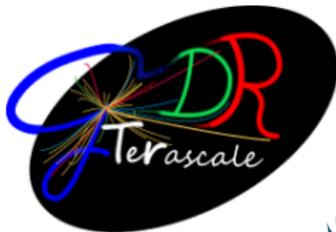


# SUSY in the GDR Terascale: Past and Future

Ulrich Ellwanger  
Université Paris-Saclay, Orsay, France



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## Past SUSY Activities

- At every meeting:  
Up to date infos by ATLAS/CMS/LHCb on the most recent (SUSY) searches, very appreciated!
- Further developments of tools:
  - Suspect
  - SFitter + NMSSM (A. Butter,...)
  - MadAnalysis 5 (E. Conte, G. Chalons, D. Sengupta, ...)
  - Lilith: a new public code for fitting the Higgs likelihood (J. Bernon,...)
  - Two-loop corrections to the Higgs mass beyond the MSSM (M. Goodsell,...)
  - CheckMate (D. Schmeier,...)
  - SloopS (G. Chalons, U. Laa, V. Bizouard...)
  - NMSSM grid (J. Knolle,...)
  - NMSSMTools

## • Studies of specific scenarios:

- Boosted Higgs  $\rightarrow \gamma + Z$  in the NMSSM (V. Bizouard,...)
- Slow Gravitino (K. Benakli, ...)
- Higgs vs electroweak symmetry breaking in general gauge mediation (D. Redigolo,...)
- Excessive Higgs pair production from sparticles in the NMSSM (U. E., ...)
- Invisible Higgs Decays to Hooperons in the NMSSM (A. Butter, ...)
- How high could SUSY go? (L. Darme, ...)
- Low energy supergravity revisited (D. Tant, ...)
- Singlet-like Higgs bosons at present and future colliders (F. Sala, ...)
- Fully covering the MSSM Higgs sector at the LHC (J. Quevillon, ...)
- Uncovering Natural SUSY with LHC and Direct Detection searches (D. Barducci, ...)
- Constraints on sneutrino dark matter from LHC Run 1 (U. Laa, ...)
- R-axion: New signs of SUSY at the LHC (F. Sala, ...)
- Search for baryonic number violation with R-parity violating SUSY (S. Berlendis, ...)
- pMSSM in light of dark matter detection experiments (G. Robbins,...)

## Possible Future Activities

### Hunt for Excesses?

Scan the  $\sim$  weekly ATLAS/CMS SUSY search publications for  $2 - 3\sigma$  excesses in one or some of the numerous search channels with  $n_j$  jets,  $n_b$  b-jets,  $n_l$  leptons (off- or on-Z),  $n_\tau$   $\tau$ 's,  $n_\gamma$  photons, various bins of  $E_T^{miss}$ , ...

Construct a model, hope for the “Lucky Punch”

Not very successful up to now

## Investigate Difficult SUSY Scenarios:

- Quenched spectra
- Long/complicated decay chains
- NMSSM, Dirac gauginos, ...
- Heavy particles (at least some of them)

→ Propose new searches!

related to...

# Recast Limits Beyond Simplified Models

## 1) Need up-to-date Tools like

- MadAnalysis
- CheckMate
- SmodelS
- MicrOmegas (do not forget direct/indirect searches for dark matter!)

## 2) Scan the parameter space, or peculiar regions therein, of

- (p)MSSM, with/without High Energy (GUT) Constraints
- NMSSM, with/without High Energy (GUT) Constraints
- other SUSY models (?)

The only SUSY legacy of the LHC may be:

Model X with parameters  $p_i$  in the range  $lim_1 < p_i < lim_2$  is definitively excluded...

This is tough! ( $\geq 8$  dim. parameter space...) But it is IMPORTANT!