

Superskepticism

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CERN TH

March 2010

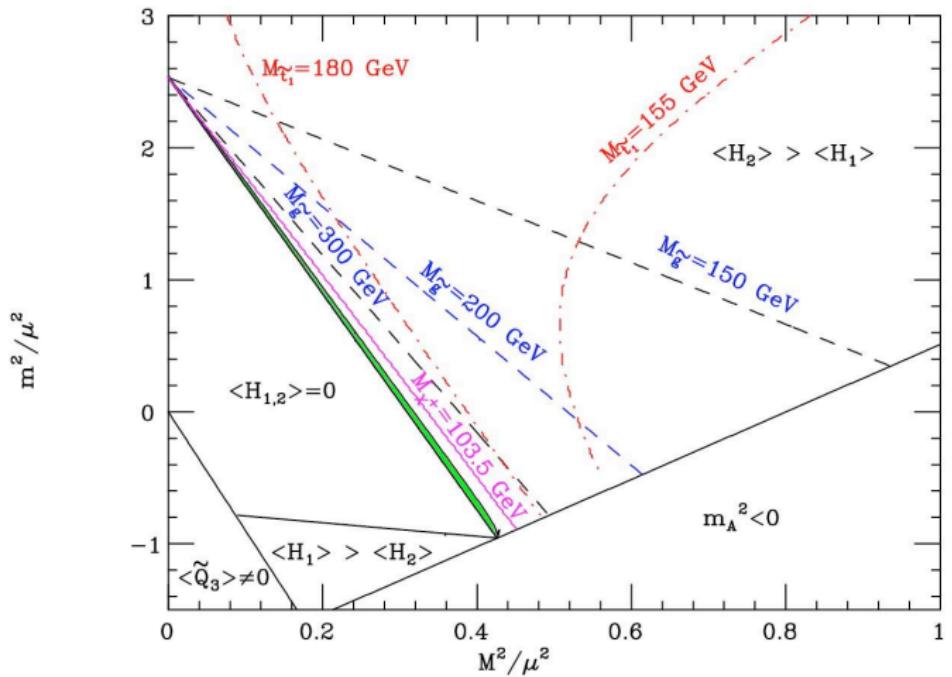
Outline

- ▶ Why I don't believe in SUSY
- ▶ Why I definitely don't believe in mSUGRA
- ▶ My favourite SUSY model

Why I don't believe in SUSY

- ▶ LEP et al. nearly killed SUSY already...and so can you
- ▶ Mass bounds.
- ▶ SUSY predicts many new particles
- ▶ Masses sprinkled around m_Z

How to kill SUSY II



Giudice and Rattazzi, 0606105

So: model independent mass bounds, please

Why I definitely don't believe in mSUGRA

What is mSUGRA?

- ▶ $SUSY$ in a hidden sector, $X \sim \theta^2 F$
- ▶ Felt through Planck suppressed operators
- ▶ $\int d^4 \theta Z \frac{X^\dagger X Q_i^\dagger Q_i}{M_P^2} \subset m^2 \tilde{q}_i^\dagger \tilde{q}_i$
- ▶ Gravity is flavour blind

Solves flavour problem ...

Why I definitely don't believe in mSUGRA II

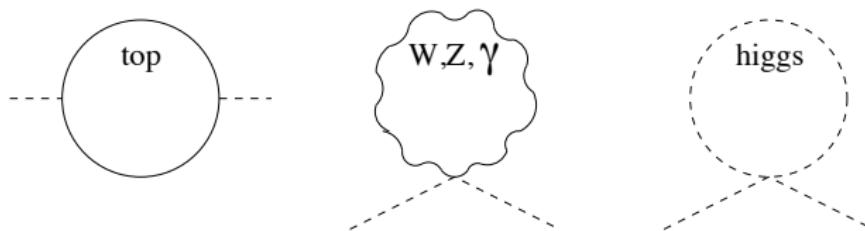
... or does it?!

- ▶ *SUSY* communicated by quantum gravity
- ▶ Unlikely that quantum gravity respects flavour symmetries
- ▶ (String theory doesn't)
- ▶ $\int d^4\theta Z_{ij} \frac{X^\dagger X Q_i^\dagger Q_j}{M_P^2} \subset m_{ij}^2 \tilde{q}_i^\dagger \tilde{q}_j$

But please feel free to rule out mSUGRA anyway!

My favourite model

$$\delta m_H^2 \sim \frac{g^2}{8\pi^2} \Lambda^2$$



To solve the hierarchy problem @ LHC, we need only

- ▶ $\tilde{t}_{L,R} < 1 \text{ TeV}$
- ▶ $\tilde{W} < 3 \text{ TeV}$
- ▶ $\tilde{H} < 5 \text{ TeV}$

This would solve the flavour problem too, by the way.

My favourite model II

- ▶ Are theorists clever enough to think up such a model?
- ▶ No

But see Cohen, Kaplan, Nelson, 9607394

- ▶ Is this a good reason not to look for it?
- ▶ No

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Summary

- ▶ Theorists are not omniscient
- ▶ My favourite model doesn't exist yet
- ▶ To kill SUSY requires model-independent mass bounds