



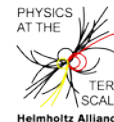
Global (SUSY) Fits with Fittino and EWSB

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(on behalf of the Fittino groups)

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About Fittino

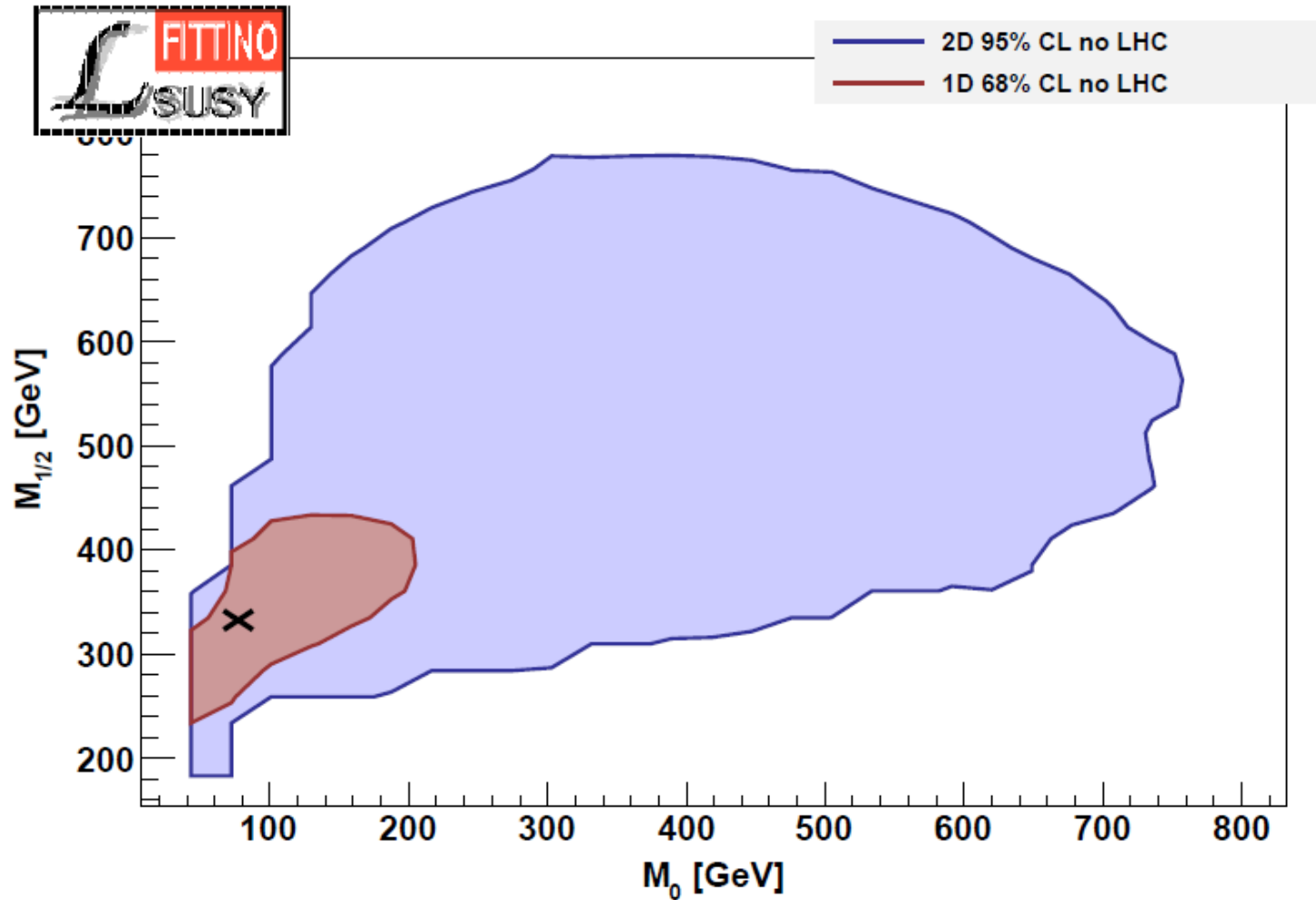


- global fit of SUSY models to SUSY-sensitive observables
- uses simulated annealing or MCMC to explore par. space
- currently: mSugra/CMSSM

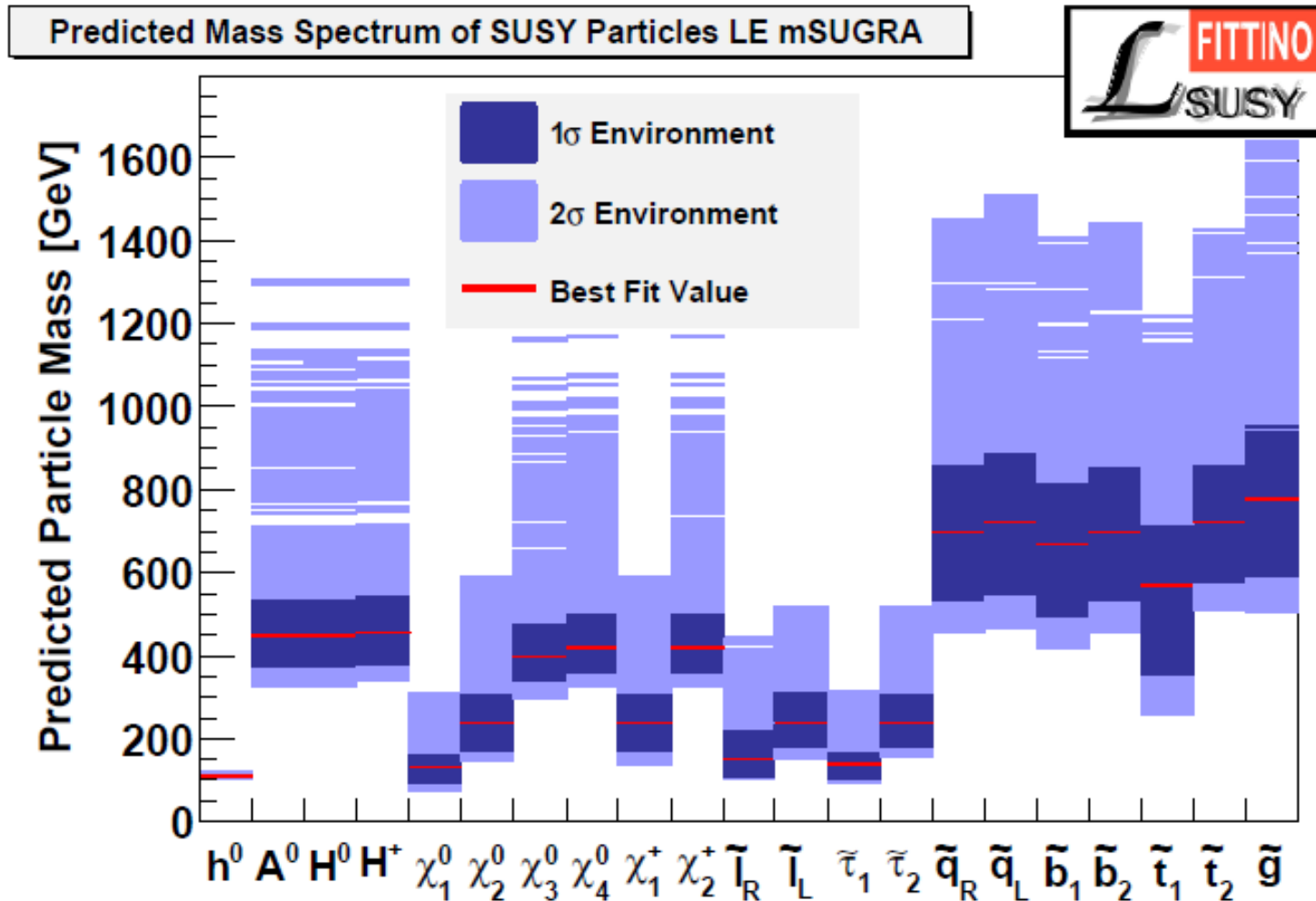
(Main) ingredients:

- Fast emulation of (negative) LHC SUSY search (Herwig, Delphes)
- Spheno: RGE running, Spectrum calculation [Porod]
- The Mastercode: Low-Energy observables (EW, B, g-2) [Buchmüller et al.]
- Micromegas 2.2: DM relic density [Bélanger et al.]
- HiggsBounds 1.2: Higgs exclusions [Williams et al.]

Pre-LHC: „low energy“ constraints on CMSSM

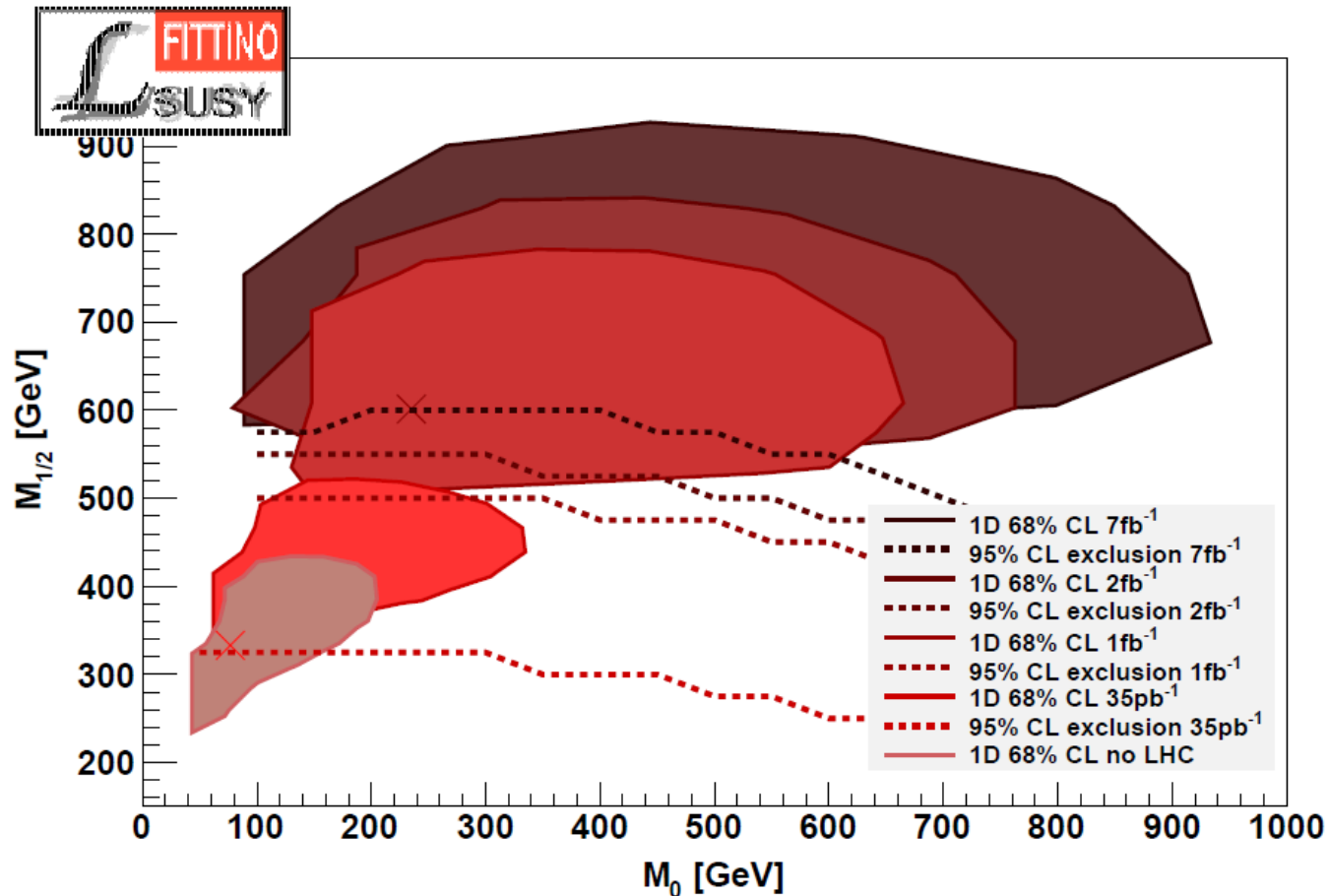


Pre-LHC: best fit masses + ranges



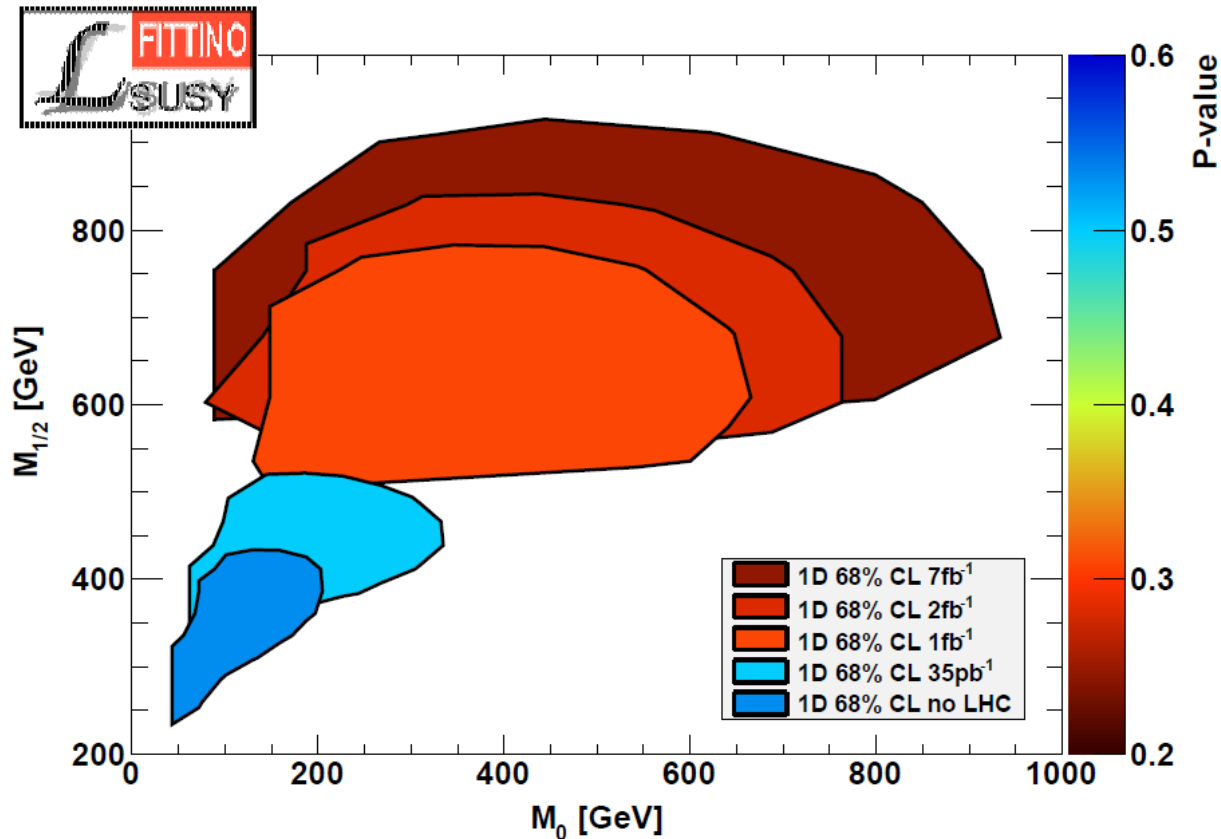
note: 2-sigma environment for squarks/gluinos ranges up to ~ 1.5 TeV!

„a little depression - but not despair“ (Altarelli)



„Emulation“ of 2010 ATLAS analysis - extrapolated to 1,2,7 fb^{-1}
Prediction for 1 fb^{-1} matched rather nicely the „average“ of A and C...
Maybe ok for further extrapolation to 2 and 7 fb^{-1}

Tension?



same plot, but
colour = $P(\chi^2)$ at
minimum

- yes: some tension is building up (of course)
- but no: even with 7fb^{-1} not a really bad overall fit.
(even if you don't like $\text{prob}(\chi^2)$ as an absolute measure - it should be fine as relative measure. Current (1fb^{-1}) best fit only a factor two less likely than pre-LHC
→ even if no discovery by end 2011 one can't safely say CMSSM/mSugra is dead...

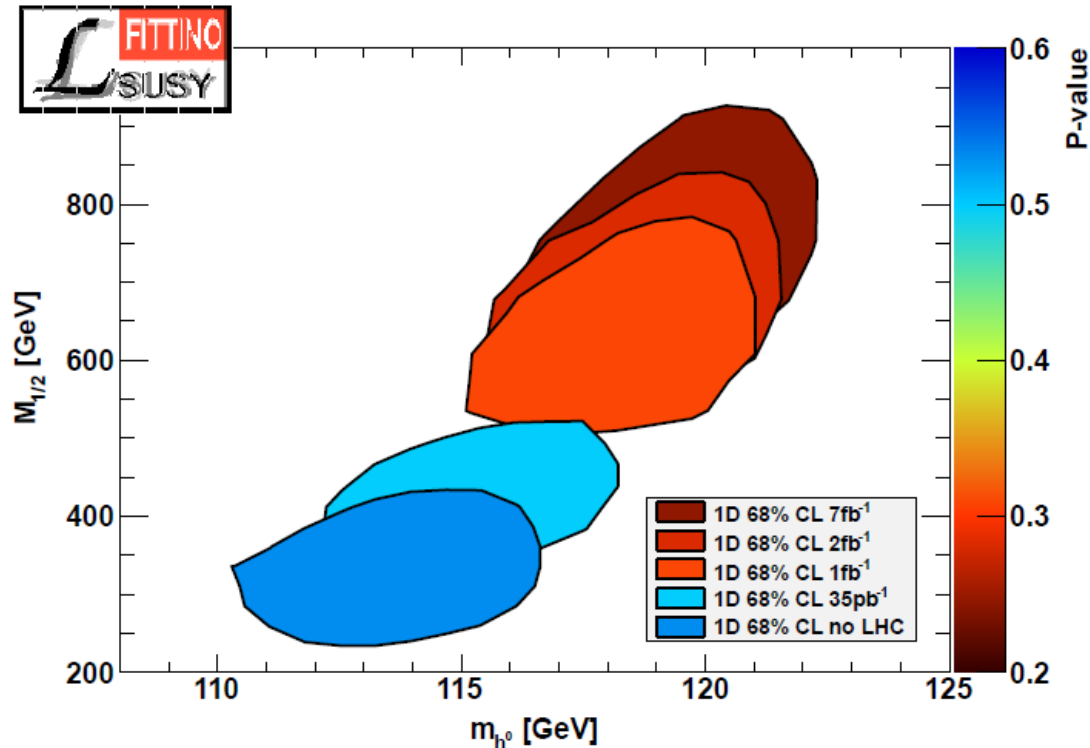
Role of the Higgs sector

Some trivia:

- Higgs sector strongly constrained in CMSSM
- Exclusion of Higgs with $m_h < \sim 140 \text{ GeV}$ probably the strongest universal soldier to constrain the MSSM
- Luckily $115 < m_h < 140 \text{ GeV}$ is still everything but excluded 😊

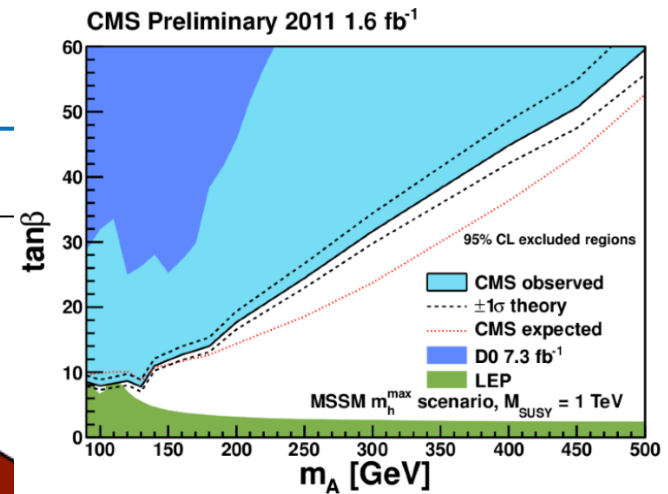
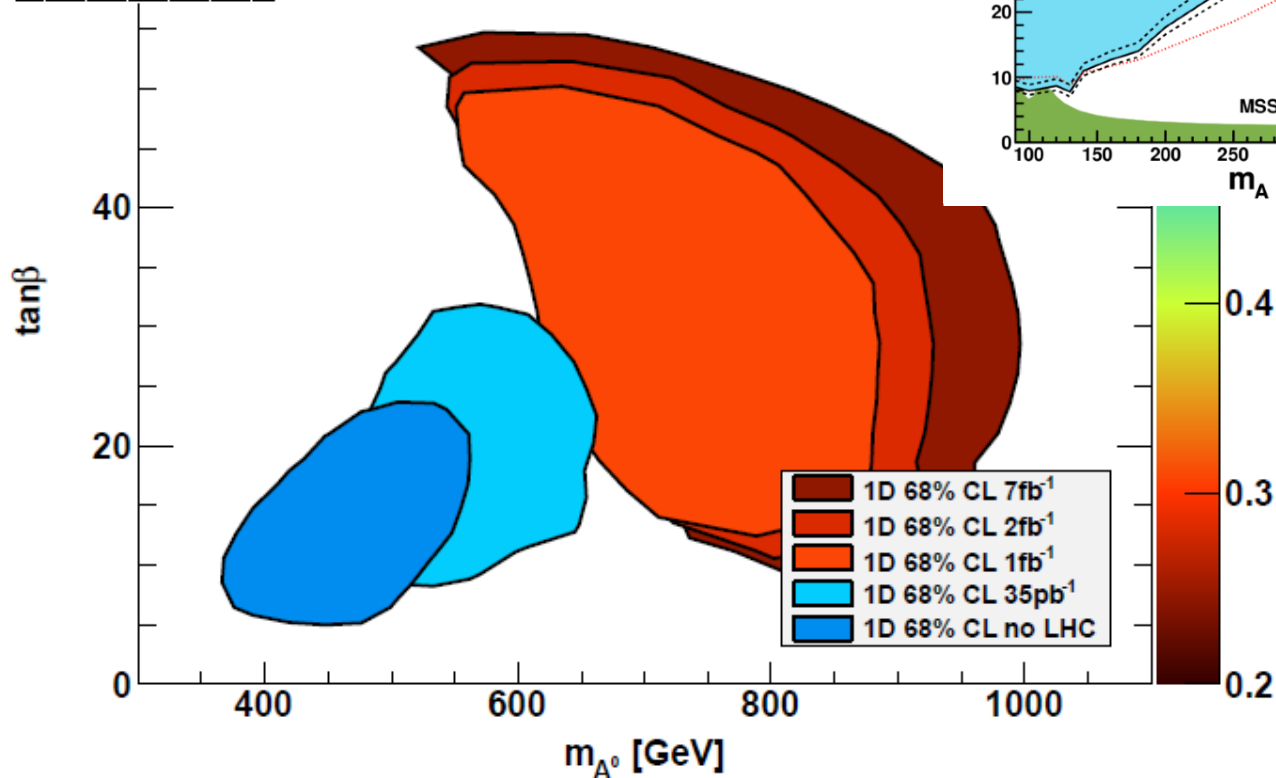
Higgs sector in CMSSM fit

Sorry, we are currently still constrained to the constrained MSSM
- current LHC exclusions (in combination with LE measurements) don't have strong impact on EWSB sector:



m_h gets somewhat heavier - not bad
(region below 115 GeV for LE was due to assumed theory error of ± 3 GeV)

Higgs sector in CMSSM fit



also heavy Higgses tend to become heavier - and escape direct detection (direct search not yet included in fit - but probably no impact yet)

Conclusion: MSSM and EWSB

other discoveries
waiting to be made



no light Higgs

MSSM