Updated Constraints on the

Minimal Supergravity Model

Abdelhak DJOUADI, Manuel DREES and Jean–Loic KNEUR

ILC Workshop, Vienna

New points

- **Improved calculation of the SUSY spectrum: SuSpect 2.34**

– Two–loop QCD–EW corrections to the Higgs sector (P. Slavich et al.).

– Two–loop RGEs for all (including scalars).

– Improved calculation of some radiative corrections (m_t, m_b, etc..).

- **New experimental data: Tevatron, low energy, cosmology**

– new top mass value: $m_t \simeq 173 \pm 5$ GeV (2σ).

– new BELLE value for $b \to s\gamma$: $2.65 \leq \mathrm{BR} \times 10^4 \leq 4.45$

include also info from $b \to s\ell^+\ell^-$ (sign as in $b \to s\gamma$).

– new value for muon g–2: $1 \lesssim a_\mu^{\mathrm{SUSY}} \times 10^9 \lesssim 4.4$

take into account only the more reliable e^+e^- data

– WMAP constraint on relic density: $0.087 \leq \Omega_{\mathrm{DM}}\, h^2 \leq 0.13$ (99%CL)

- **New output (preliminary)**

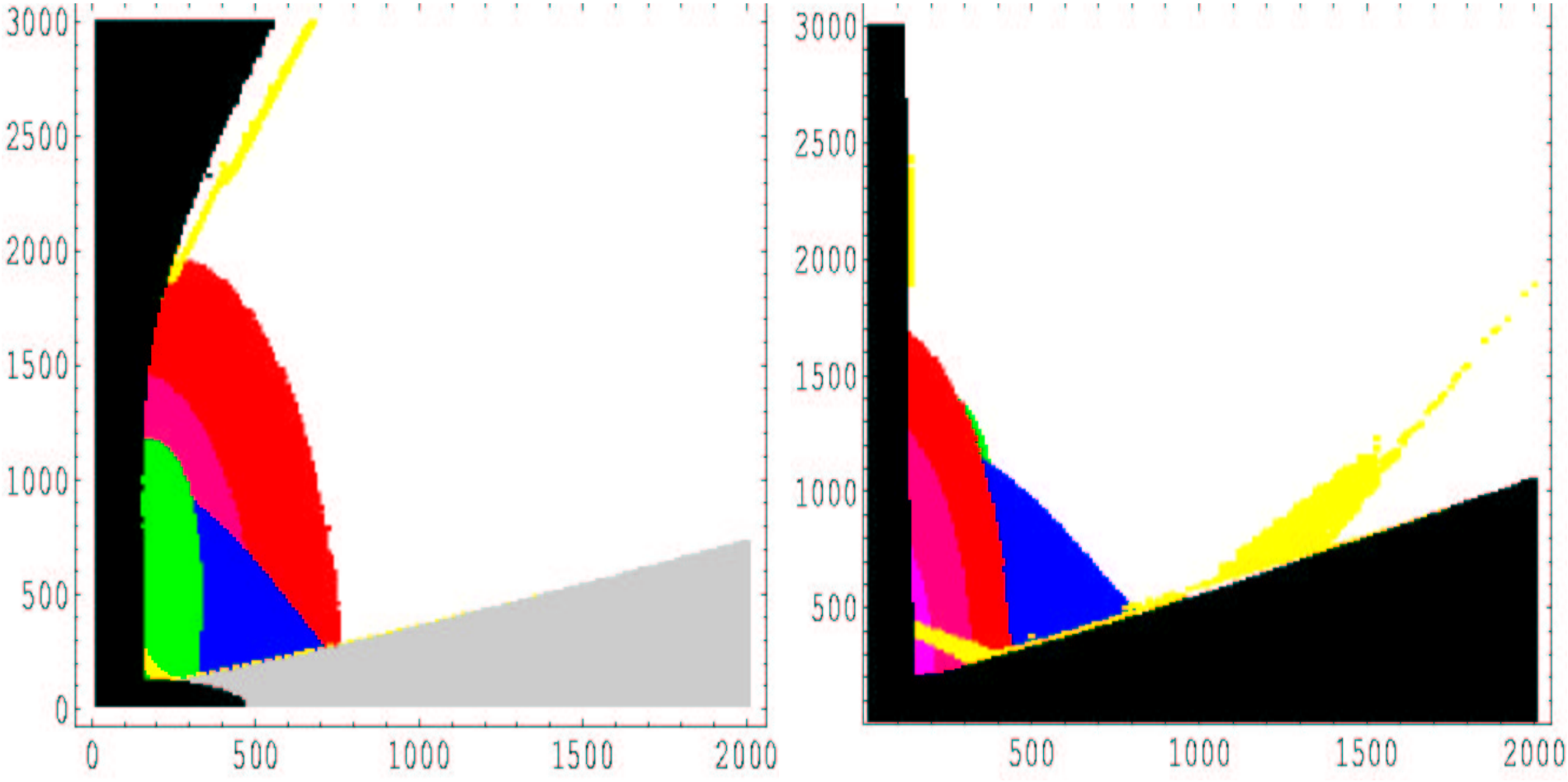
– update of constraints on $(m_0, m_{1/2})$ space (e.g. h–pole region)

– plots in paramater space with physical masses (interesting!)

– lower/upper bounds on SUSY particle and Higgs masses.

An $(m_{1/2}, m_0)$ scan in mSUGRA with $A = 0, \mu > 0$

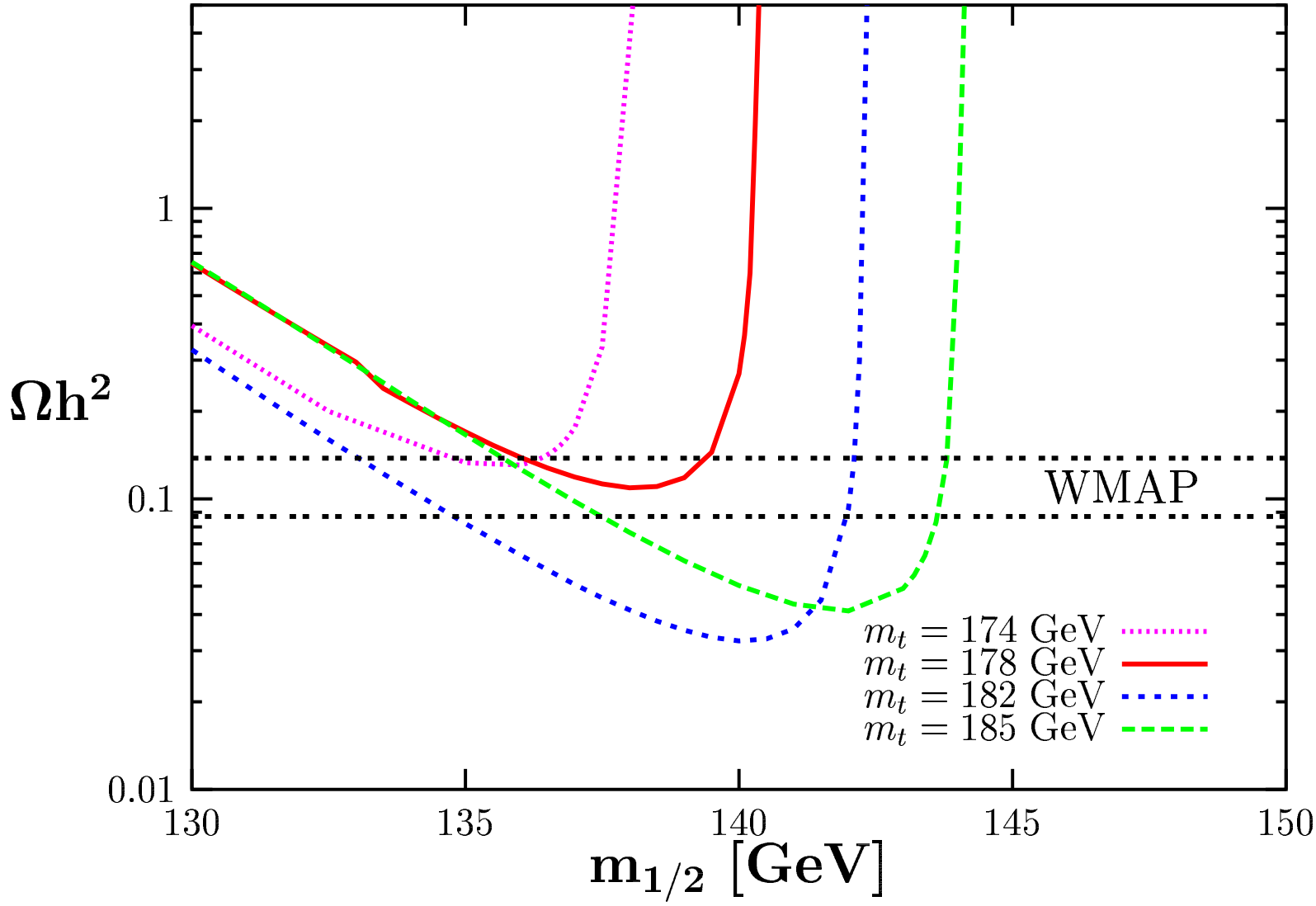
$m_t = 173$ GeV, $\tan\beta = 30$ $\qquad$ $m_t = 178$ GeV, $\tan\beta = 50$



Generically, five regions with the required ammount of DM:

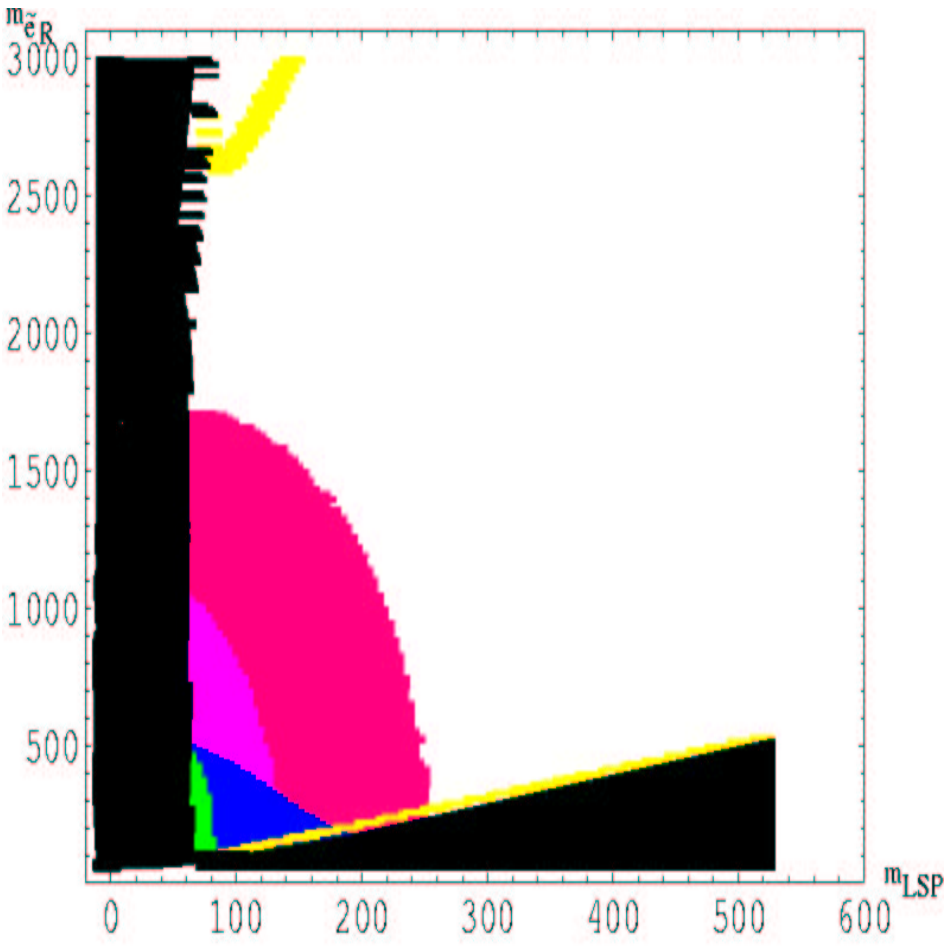
bulk region, focus point, co-annihilation, A pole and h pole.....

New region: annihilation via h exchange



Drees, Kneur, AD, PLB624 (2005) 60

Plots with physical masses (1)



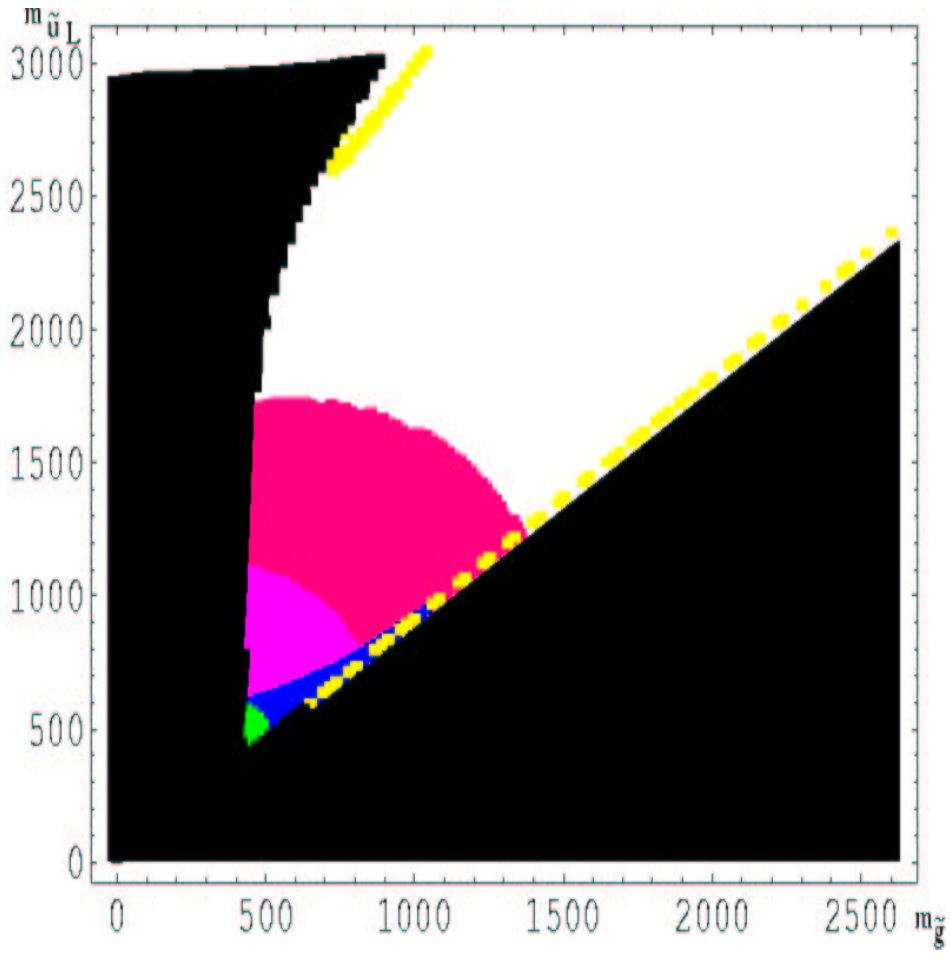


Figure 1: The mSUGRA parameter space with all constraints for $A_0 = 0, \mu > 0, \tan\beta = 10, m_t = 173$ **GeV.**

Plots with physical masses (2)

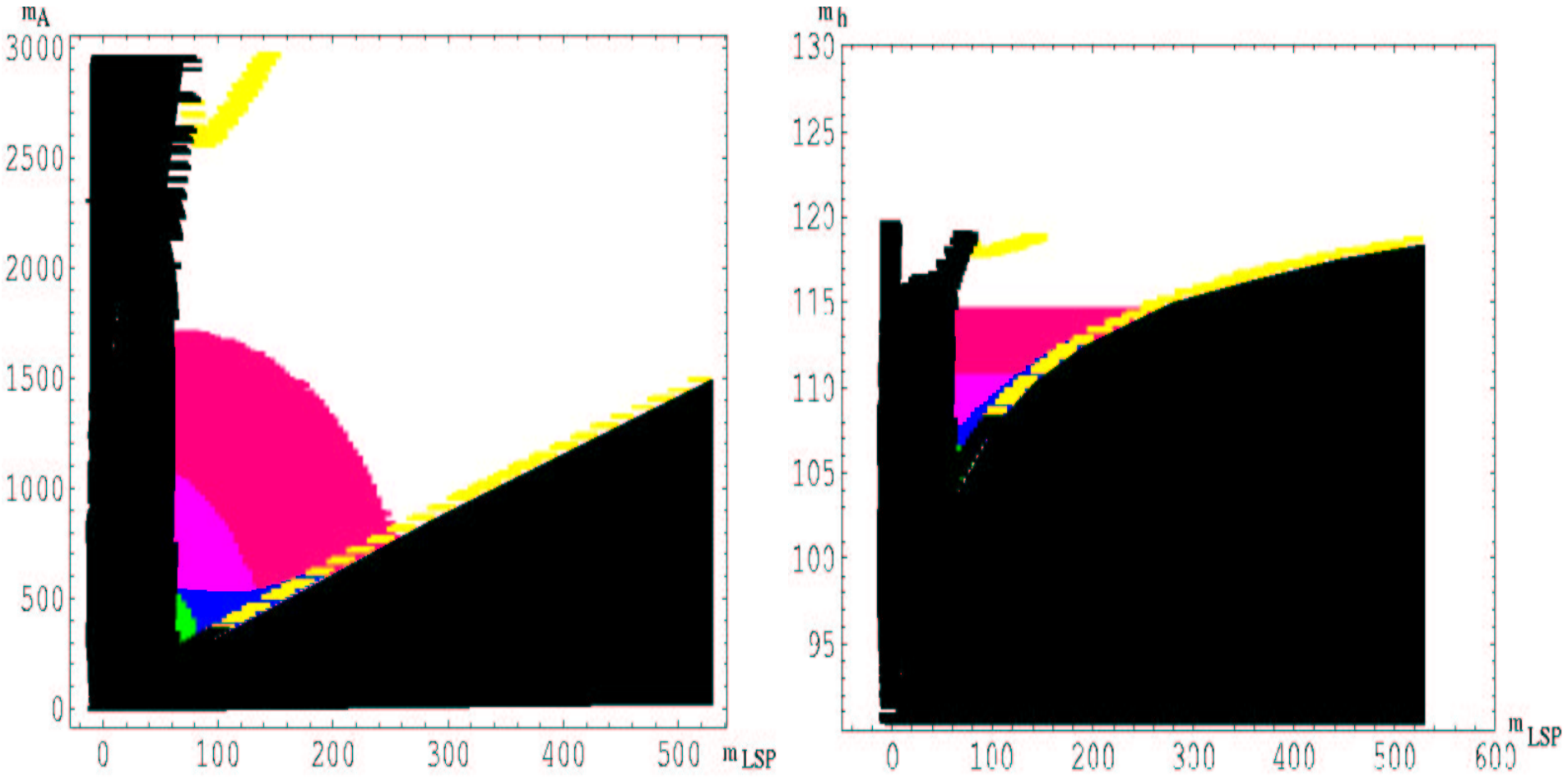


Figure 2: The mSUGRA parameter space with all constraints for $A_0 = 0, \mu > 0, \tan\beta = 10, m_t = 173$ GeV.

Plots with physical masses (3)

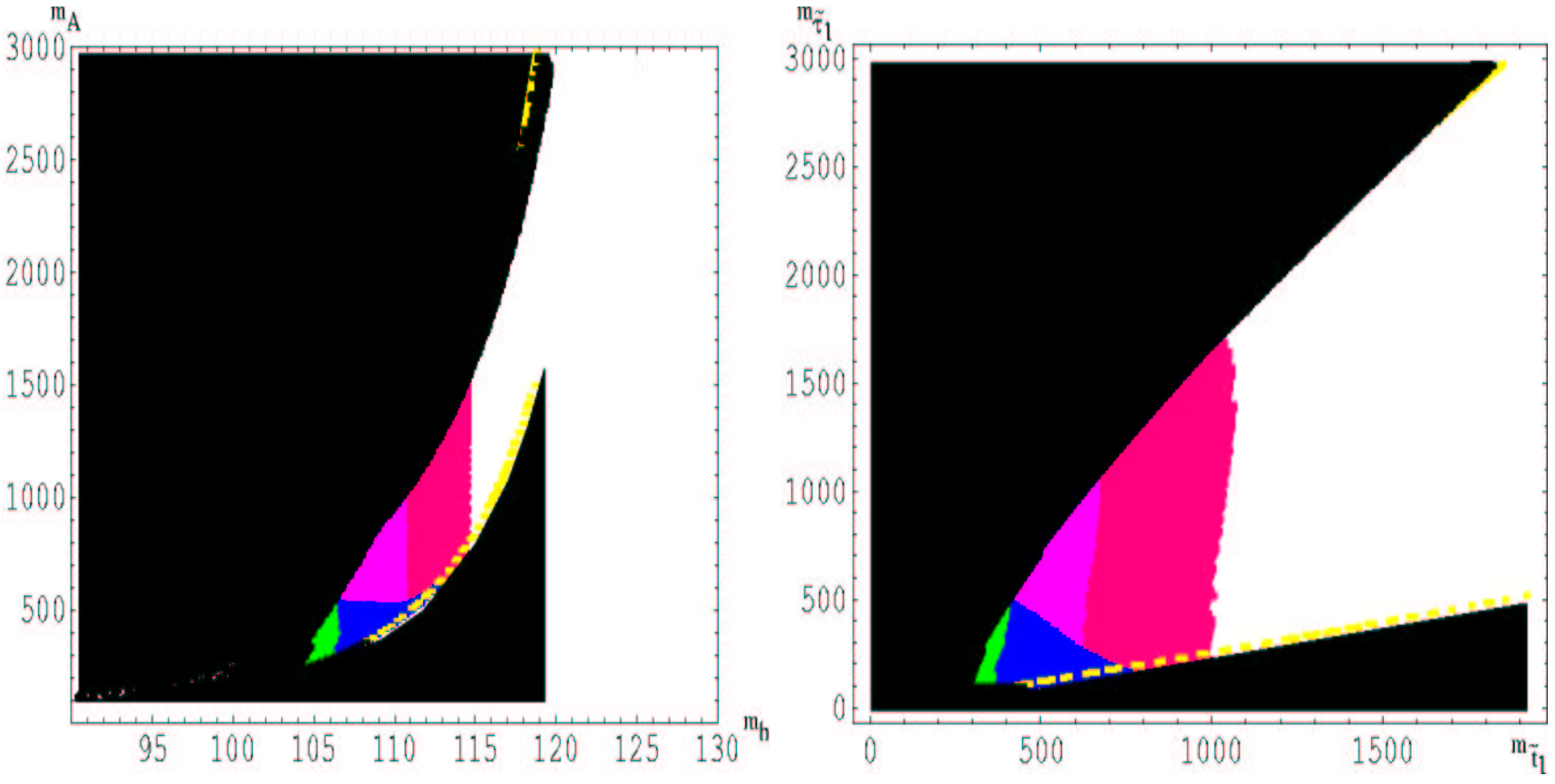


Figure 3: The mSUGRA parameter space with all constraints for $A_0 = 0, \mu > 0, \tan\beta = 10, m_t = 173$ **GeV.**

Upper and lower bounds from scans

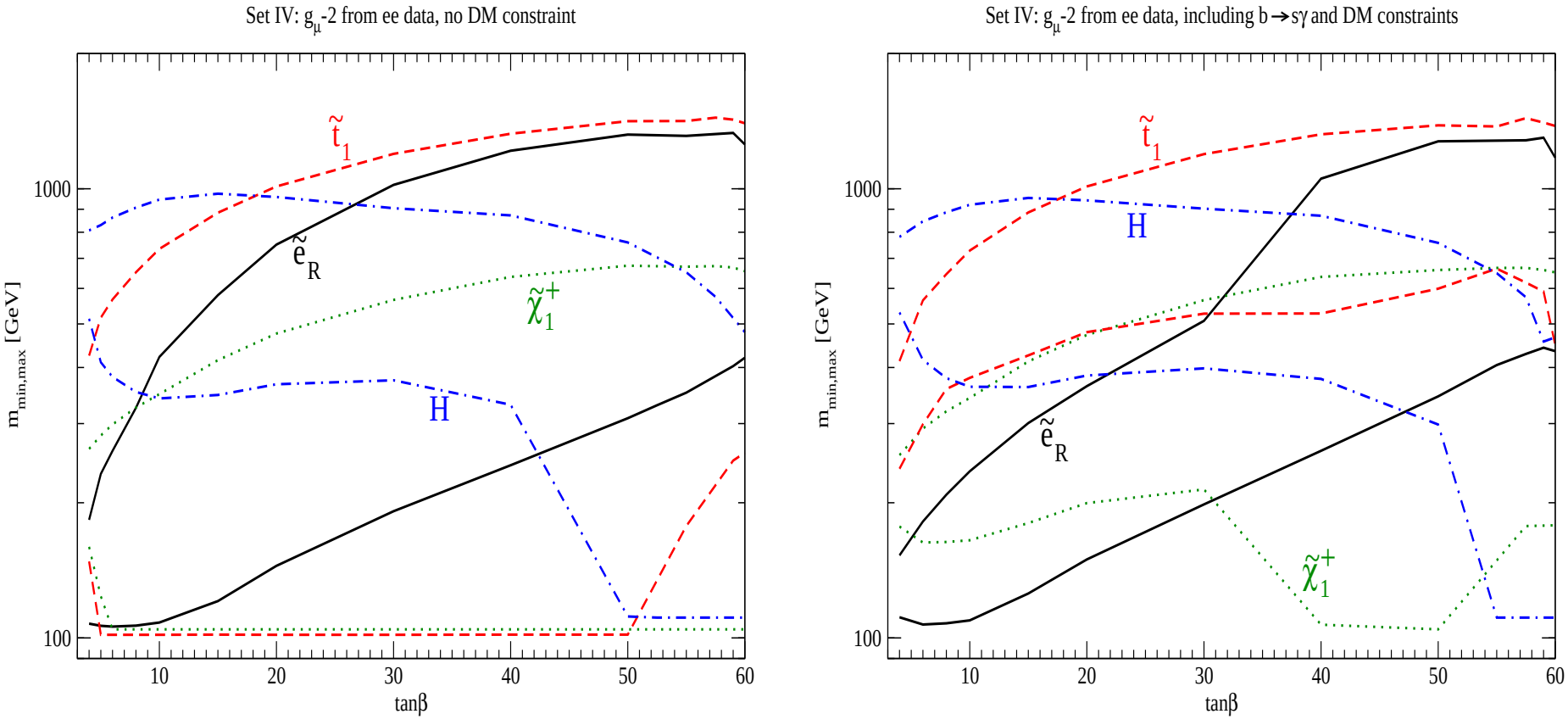


Figure 4: Lower/upper bounds with some/all constraints imposed.