_u^\dagger H_u - \left(B\mu\,\widetilde{H}_d^T H_u + \text{h.c.}\right)$$
$$+\left(y_\ell A_\ell\, H_d^\dagger\widetilde{L}\widetilde{E} + y_d A_d\, H_d^\dagger\widetilde{Q}\widetilde{D} - y_u A_u\, H_u^T\widetilde{Q}\widetilde{U} + \text{h.c.}\right),$$

Inspired from supergravity assume universal soft breaking, $\mathcal{L}_{\rm soft}$:

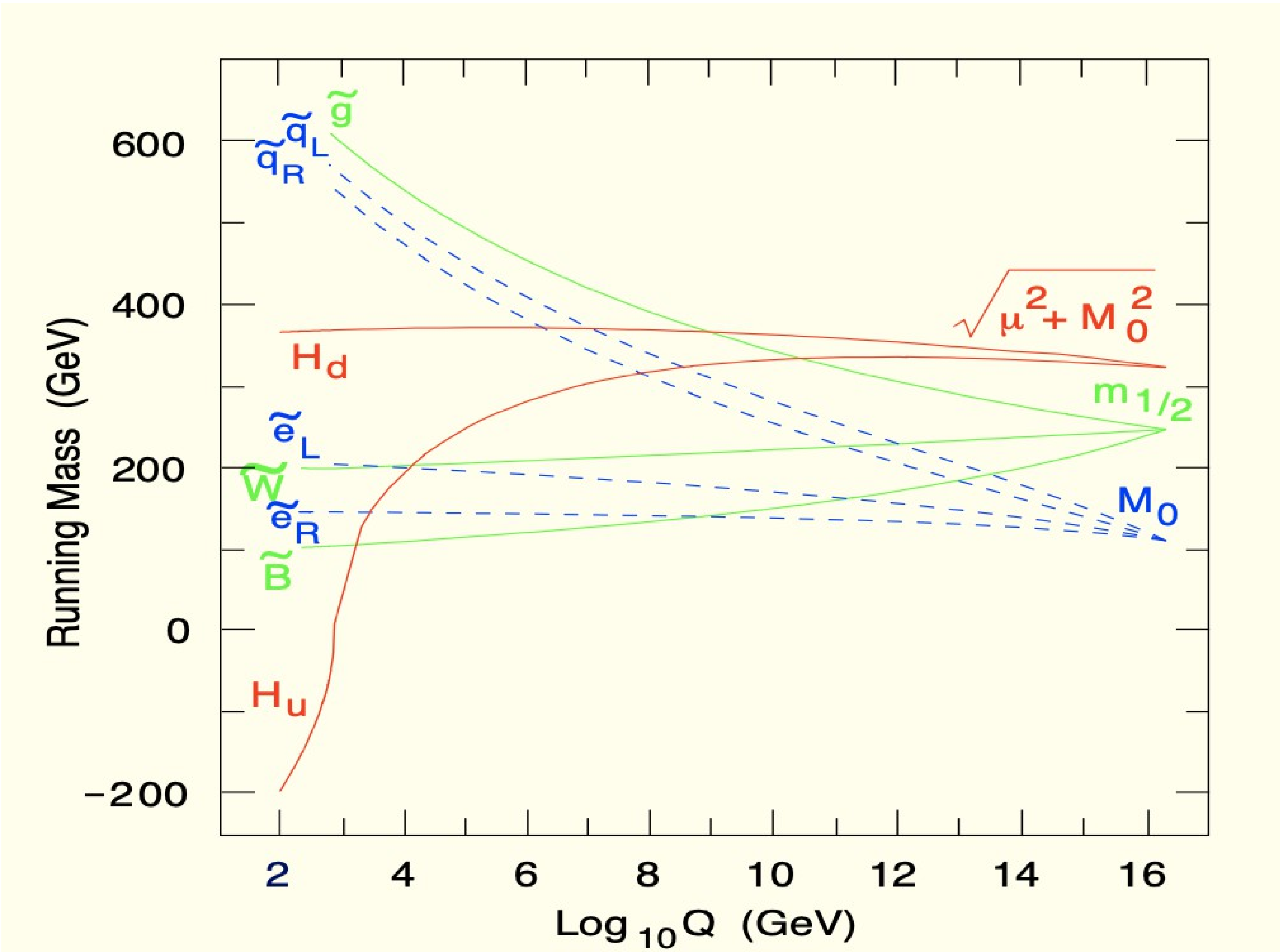
$$\sum_{f,H} m_0^2\tilde{f}\tilde{f} + \sum_{\lambda} m_{\frac{1}{2}}\lambda\lambda + \sum_{f} A_0 Y_f \tilde{f}\tilde{F}H_f + B\mu H_u H_d$$

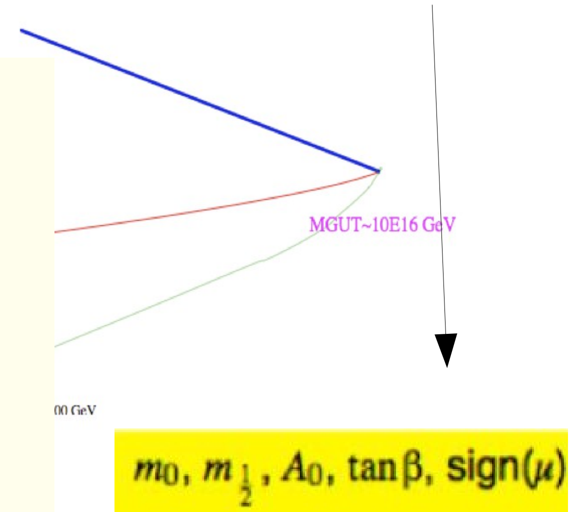
m_0, $m_{\frac{1}{2}}$, A_0, $\tan\beta$, sign(μ)

μ and A_0 can be complex, however their phases contraint to be $< 0{,}2$ rad by the bounds c

the fermion EDM.

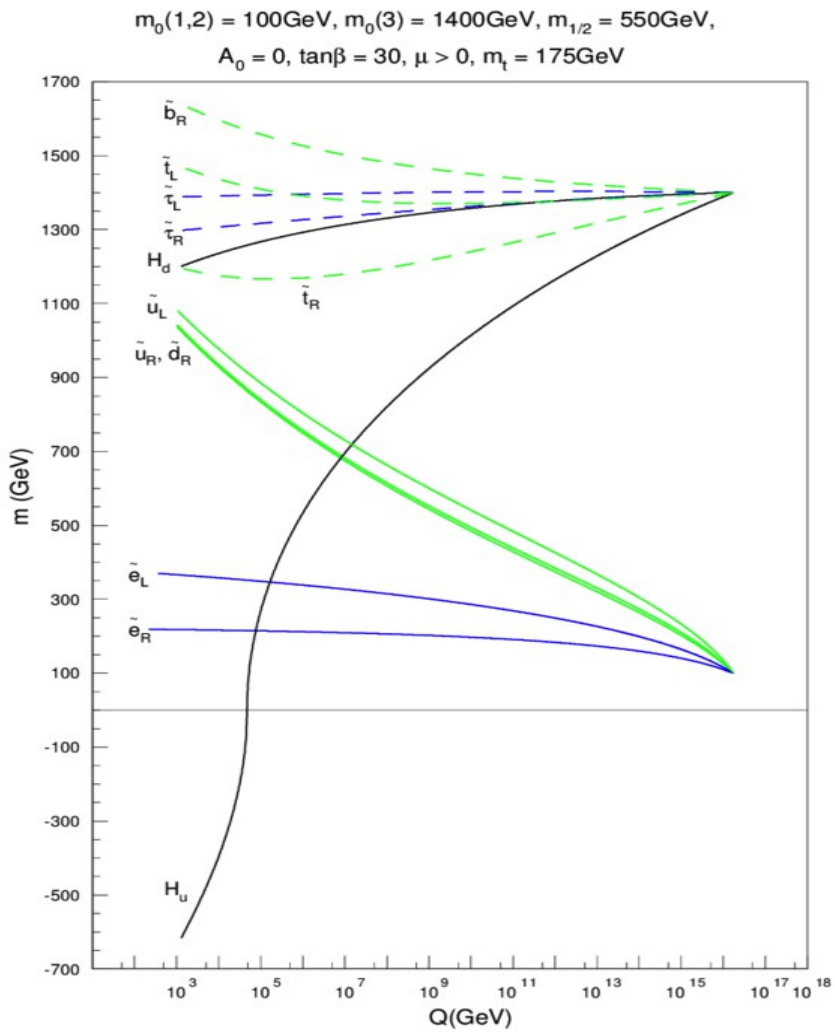
GUT initial conditions



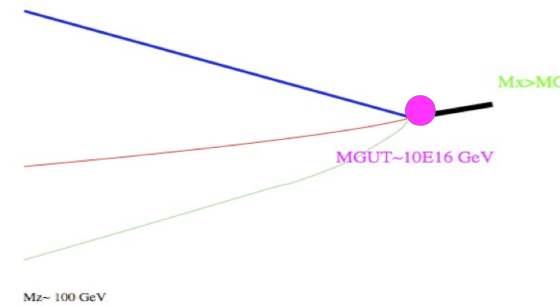


Gunion,
Int. J. Mod. Phys. A 2010

Non Universal scenarios



Baer et al., HEP 06 (2004) 044



CMSSM choice:

- *m0 Universal soft masses.*
- m1/2 *Universal gaugino masses.*
- A0 *Universal Trilinear terms.*

Representation-dependent choice

$$m_r = x_r\, m_0$$

$$A_r = Y_r\, A_0, \quad A_0 = a_0\, m_0$$

PATI-SALAM Unification

$$G_{PS} \equiv SU(4) \times SU(2)_L \times SU(2)_R$$

$\mathbf{4}_c\mathbf{2}_L\mathbf{2}_R$

Matter Fields

F_r	$\begin{pmatrix} d_r & -u_r \end{pmatrix}$ $\begin{pmatrix} e_r & -\nu_r \end{pmatrix}$	$(\mathbf{4},\mathbf{2},\mathbf{1})$
F_r^c	$\begin{pmatrix} u_r^c \\ d_r^c \end{pmatrix}, \begin{pmatrix} \nu_r^c \\ e_r^c \end{pmatrix}$	$(\bar{\mathbf{4}},\mathbf{1},\mathbf{2})$

$$< \tilde{\nu}_H^c > = < \bar{\tilde{\nu}}_H^c > \sim M$$

Higgs Fields

H^c	$\begin{pmatrix} u_H^c \\ d_H^c \end{pmatrix}, \begin{pmatrix} \nu_H^c \\ e_H^c \end{pmatrix}$	$(\bar{\mathbf{4}},\mathbf{1},\mathbf{2})$
$\bar{H}^c$	$\begin{pmatrix} \bar{u}_H^c & \bar{d}_H^c \end{pmatrix}$ $\begin{pmatrix} \bar{\nu}_H^c & \bar{e}_H^c \end{pmatrix}$	$(\mathbf{4},\mathbf{1},\mathbf{2})$
h	$\begin{pmatrix} h_2^+ & h_1^0 \\ h_2^0 & h_1^- \end{pmatrix}$	$(\mathbf{1},\mathbf{2},\mathbf{2})$

$$G_{PS} \to \mathrm{SU}(3)_C \otimes \mathrm{SU}(2)_L \otimes \mathrm{U}(1)_Y$$

Non universal Higgs Mass terms due to D- terms.

$$m_{H_{u,d}}^2 = m_{10}^2 \mp 2M_D^2$$

$$M_4 = M_3 ; M_2 = y_{LR} M_{2R}$$

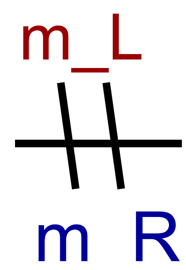
$$M_4 = M_3 ; M_2 = y_{LR} M_{2R}$$

Condition for gaugino masses.

PS(4-2-1) ***LR Asymmetry***

MATTER FIELDS

F_r	$\begin{pmatrix} d_r & -u_r \end{pmatrix}$ $\begin{pmatrix} e_r & -\nu_r \end{pmatrix}$	$(\mathbf{4}, \mathbf{2}, \mathbf{1})$
F_r^c	$\begin{pmatrix} u_r^c \\ d_r^c \end{pmatrix}, \begin{pmatrix} \nu_r^c \\ e_r^c \end{pmatrix}$	$(\bar{\mathbf{4}}, \mathbf{1}, \mathbf{2})$



Gaugino Masses

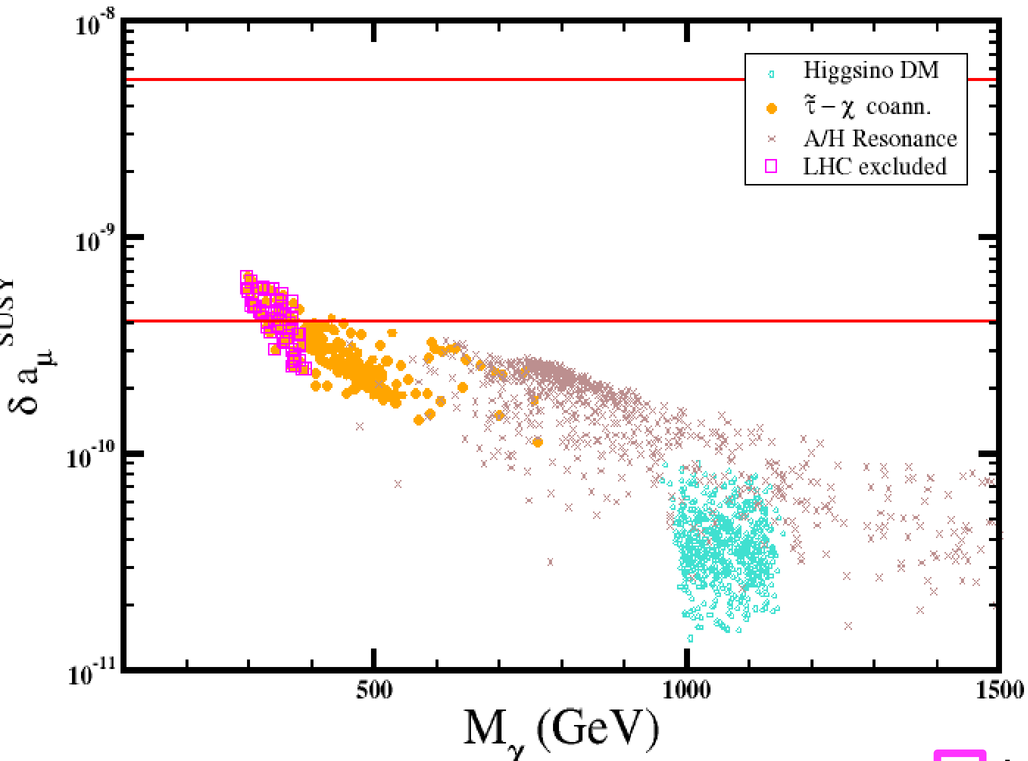
$$M_1 = \frac{3}{5} M_{2R} + \frac{2}{5} M_4 \ ,$$

$$M_4 = M_3 ; M_2 = y_{LR} M_{2R}$$

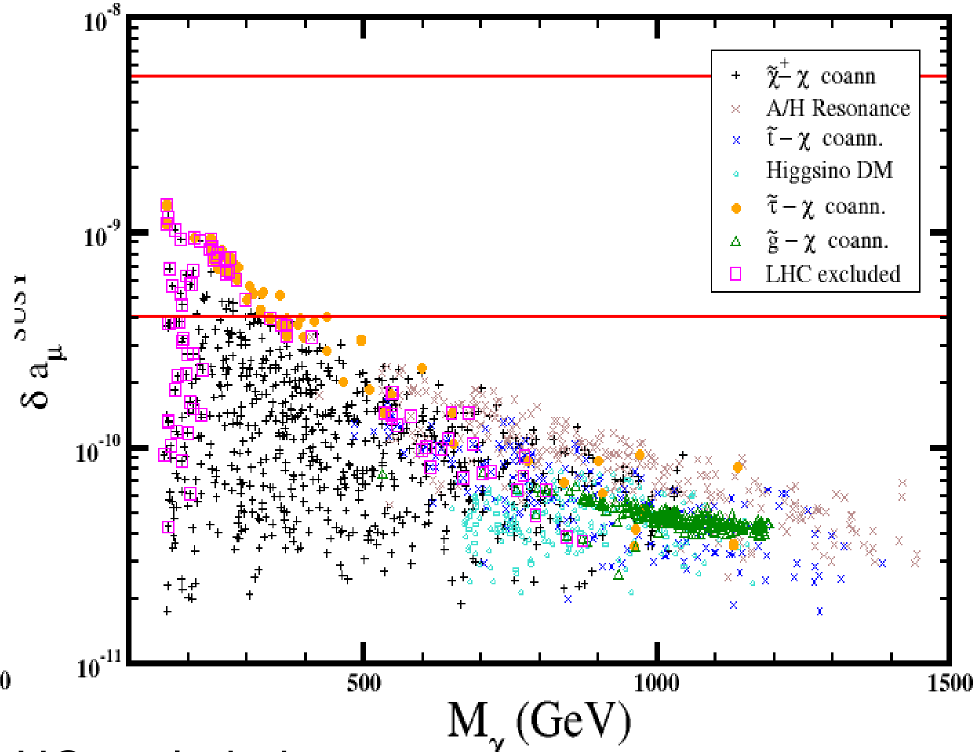
New Parameter

$$X_{LR} = \frac{m_R}{m_L}$$

SO(10)



PS(4-2-2)



LHC excluded.

Higgsino DM

$$h_f > 0.1, \quad |m_A - 2m_\chi| > 0.1\, m_\chi .$$

$$h_f \equiv |N_{13}|^2 + |N_{14}|^2 ,$$

A/H Resonances

$$|m_A - 2m_\chi| \leq 0.1\, m_\chi$$

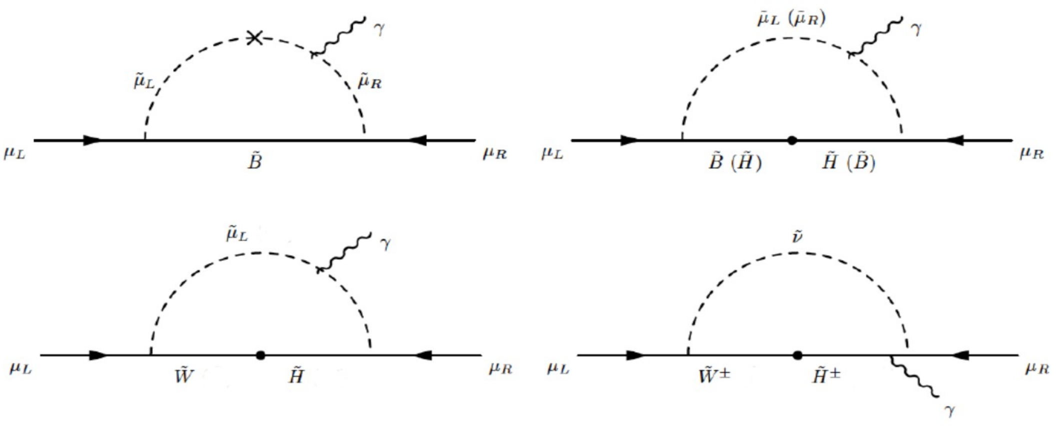
Coanihilations: $(m_z - m_{LSP}) < 0.1\, m_{LSP}$

$\tilde{\tau}$ $\tilde{\chi}^{+}$ Stop gluino

Muon g-2 combining Fermilab + BNL data

$$\Delta a_\mu \equiv a_\mu^{\rm exp} - a_\mu^{\rm SM} = (25.1 \pm 5.9) \times 10^{-10} \ .$$

SUSY Contribution to Muon g-2



Low Scale	GUT Scale
$m_{\tilde\mu_L}, m_{\tilde\nu}$	m_L
$m_{\tilde\mu_R}$	m_R
$M_{\tilde B}$	M_1
$M_{\tilde W}$	M_2
μ	m_{H_u}, m_{H_d}
A_μ	A_0
$\tan\beta$	$\tan\beta$

$$m_h = 123 - 127 \text{ GeV}$$

$$m_{\tilde g} \geq 2.1 \text{ TeV (800 GeV if it is NLSP)}$$

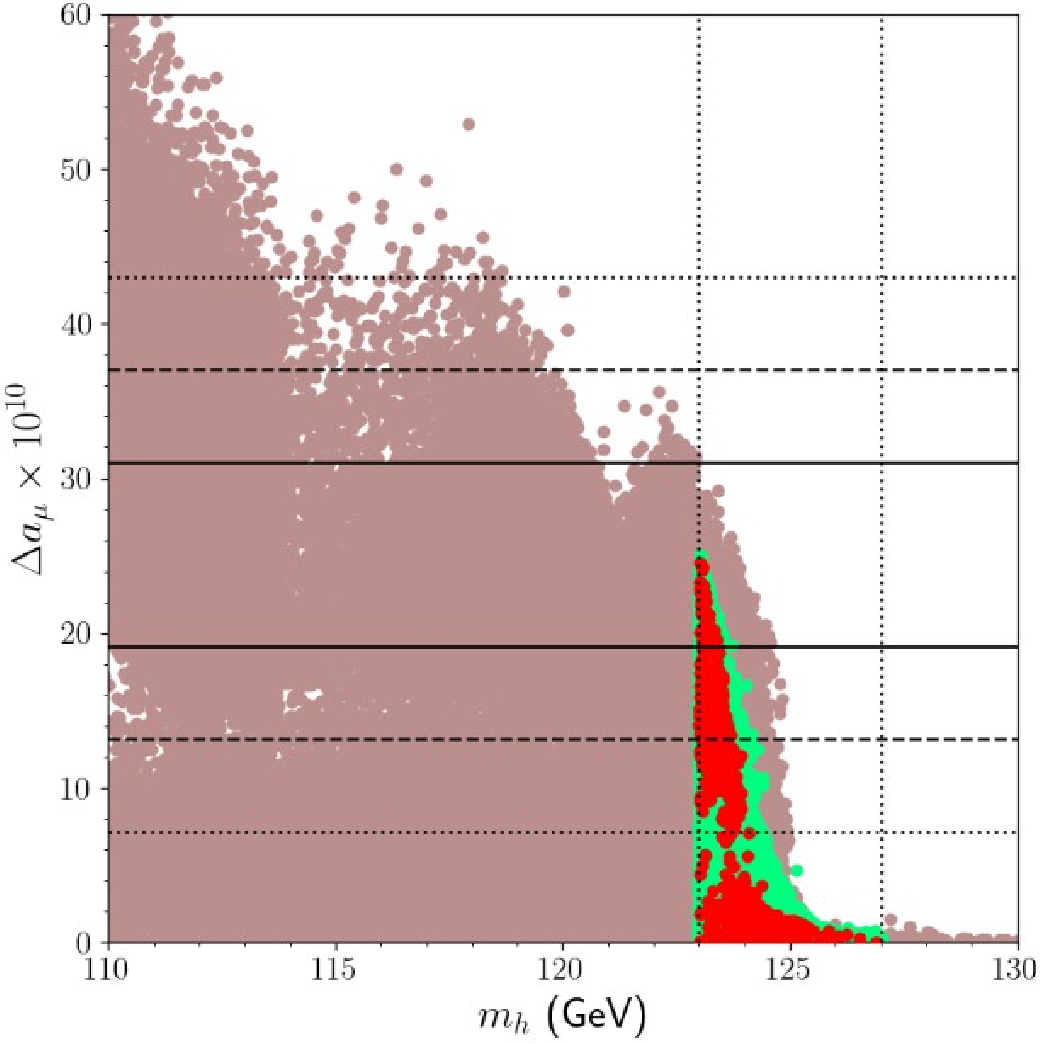
$$0.8 \times 10^{-9} \leq \text{BR}(B_s \to \mu^+\mu^-) \leq 6.2 \times 10^{-9} \ (2\sigma)$$

$$2.99 \times 10^{-4} \leq \text{BR}(B \to X_s\gamma) \leq 3.87 \times 10^{-4} \ (2\sigma)$$

$$0.114 \leq \Omega_{\rm CDM} h^2 \leq 0.126 \ .$$

$$\begin{aligned}
0 \leq\ & m_L && \leq 5 \text{ TeV} \\
0 \leq\ & M_{2L} && \leq 5 \text{ TeV} \\
-3 \leq\ & M_3 && \leq 5 \text{ TeV} \\
-3 \leq\ & A_0/m_L && \leq 3 \\
1.2 \leq\ & \tan\beta && \leq 60 \\
0 \leq\ & \rm x_{LR} && \leq 3 \\
-3 \leq\ & \rm y_{LR} && \leq 3 \\
0 \leq\ & \rm x_d && \leq 3 \\
-1 \leq\ & \rm x_u && \leq 2 \ .
\end{aligned}$$

Important contribution is in tension with the Higgs mass



$$\Delta a_\mu^{\tilde{B}\tilde{\mu}_L\tilde{\mu}_R} \simeq \frac{g_1^2}{16\pi^2}\frac{m_\mu^2 M_{\tilde{B}}(\mu\tan\beta - A_\mu)}{m_{\tilde{\mu}_L}^2 m_{\tilde{\mu}_R}^2} F_N\left(\frac{m_{\tilde{\mu}_L}^2}{M_{\tilde{B}}^2}, \frac{m_{\tilde{\mu}_R}^2}{M_{\tilde{B}}^2}\right)$$

$$\Delta m_h^2 \simeq \frac{m_t^4}{16\pi^2 v^2 \sin^2\beta}\frac{\mu A_t}{M_{\rm SUSY}^2}\left[\frac{A_t^2}{M_{\rm SUSY}^2} - 6\right] \cdot$$

$$\frac{dm^2_{\tilde{l}_{R_i}}}{dt} = -\frac{1}{16\pi^2}\Big[2(Y^i_l)^2 P^i_{\tilde{l}} + g_1^2 \mathrm{Tr}(Ym^2) - 4g_1^2 M_1^2\Big]$$

$$\frac{dm^2_{\tilde{L}_i}}{dt} = -\frac{1}{16\pi^2}\Big[(Y^i_l)^2 P^i_{\tilde{l}} - \frac{1}{2}g_1^2 \mathrm{Tr}(Ym^2) - (g_1^2 M_1^2 + 3g_2^2 M_2^2)\Big]$$

$$\frac{dm^2_{\tilde{d}_{R_i}}}{dt} = -\frac{1}{16\pi^2}\Big[2(Y^i_d)^2 P^i_{\tilde{d}} + \frac{1}{3}g_1^2 \mathrm{Tr}(Ym^2) - \Big(\frac{4}{9}g_1^2 M_1^2 + \frac{16}{3}g_3^2 M_3^2\Big)\Big]$$

$$\frac{dm^2_{\tilde{u}_{R_i}}}{dt} = -\frac{1}{16\pi^2}\Big[2(Y^i_u)^2 P^i_{\tilde{u}} - \frac{2}{3}g_1^2 \mathrm{Tr}(Ym^2) - \Big(\frac{16}{9}g_1^2 M_1^2 + \frac{16}{3}g_3^2 M_3^2\Big)\Big]$$

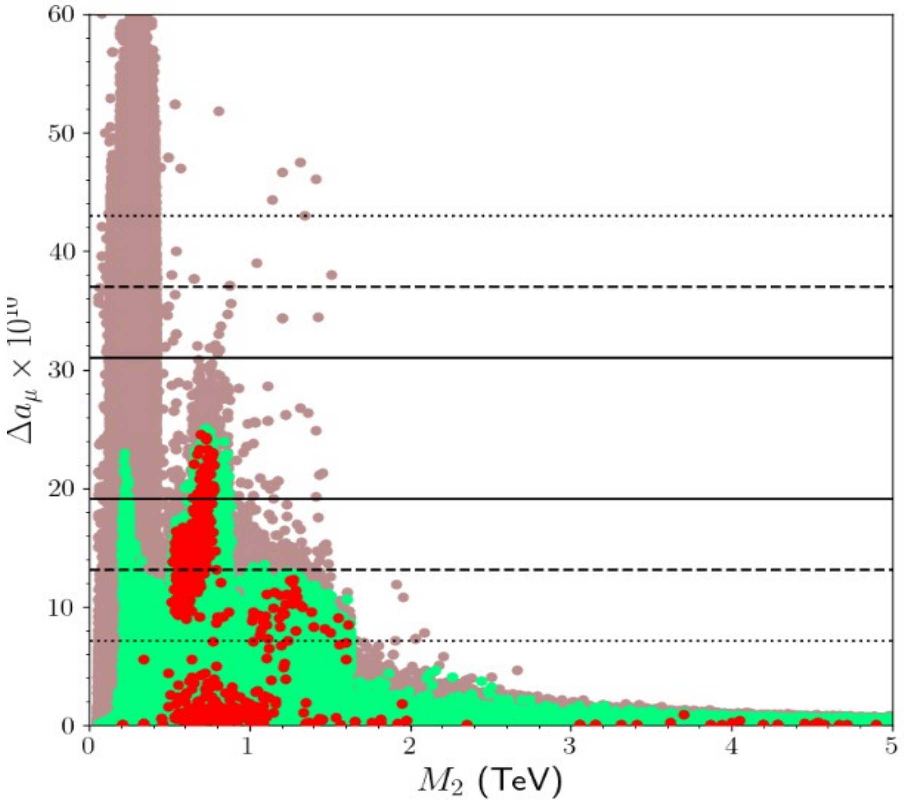
$$\frac{dm^2_{\tilde{Q}_i}}{dt} = -\frac{1}{16\pi^2}\Big[(Y^i_u)^2 P^i_{\tilde{u}} + (Y^i_d)^2 P^i_{\tilde{d}} + \frac{1}{6}g_1^2 \mathrm{Tr}(Ym^2) \ -\Big(\frac{1}{9}g_1^2 M_1^2 + 3g_2^2 M_2^2 + \frac{16}{3}g_3^2 M_3^2\Big)\Big]$$

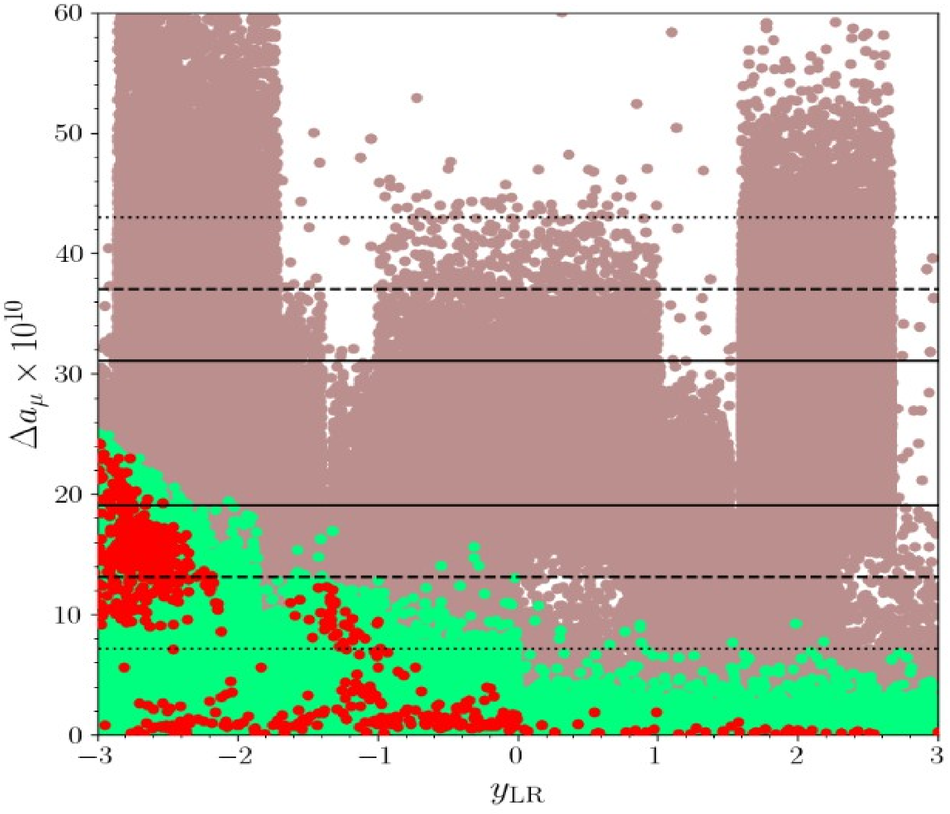
$$m^2_{\tilde{u}_{iL}} = m^2_{\tilde{q}_{i0}} + m^2_{u_i} + \tilde{\alpha}_G \left(\frac{8}{3}f_3 m_3^2 + \frac{3}{2}f_2 m_2^2 + \frac{1}{30}f_1 m_1^2\right)$$

$$m^2_{\tilde{u}_{iR}} = m^2_{\tilde{u}_{i0}} + m^2_{u_i} + \tilde{\alpha}_G \left(\frac{8}{3}f_3 m_3^2 + \frac{8}{15}f_1 m_1^2\right)$$

$$m^2_{\tilde{e}_{iL}} = m^2_{\tilde{\ell}_{i0}} + m^2_{e_i} + \tilde{\alpha}_G \left(\frac{3}{2}f_2 m_2^2 + \frac{3}{10}f_1 m_1^2\right)$$

$$m^2_{\tilde{e}_{iR}} = m^2_{\tilde{e}_{i0}} + m^2_{e_i} + \tilde{\alpha}_G \frac{6}{5}f_1 m_1^2 \, .$$





- Gaugino masses not unified at GUT
- $M_3 >> M_2$, M_1

$$M_1 = \frac{3}{5} M_{2R} + \frac{2}{5} M_4 \ ,$$

$$M_4 = M_3 ; M_2 = y_{LR} M_{2R}$$

MSSM extended by seesaw mechanism

- The superpotential for MSSM-Seesaw I can be written as

$$W = W_{\rm MSSM} + Y_\nu^{ij}\epsilon_{\alpha\beta}H_2^\alpha N_i^c L_j^\beta + \frac{1}{2}M_N^{ij}N_i^c N_j^c, \qquad (5)$$

- The full set of soft SUSY-breaking terms is given by,

$$\begin{aligned} -\mathcal{L}_{\rm soft,SI} &= -\mathcal{L}_{\rm soft} + (m_{\tilde\nu}^2)^i_j \tilde\nu^*_{Ri}\tilde\nu^j_R + (\frac{1}{2}B_\nu^{ij}M_N^{ij}\tilde\nu^*_{Ri}\tilde\nu^*_{Rj} \\ &\quad + A_\nu^{ij}h_2\tilde\nu^*_{Ri}\tilde l_{Lj} + {\rm h.c.})\ , \qquad (6)\end{aligned}$$

$$\mathcal{M} = \begin{pmatrix} 0 & m_\nu^D \\ m_\nu^{D^T} & M_R \end{pmatrix}$$

"See-Saw" explanation for tiny masses.

- The physical masses are:
  1. $m_1 \equiv m_{light} \simeq \frac{(m_\nu^D)^2}{M_R}$
  2. $m_2 \simeq M_R$
- For $(m_\nu^D)_{33} \approx (200 \text{ GeV})$ $(\lambda_\nu \approx \lambda_t)$ and $M_{N_3} \approx O(10^{14} \text{ GeV})$, $m_{eff} \approx 0.05$ eV

$$W = W_{\rm MSSM} + \frac{1}{2}(Y_\nu L H_2)^T M_N^{-1} (Y_\nu L H_2).$$

$$m_{\rm eff} = -\frac{1}{2} v_u^2 Y_\nu \cdot M_N^{-1} \cdot Y_\nu^T, \qquad m_\nu^\delta = U^T m_{\rm eff} U$$

Slepton flavor mixings

$$(m^2_{\tilde{L}})_{ij} \sim \frac{1}{16\pi^2}(6m_0^2 + 2A_0^2)\,\left(Y_\nu{}^\dagger Y_\nu\right)_{ij} \log\left(\frac{M_{\rm GUT}}{M_N}\right)$$

$$(m^2_{\tilde{e}})_{ij} \sim 0$$

$$(A_l)_{ij} \sim \frac{3}{8\pi^2} A_0 Y_{l\,i}\,\left(Y_\nu{}^\dagger Y_\nu\right)_{ij} \log\left(\frac{M_{\rm GUT}}{M_N}\right)$$

Orthogonal matrix

$$Y_\nu = \frac{\sqrt{2}}{v_u}\sqrt{M_R^\delta}\,R\,\sqrt{m_\nu^\delta}\,U^\dagger$$

Casas + Ibarra

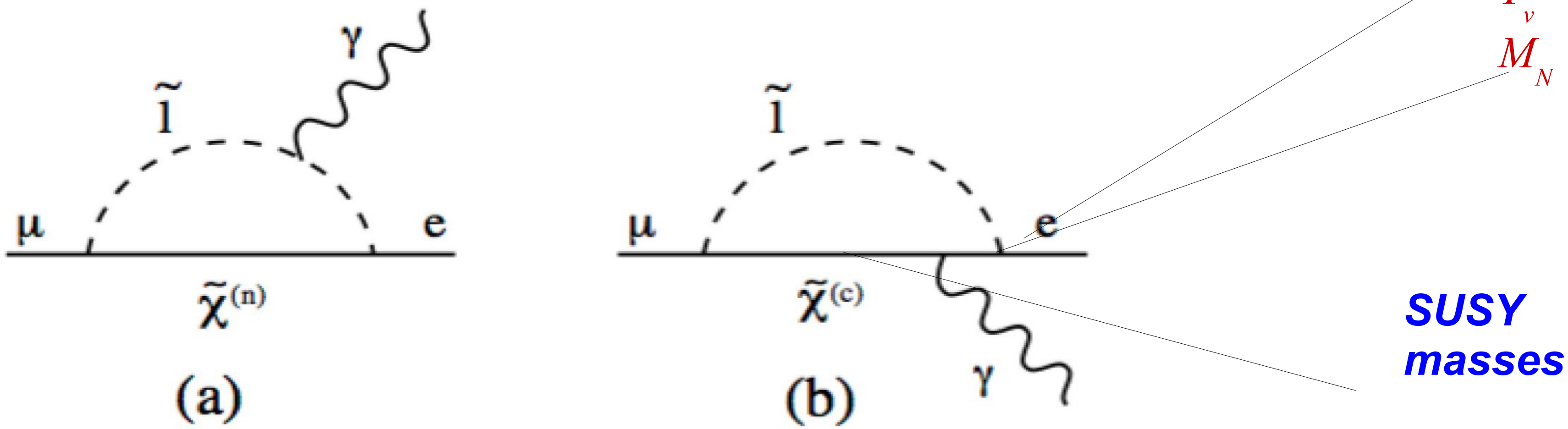
Diagonal Universal
1E14 GeV

Order 1

$$Y_\nu^\dagger Y_\nu = \frac{2}{v_u^2} M_R U m_\nu^\delta U^\dagger$$

Limit case of degenerate MR

In SUSY flavor mixing lepton-slepton vertices can induce LFV diagrams:



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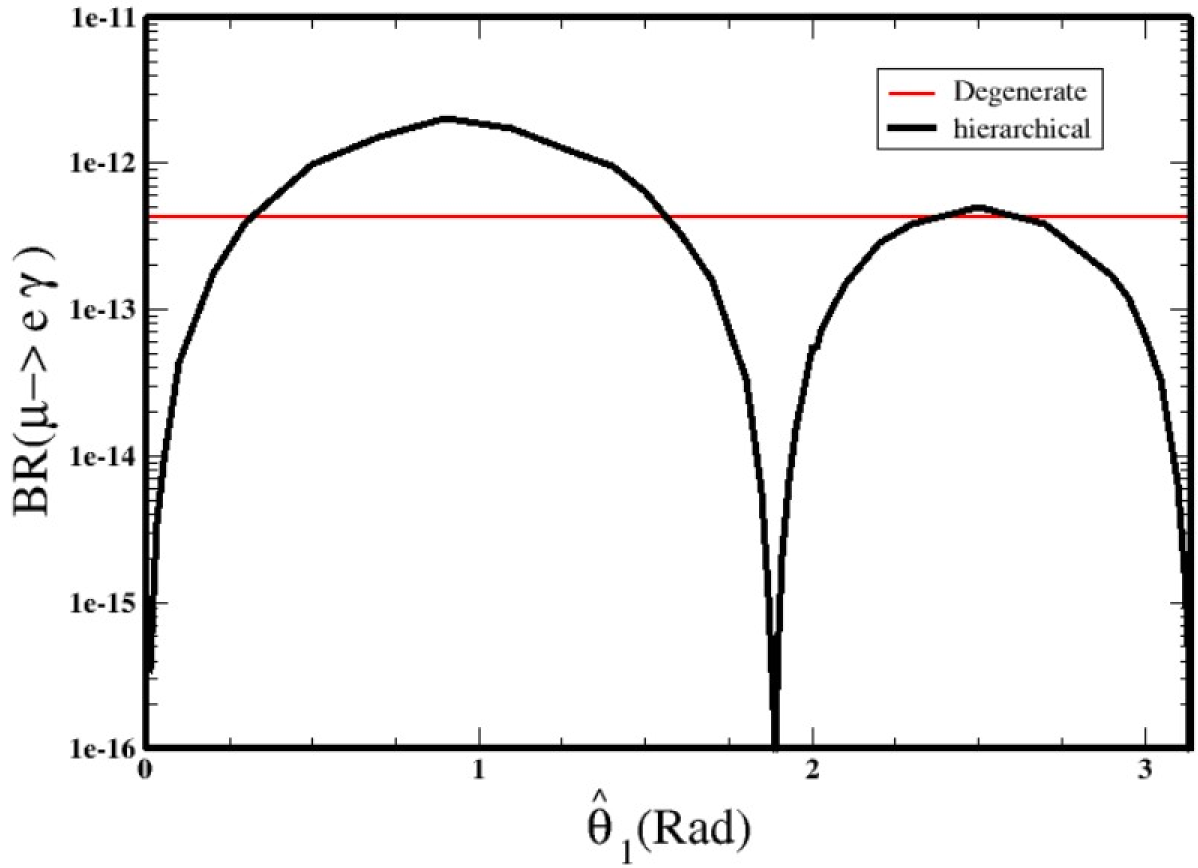
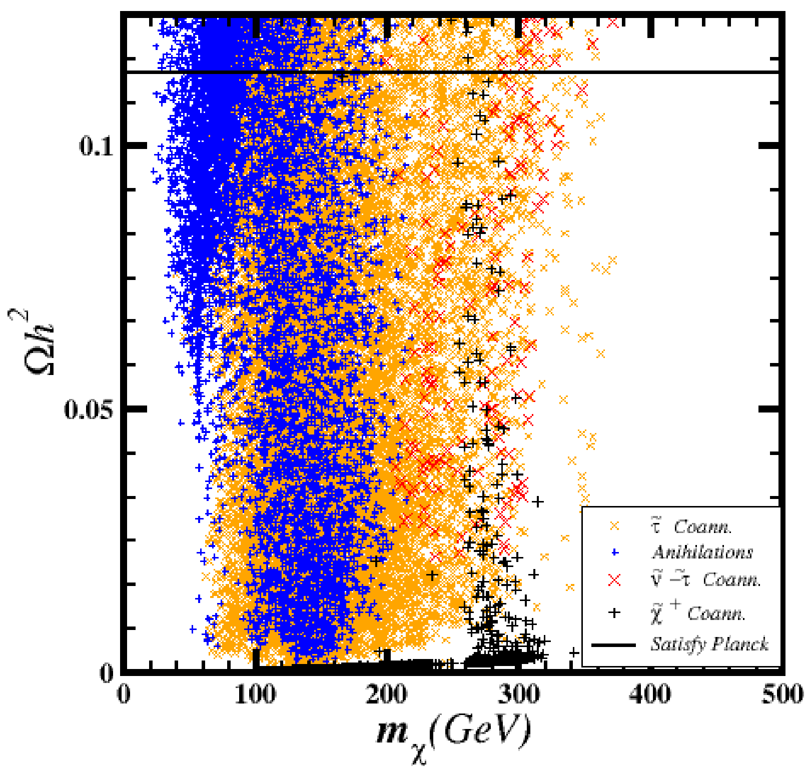
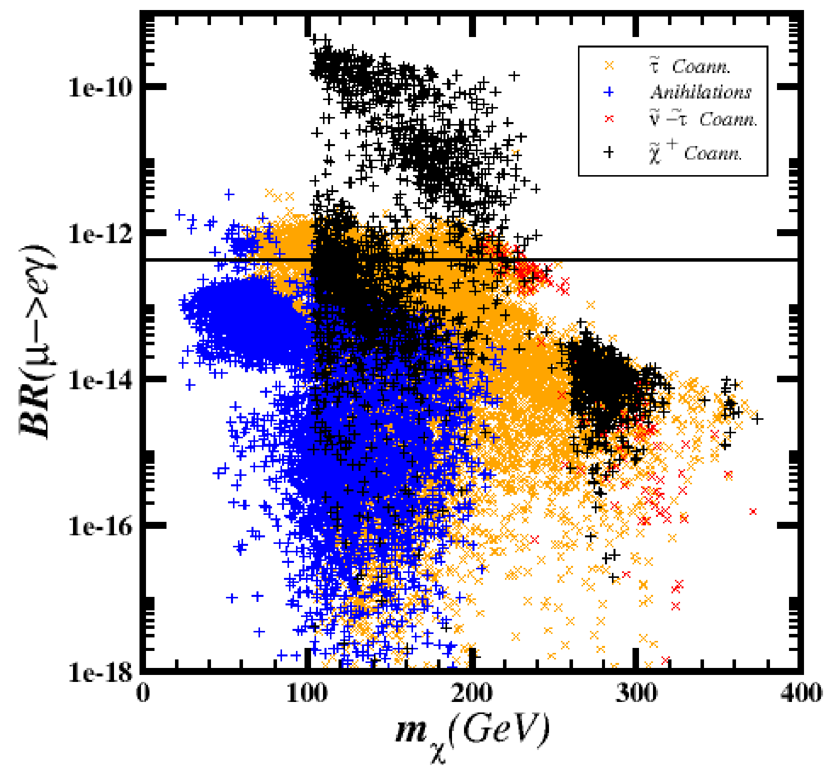


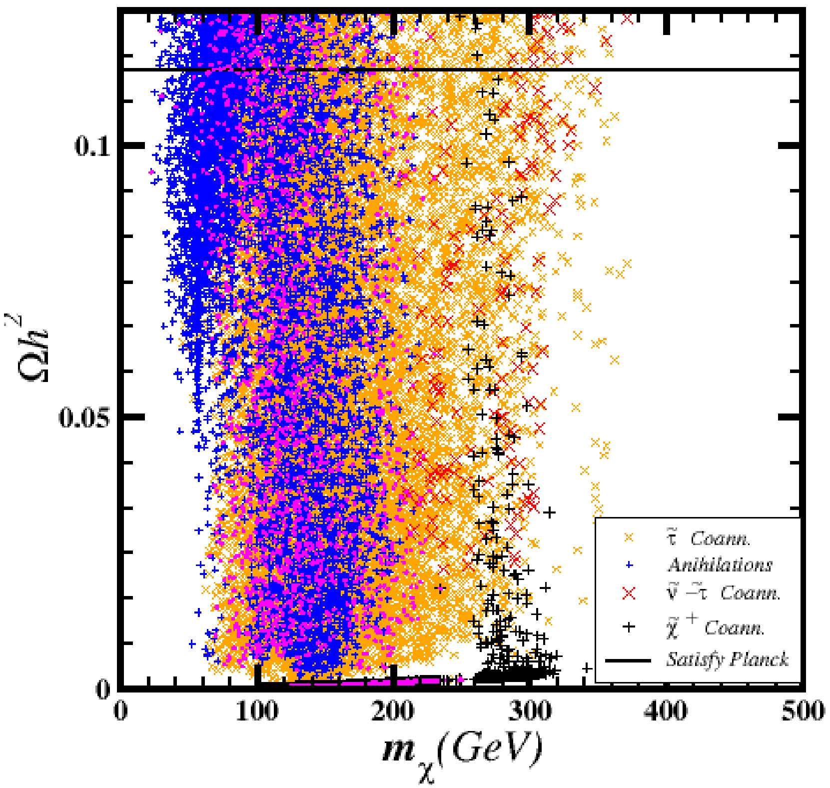
Figure 1: $BR(\mu \to e\gamma)$ *vs* $\hat{\theta}_1$ *under two different assumptions for the right-handed neutrinos using the CMSSM with* $m_0 = 650\ GeV$, $m_{1/2} = 700\ GeV$, $A_0 = -1400\ GeV$ *and* $\tan\beta = 40$, $\mu > 0$ *and* $M_3 = 2.5 \cdot 10^{12}\ GeV$.



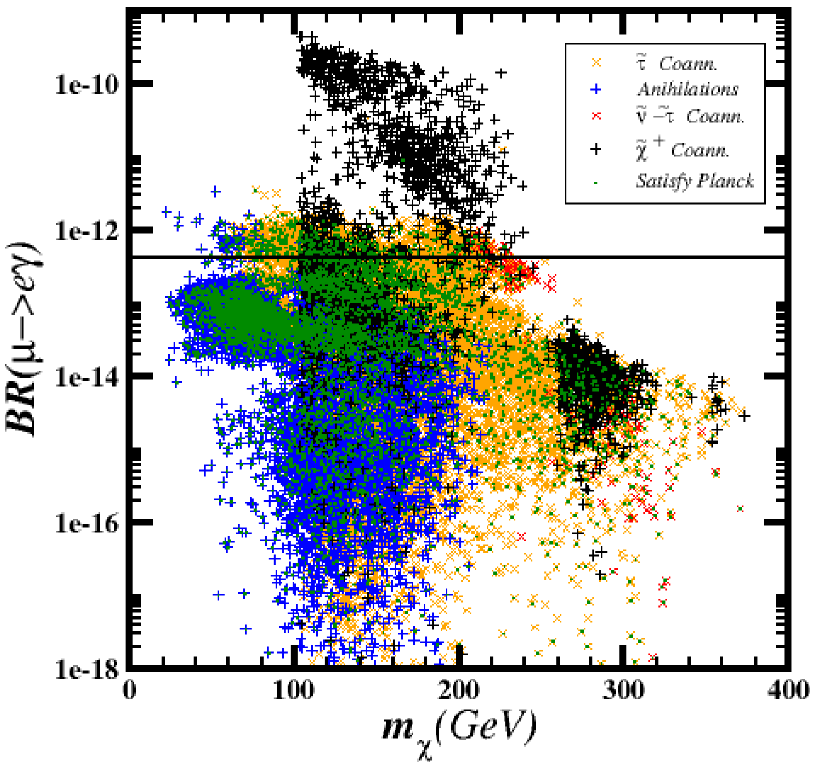
Ωh^2
0.1
0.05
0
0
100
200
300
400
500
$m_\chi (GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\nu}$ - $\tilde{\tau}$ Coann.
$\tilde{\chi}^+$ Coann.
Satisfy Planck



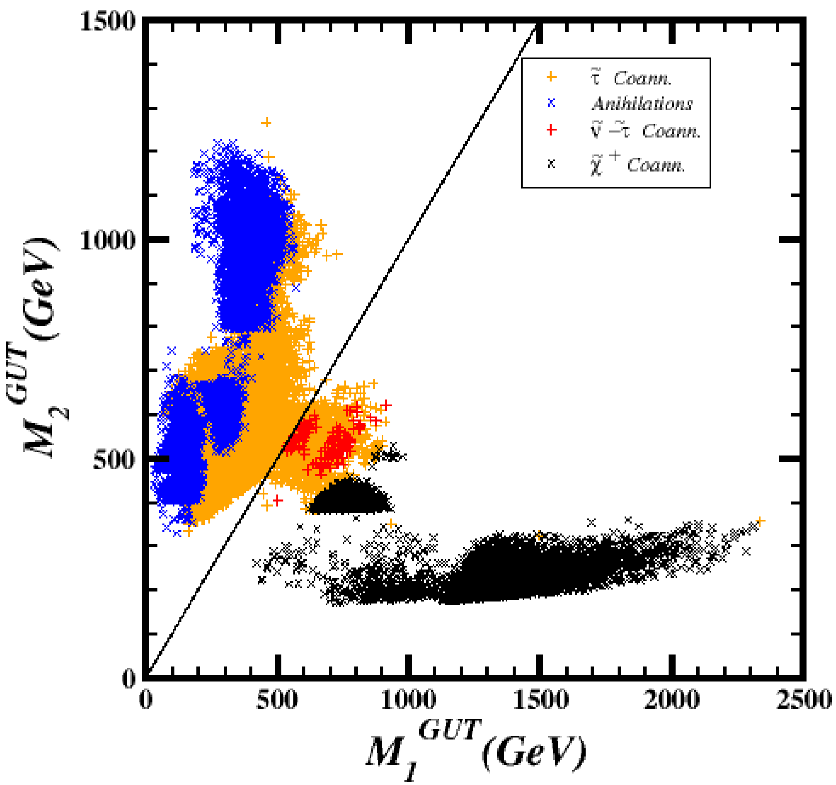
$BR(\mu \to e\gamma)$
1e-10
1e-12
1e-14
1e-16
1e-18
0
100
200
300
400
$m_\chi (GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\nu}$ - $\tilde{\tau}$ Coann.
$\tilde{\chi}^+$ Coann.

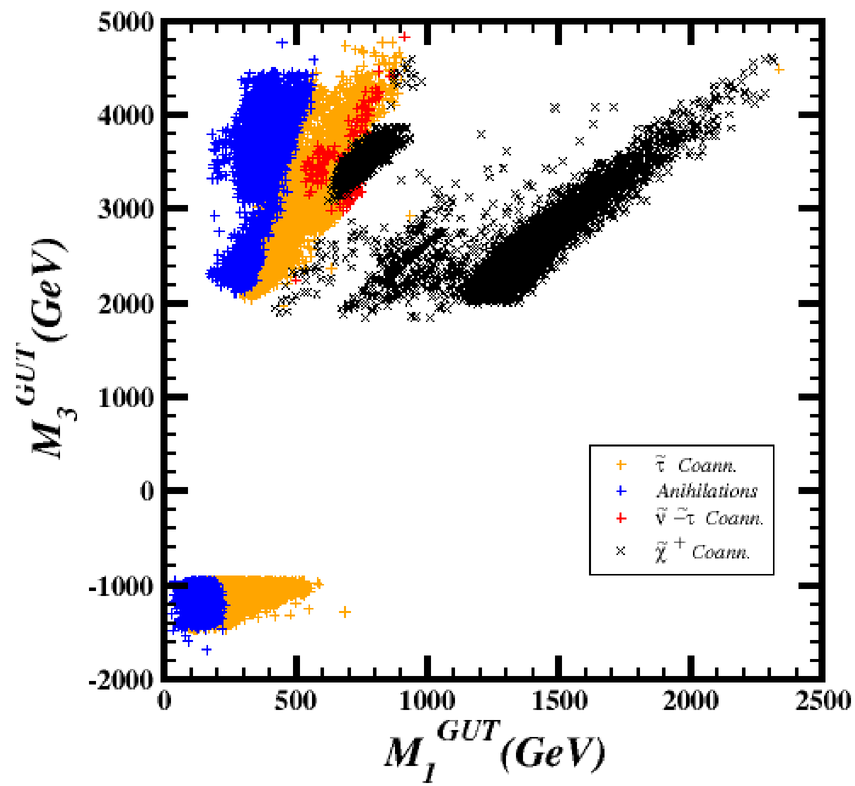


0.1
0.05
0
0
100
200
300
400
500
Ωh^2
$m_\chi(GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\nu}$ -$\tilde{\tau}$ Coann.
$\tilde{\chi}^+$ Coann.
Satisfy Planck



1e-10
1e-12
1e-14
1e-16
1e-18
0
100
200
300
400
$BR(\mu\to e\gamma)$
$m_\chi(GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\nu}$ -$\tilde{\tau}$ Coann.
$\tilde{\chi}^+$ Coann.
Satisfy Planck

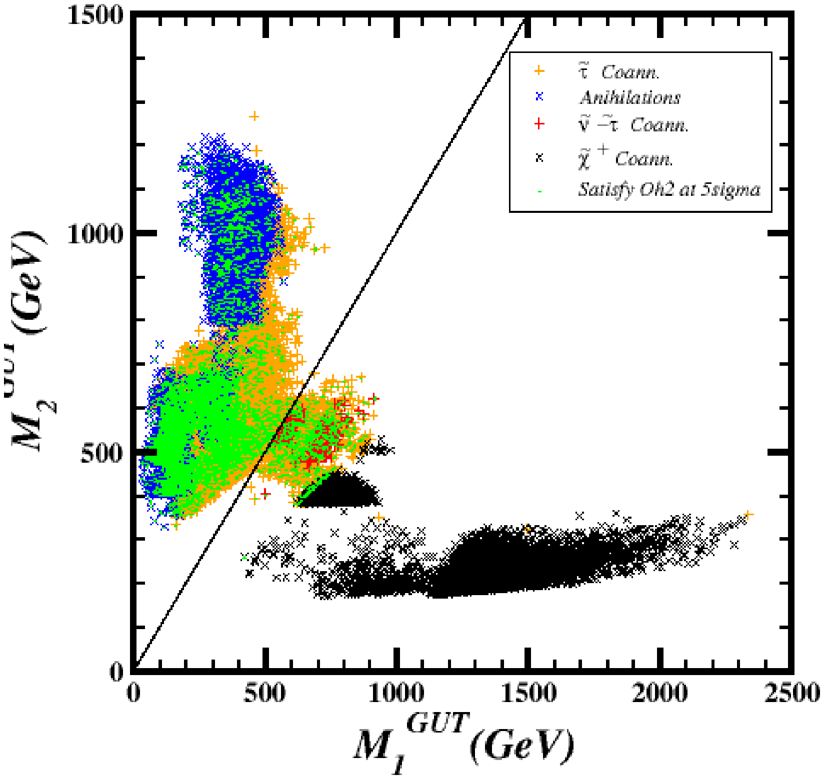


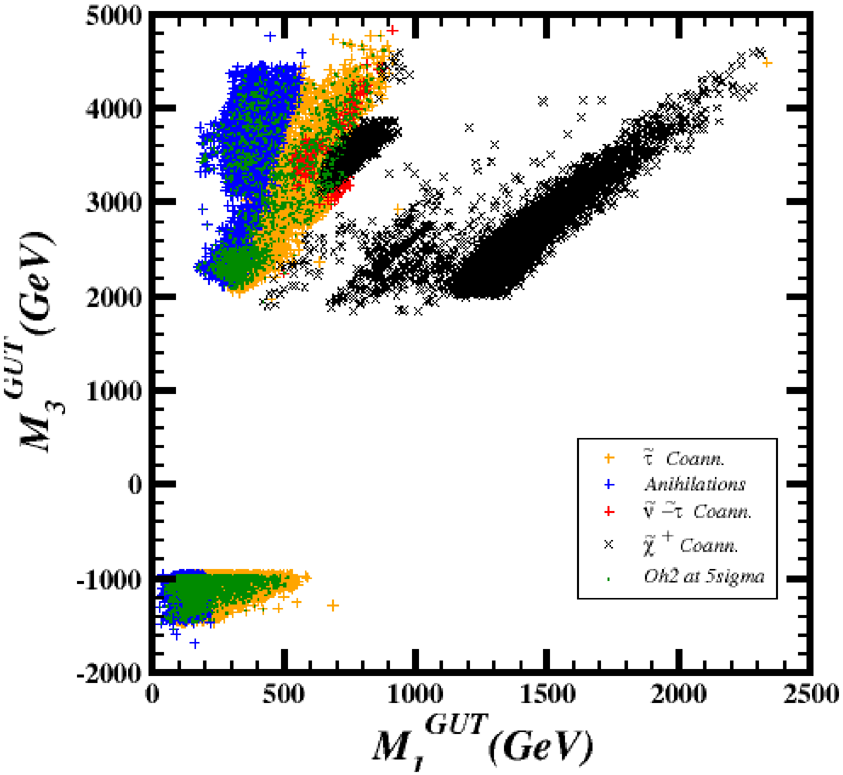


- Gaugino masses not unified at GUT
- $M_3 >> M_2$, M_1

$$M_1 = \frac{3}{5} M_{2R} + \frac{2}{5} M_4 \ ,$$

$$M_4 = M_3 ; M_2 = y_{LR} M_{2R}$$





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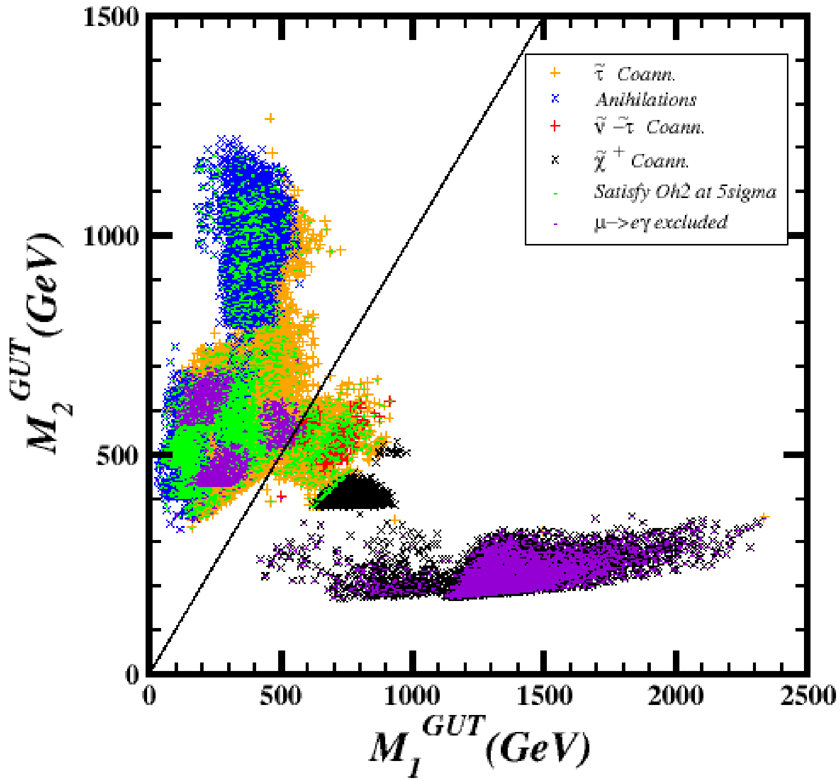

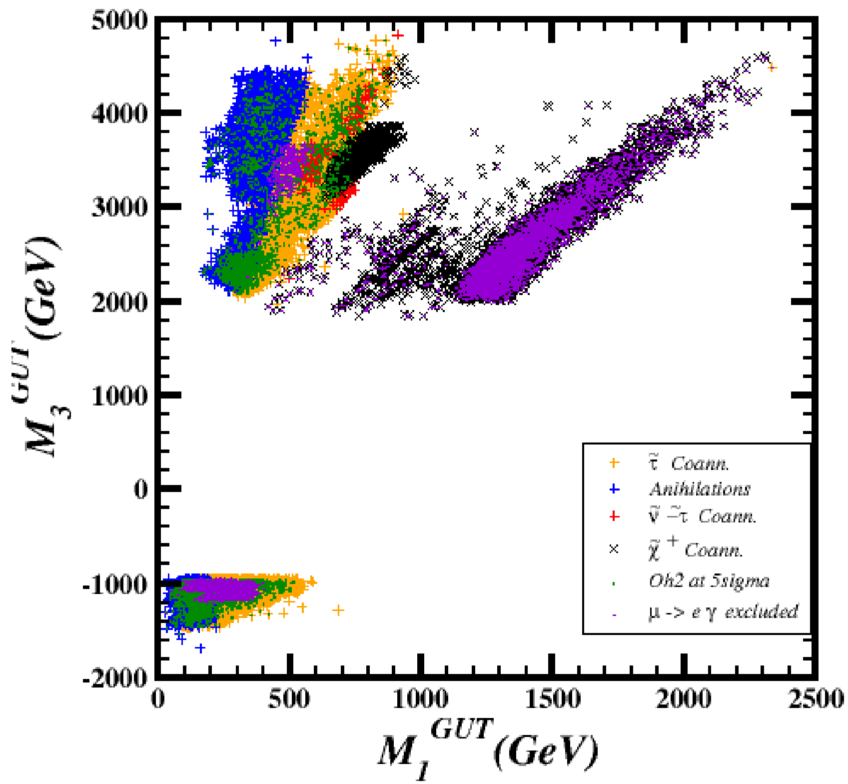

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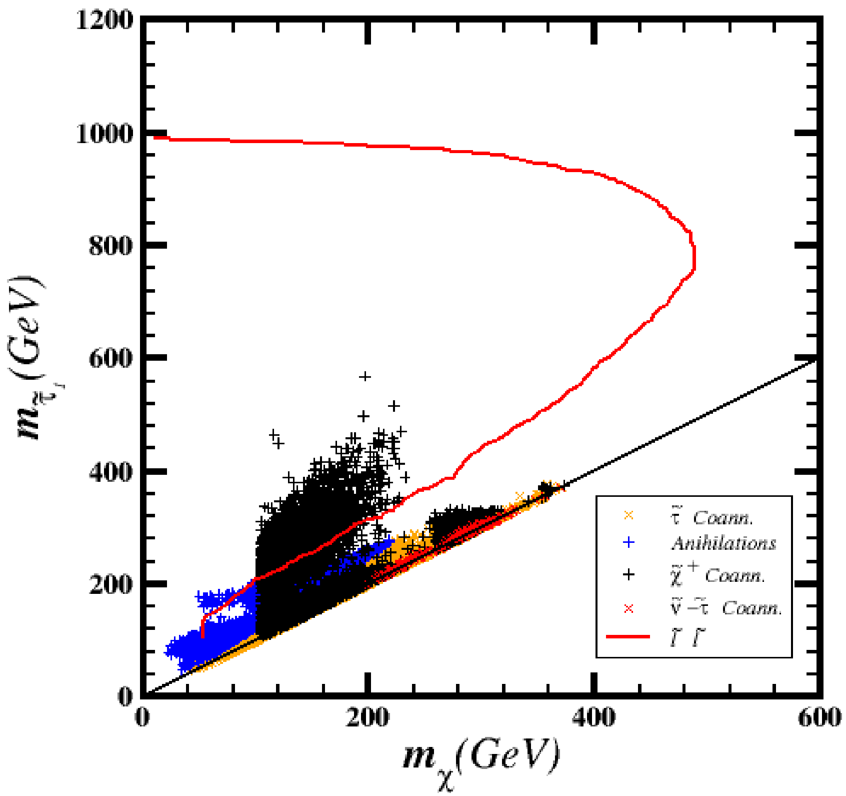
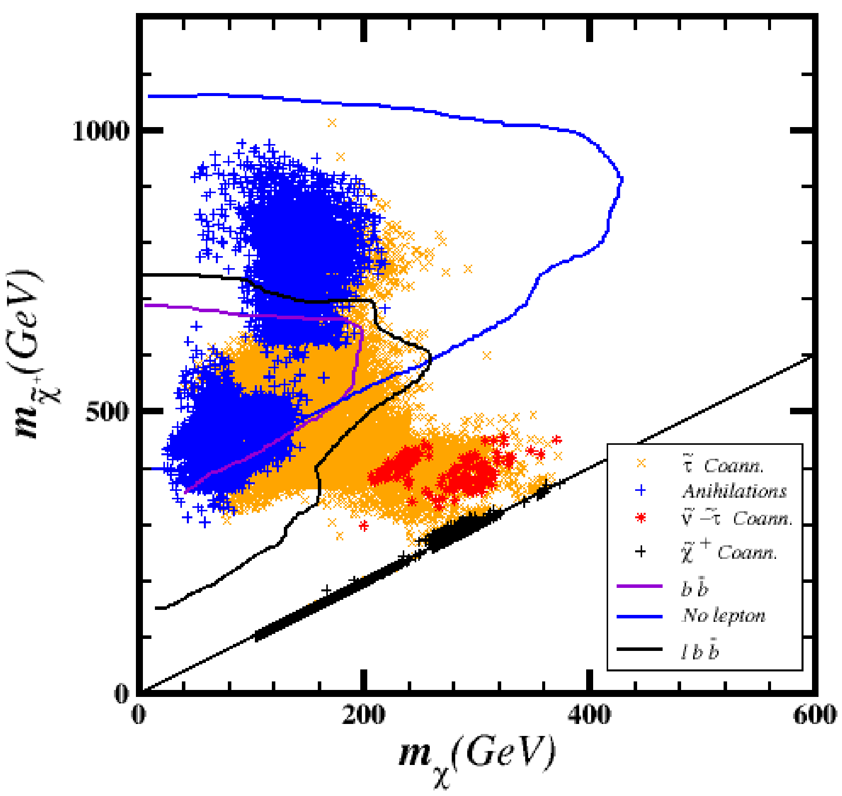
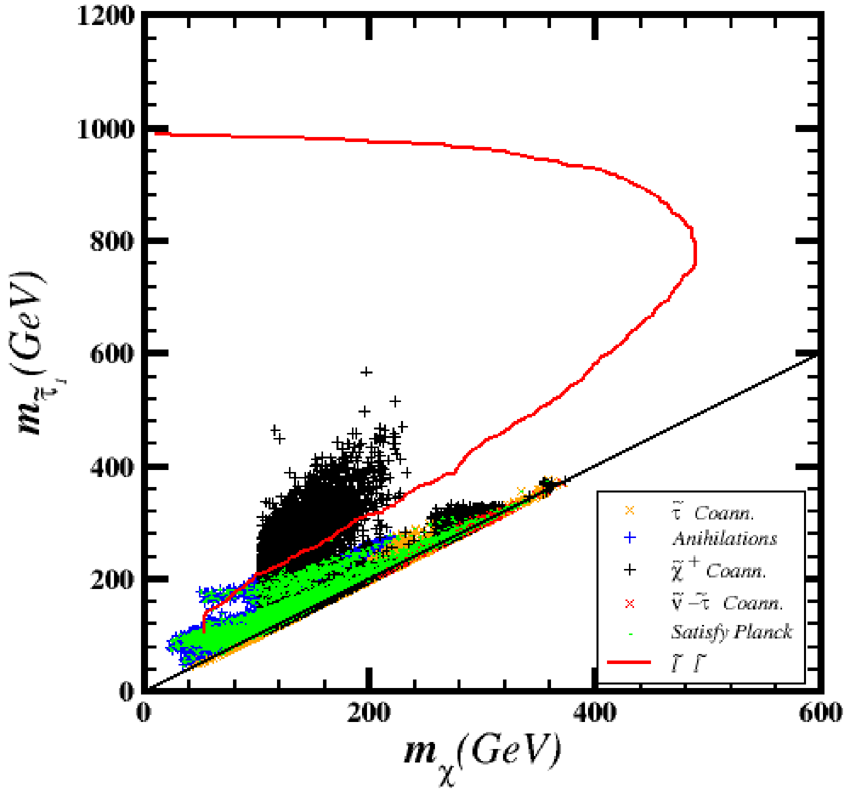


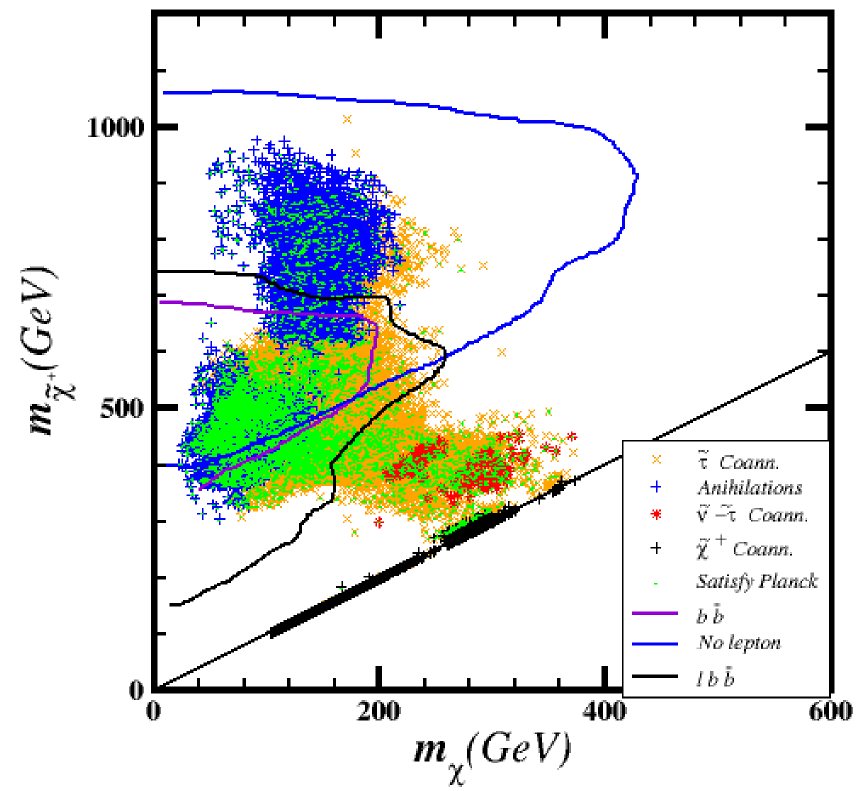
1200
1000
800
600
400
200
0
0
200
400
600
$m_{\tilde{\tau}_1}(GeV)$
$m_\chi(GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\chi}^+$ Coann.
$\tilde{\nu}-\tilde{\tau}$ Coann.
$\tilde{l}\ \tilde{l}$



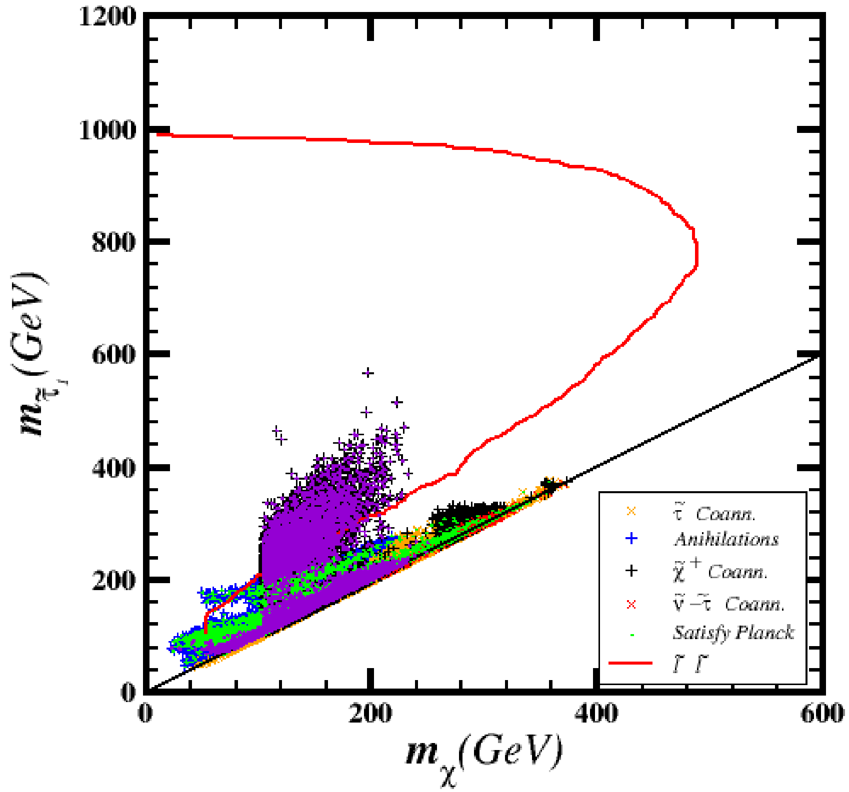
1000
500
0
0
200
400
600
$m_{\tilde{\chi}^+}(GeV)$
$m_\chi(GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\nu}-\tilde{\tau}$ Coann.
$\tilde{\chi}^+$ Coann.
$b\bar{b}$
No lepton
$l\,b\,\bar{b}$



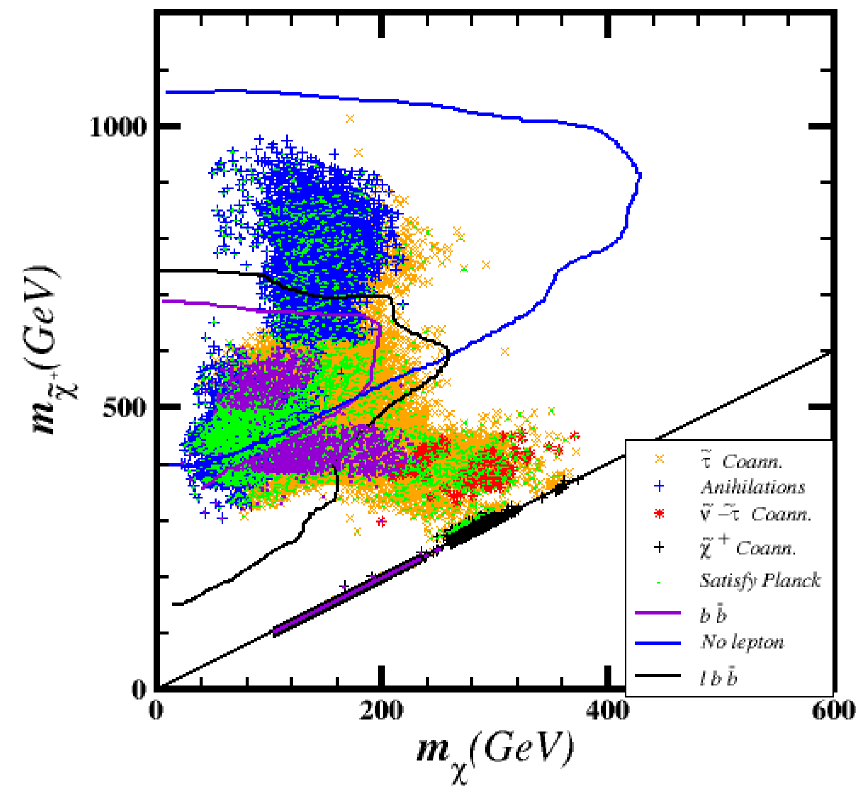
1200
1000
800
600
400
200
0
$m_{\tilde{\tau}_1}(GeV)$
0
200
400
600
$m_\chi(GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\chi}^+$ Coann.
$\tilde{\nu}-\tilde{\tau}$ Coann.
Satisfy Planck
$\tilde{l}\ \tilde{l}$



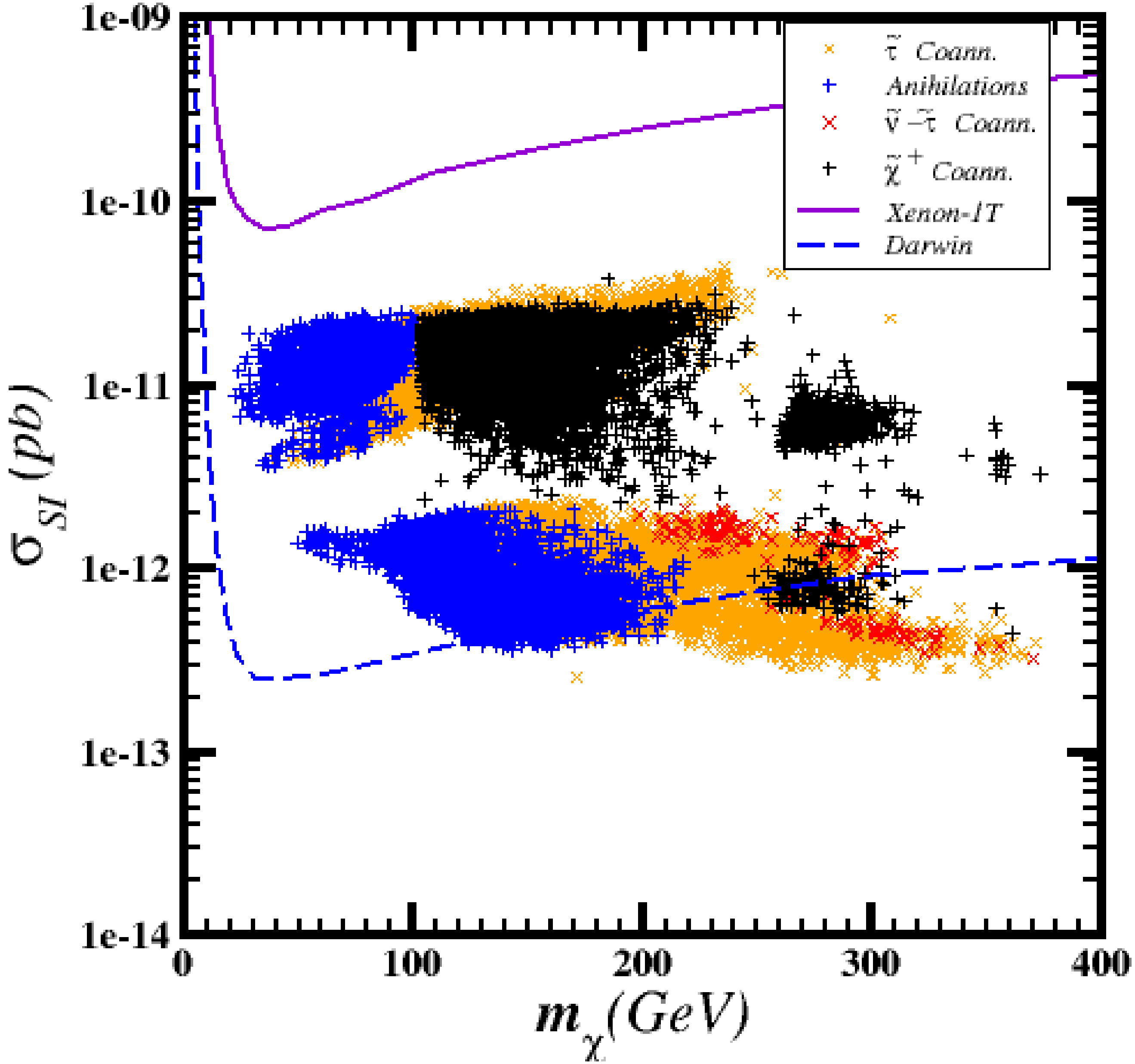
1000
500
0
$m_{\tilde{\chi}^+}(GeV)$
0
200
400
600
$m_\chi(GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\nu}-\tilde{\tau}$ Coann.
$\tilde{\chi}^+$ Coann.
Satisfy Planck
$b\ \bar{b}$
No lepton
$l\ b\ \bar{b}$

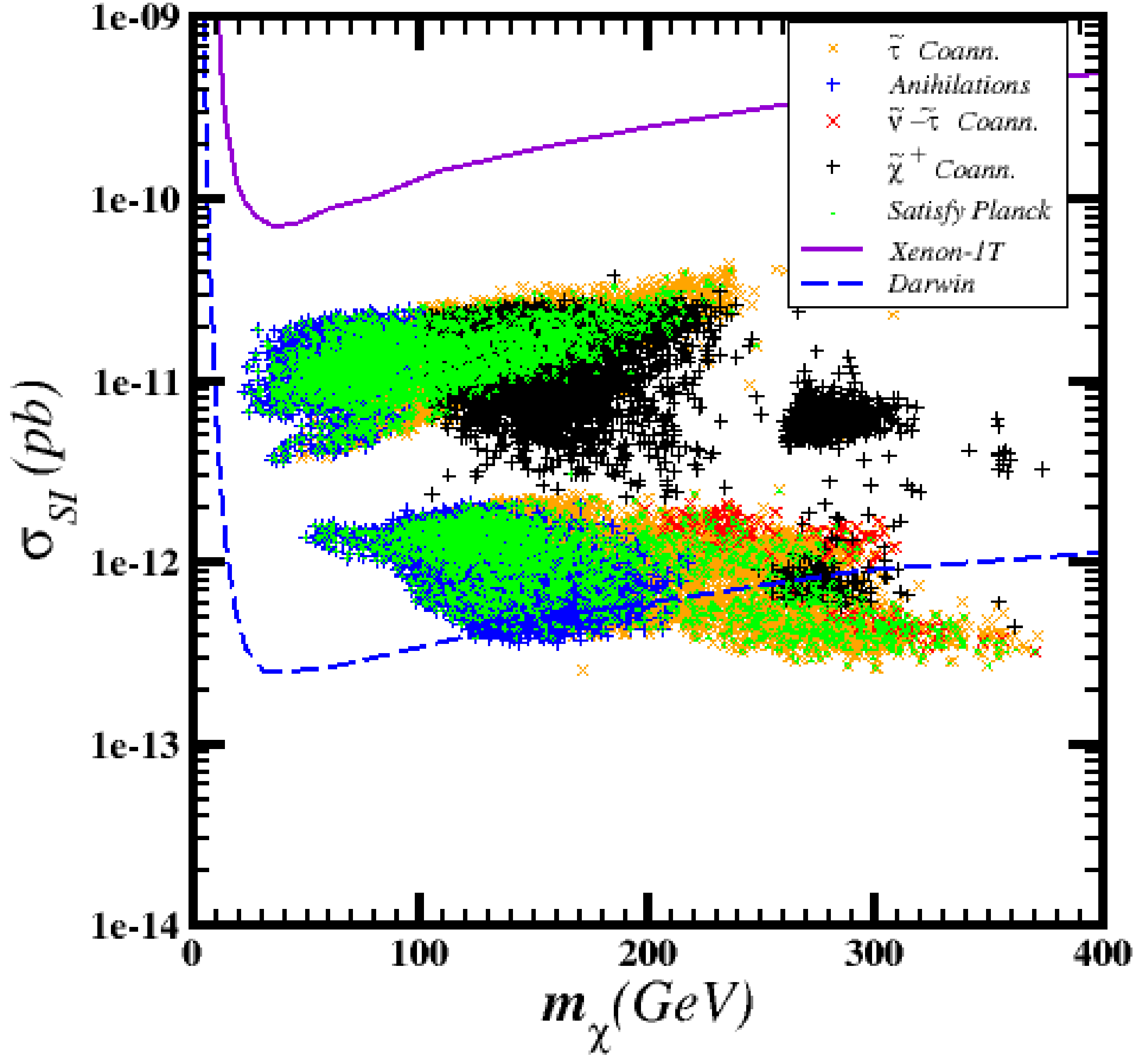


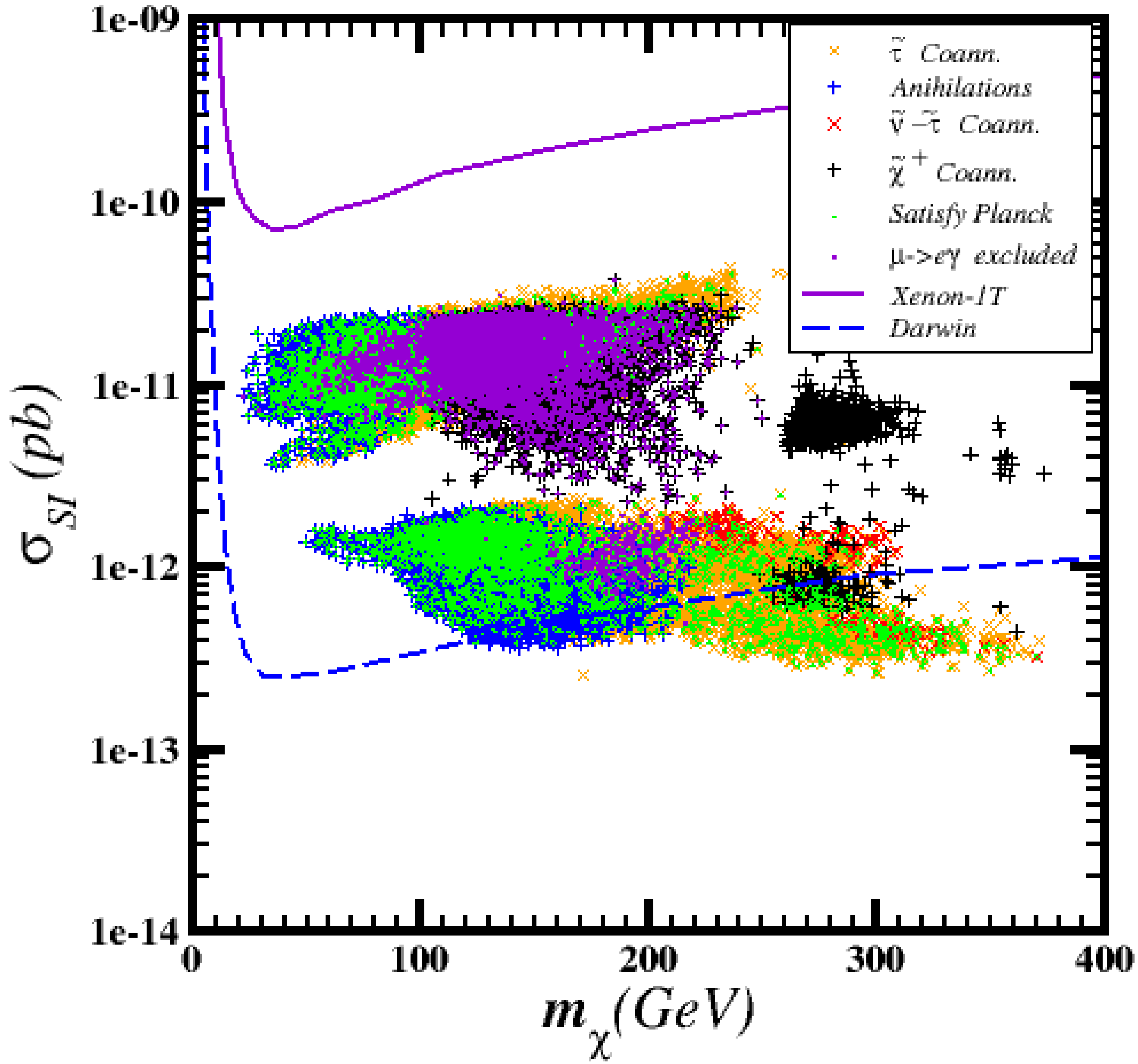
$m_{\tilde{\tau}_1}(GeV)$
$m_\chi(GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\chi}^+$ Coann.
$\tilde{\nu}-\tilde{\tau}$ Coann.
Satisfy Planck
$l^+ l^-$



$m_{\tilde{\chi}^+}(GeV)$
$m_\chi(GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\nu}-\tilde{\tau}$ Coann.
$\tilde{\chi}^+$ Coann.
Satisfy Planck
$b\,\bar{b}$
No lepton
$l\,b\,\bar{b}$


1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
0
100
200
300
400
σ_SI (pb)
m_χ(GeV)
τ̃ Coann.
Anihilations
ν̃ – τ̃ Coann.
χ̃+ Coann.
Xenon-1T
Darwin


1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
0
100
200
300
400
$\sigma_{SI}\ (pb)$
$m_\chi (GeV)$
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\nu}-\tilde{\tau}$ Coann.
$\tilde{\chi}^+$ Coann.
Satisfy Planck
Xenon-1T
Darwin



1e-09
1e-10
1e-11
1e-12
1e-13
1e-14
0
100
200
300
400
σ_{SI} (pb)
m_χ(GeV)
$\tilde{\tau}$ Coann.
Anihilations
$\tilde{\nu}-\tilde{\tau}$ Coann.
$\tilde{\chi}^+$ Coann.
Satisfy Planck
μ->eγ excluded
Xenon-1T
Darwin

CONCLUSIONS

Susy Models with large gluino masses can explain the muon (g-2) discrepancy via a SUSY contribution mainting the prediction for the observed Higgs masses.

Models with Pati-Salam Unification, SU(4)xSU(2)xSU(2) can motivate gaugino non-universality ($M_3 >> M_2$, M_1) and a L/R asymmetry on the scalars such that muon (g-2) can be explained while LSP that satisfies the relic abundance condition.

(g-2)+DM satisfaction implies chargino and slepton masses at the LHC range. However, the small mass difference neutralino-stau makes difficult the identification of the signal. But that may be at the reach of planned linear colliders.

When the model is complemented with a simple see-saw with RH-neutrinos with mass ~

2.5 E+13 GeV, BR($\mu \to e \gamma$) falls in the experimental range.

Many of the points with relic density predict interesting SD cross sections above the neutrino floor.

Thanks for attention !!!!