MSSM Electroweak Baryogenesis and LHC data

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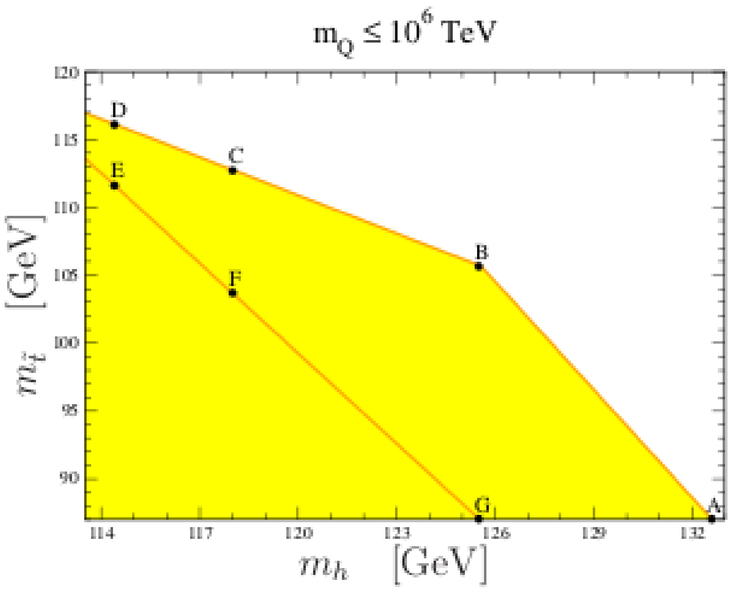
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LIGHT STOP SCENARIO (MSSM framework for EWBG) [1, 2, 3]

In the MSSM the minimal requirement for EWBG are:

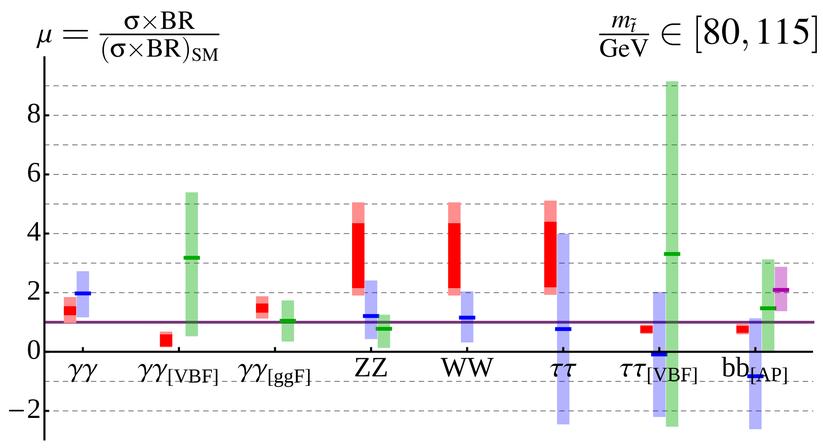
- Right-handed stop lighter than top quark and small trilinear parameter A_t (to achieve strong first order phase transition).
- Left-handed stop much heavier than 1 TeV (to increase radiatively the Higgs mass).
- Gauginos and Higgsinos below the TeV scale (sources of CP violations to generate the baryon asymmetry).
- Gluinos heavier than about 700 GeV (stop experimental constraints).
- SM-like Higgs sector ($m_A \gg m_t$. Not required but helps).

EWBG CONSTRAINTS ON STOP AND SM-LIKE HIGGS [4, 5]



Point	A	B	C	D	E	F	G
$\lvert A_t/m_Q\rvert$	0.5	0	0	0	0.3	0.4	0.7
$\tan\beta$	15	15	2.0	1.5	1.0	1.0	1.0

FIRST COMPARISON WITH 2011 LHC DATA ($m_h = 126$ GeV) [6, 7]



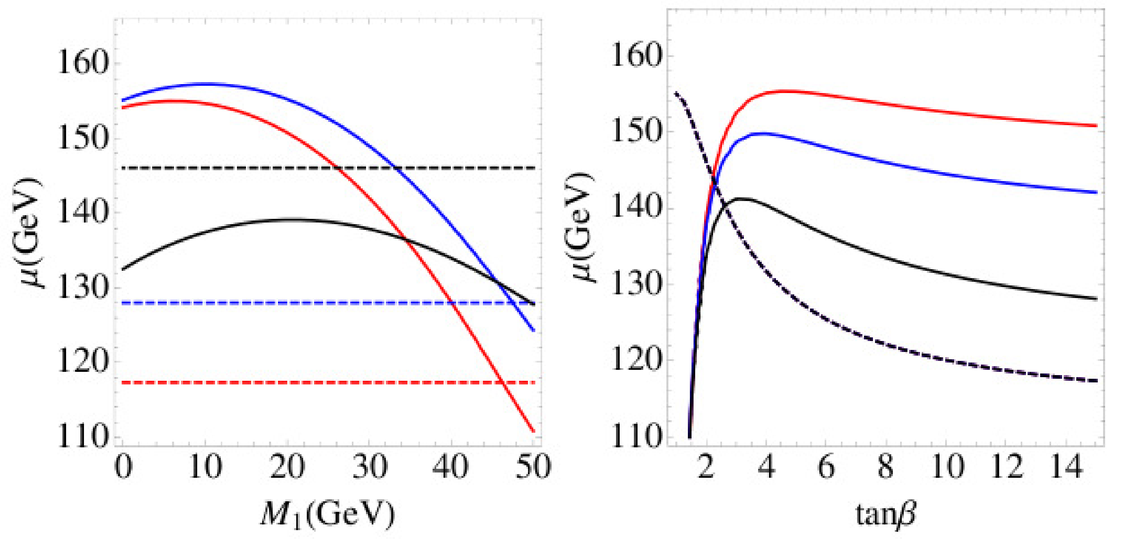
4 Columns: LSS as in [7], 1-σ fit of ATLAS, CMS, Tevatron.

Some measures are reconstructed. Results obtained by neglecting correlation between masses and effective couplings.

1. Is correlation between couplings and masses important?
2. Light neutralinos (as in [8]) allowing BR($h \to \chi_1^0\chi_1^0$) > 0 ?

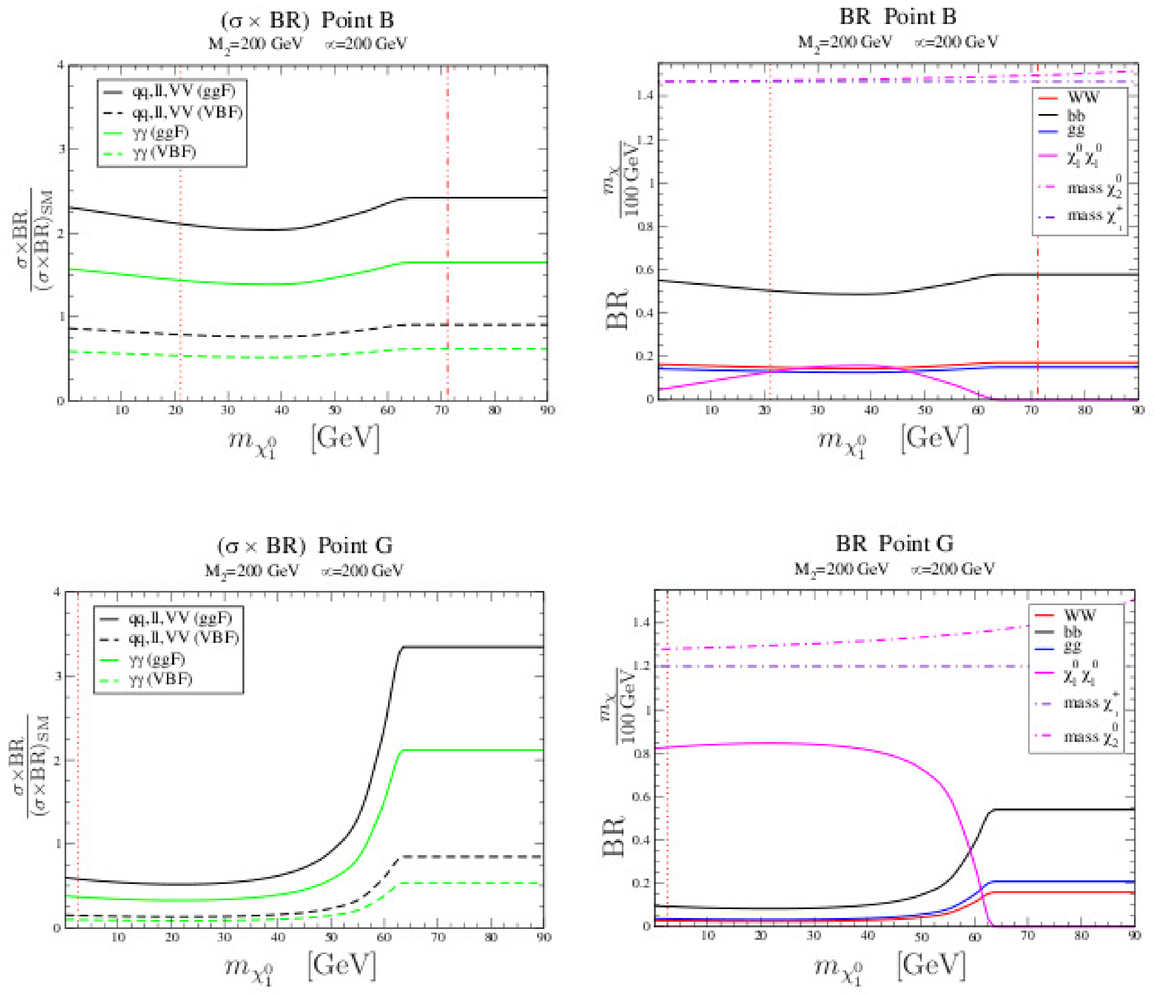
CONSTRAINTS ON PARAMETERS WITH LIGHT χ_1^0 AT 95% C.L.

- LEP, Tevatron and LHC Stop searches ($\tilde{t} \to c\chi_1^0$; $\tilde{t} \to W b \chi_1^0$; $\tilde{t} \to b\chi_1^0 \bar{f} f'$)
- $\Gamma(t \to \tilde{t}\,\chi_1^0) \lesssim 0.45$ GeV and $\frac{\sigma(gg\to h)}{\sigma(gg\to h)_{SM}} \times \mathrm{BR}(h \to \mathrm{inv}) \lesssim 1.9$
- $m_{\chi_1^+} \gtrsim 94$ GeV and $\Gamma(Z \to \chi_1^0\chi_1^0) \lesssim 0.5$ MeV (above the dashed and solid curves, respectively).

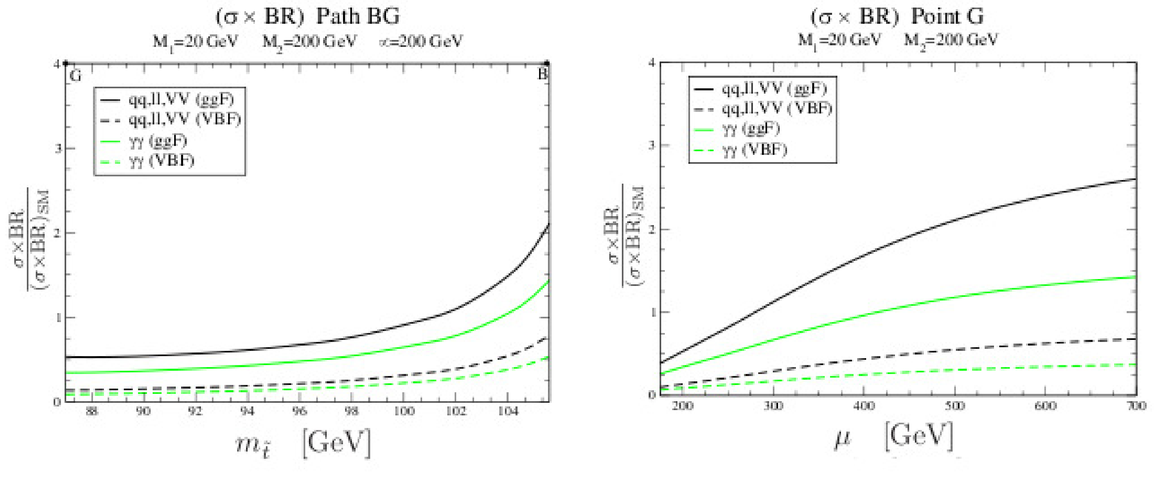


Red, blue, black correspond to $\tan\beta = 15, 5, 2$ in left panel and $M_1 = 20, 30, 40$ GeV in right panel. $M_2 = 200$ GeV.

RESULTS FOR $m_h \simeq 126$ GeV



Results depend on $m_{\tilde{t}}$ but also on $\tan\beta$ and μ. Intermediate results can be found!



CONCLUSIONS

- For heavy χ_1^0 deviations from the SM are smaller than in Ref. [7]
- EWBG in the MSSM is COMPATIBLE WITH 2012 LHC DATA
- Light neutralino can still be DARK MATTER (not showed in the poster)

References

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[3] M. Laine and K. Rummukainen, *Nucl.Phys.* **B535** (1998) 423–457.

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[6] T. Cohen *et al.*, 1203.2924.

[7] D. Curtin *et al.*, 1203.2932.

[8] H. K. Dreiner *et al.*, *Eur.Phys.J.* **C62** (2009) 547–572.