

LHC Implications for NMSSM

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work in progress

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Motivation

- EWSB
- Stabilization
- SUSY

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Large Hadron Collider

Motivation

NMSSM

Why NMSSM?

- $\mu(B\mu)$ problem?
- Baryon-Antibaryon asymmetry?

Next to Minimal SuperSymmetric Standard Model(NMSSM)

Scalar Higgs Potential

$$\begin{aligned}V_H &= \frac{1}{8}(g_1^2 + g_2^2)(H_u^\dagger H_u - H_d^\dagger H_d)^2 + \frac{1}{2}g_2^2|H_u^\dagger H_d|^2 \\ &\quad + |\lambda|^2 S^2 (H_u^\dagger H_u + H_d^\dagger H_d) \\ &\quad + |\lambda(H_u^T \epsilon H_d) + \kappa S^2|^2 + V_{H,Soft} \\ V_{H,Soft} &= m_{H_u}^2 H_u^\dagger H_u + m_{H_d}^2 H_d^\dagger H_d + m_S^2 |S|^2 \\ &\quad + (\lambda A_\lambda (H_t^T \epsilon H_d) S + \frac{1}{3} \kappa A_\kappa S^3 + \text{c.c.})\end{aligned}$$

Next to Minimal SuperSymmetric Standard Model(NMSSM)

Parameters

Basic Parameters for MSSM scalar sector:

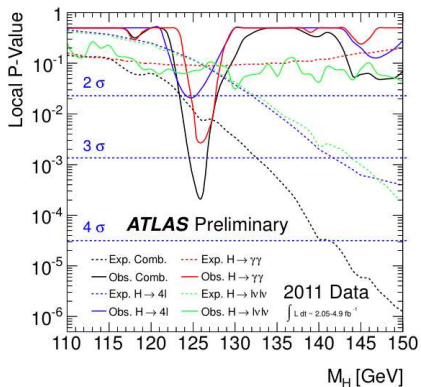
$$\tan\beta, \mu(m_A), A_t, m_{3SQ}, m_{3SU}, m_1, m_2, m_3$$

New Parameters when Comparing to MSSM:

$$\lambda, \kappa, A_\lambda, A_\kappa, v_S(\mu_{\text{eff}} = \lambda v_S)$$

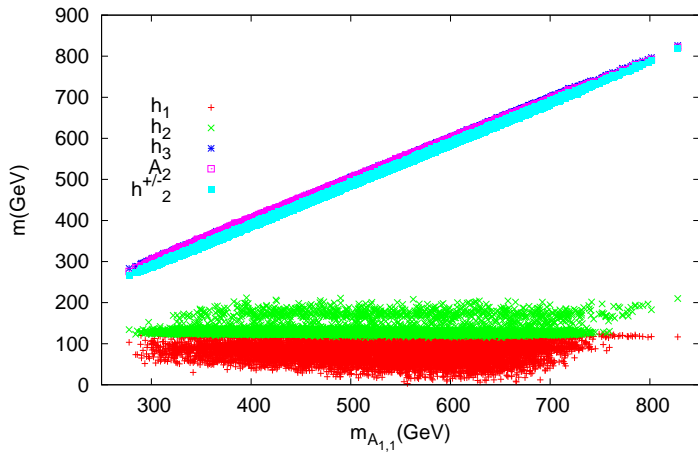
Parameters are chosen with no CP violation, no tachyon, etc

Looking forward



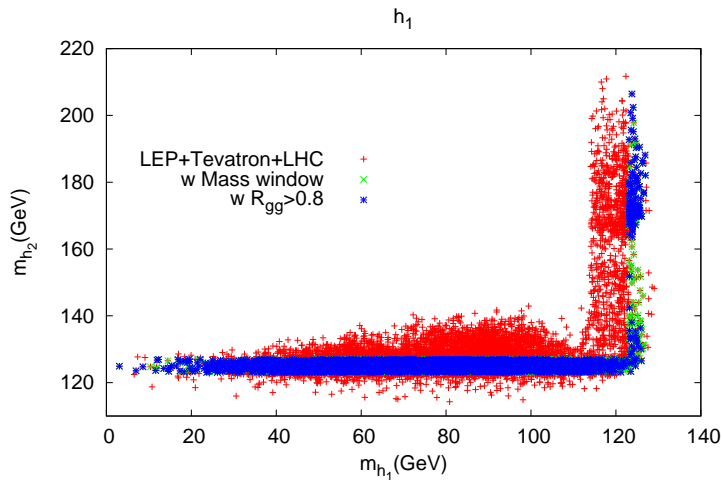
Mass Spectrum

Overview

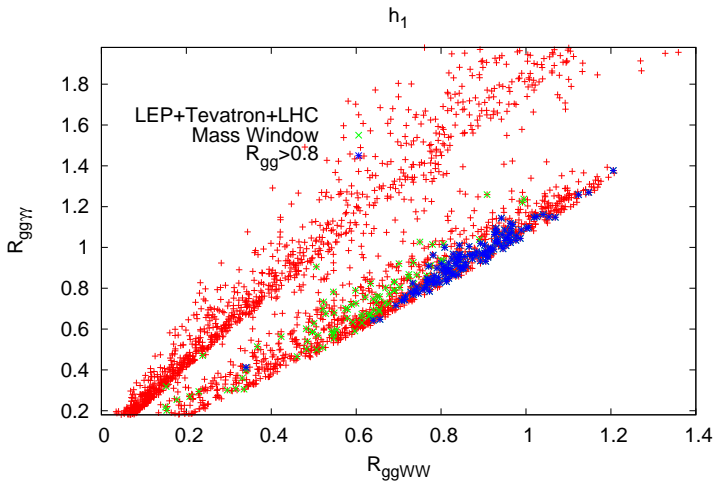


Mass Spectrum

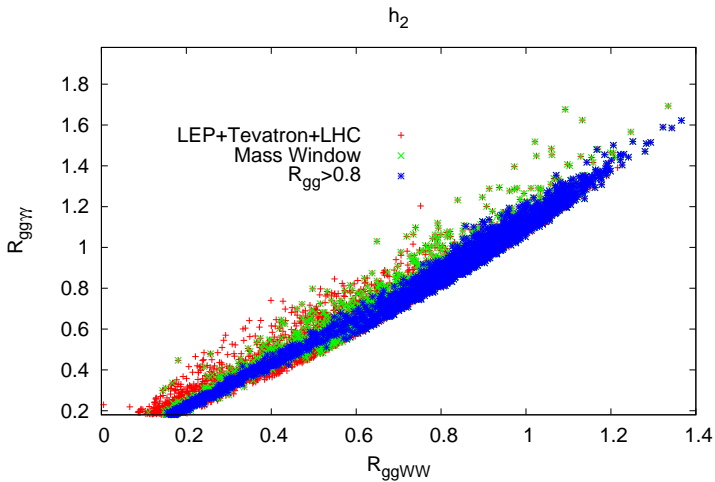
Zoom In for h_1 and h_2



R Values for h_1



R Values for h_2



Conclusion

- General NMSSM Scan focusing on the Higgs sector
- Implication and Constrains from 2011's LHC Higgs search result
- Lots of interesting features
- Looking forward to 2012's LHC data
- Preparation for future study revealing EWSB

Thank you!