



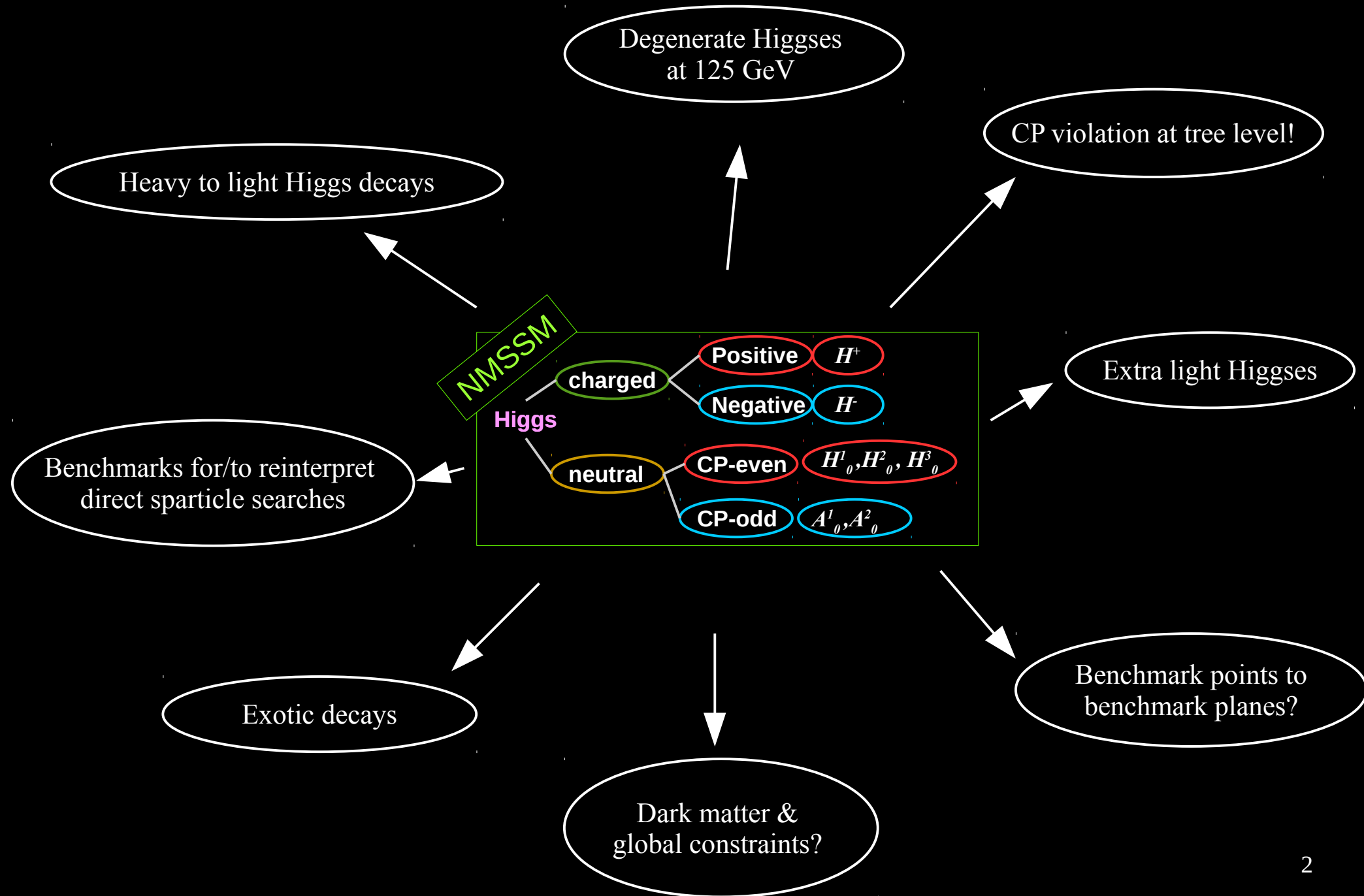
# *Inputs from CMS for NMSSM discussion*

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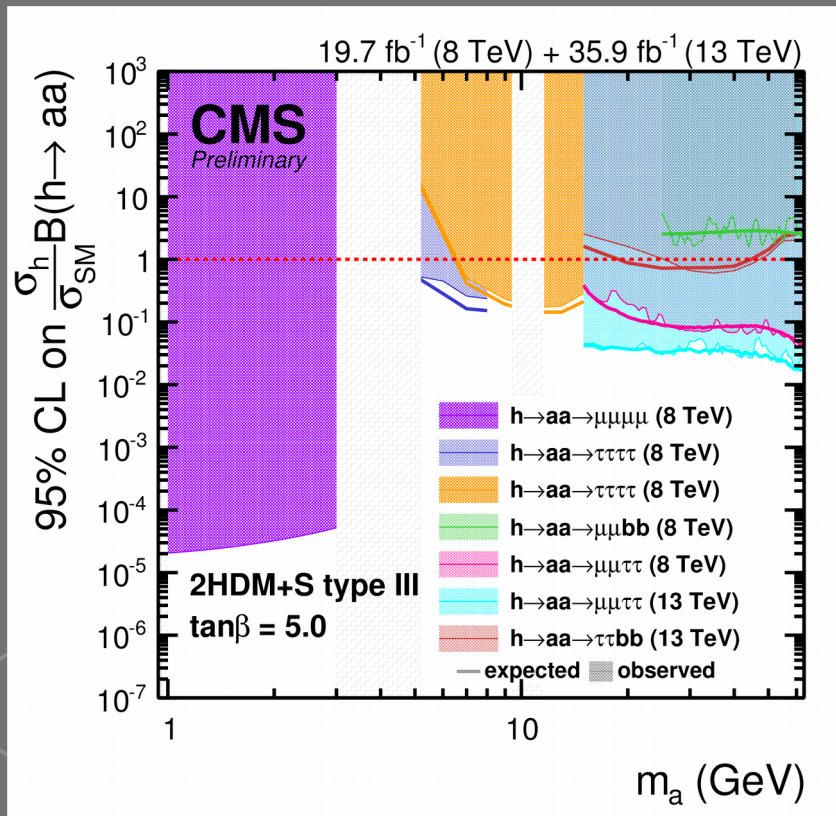
The NMSSM meeting

13.04.2018

# *Diversity* in ideas and search topics

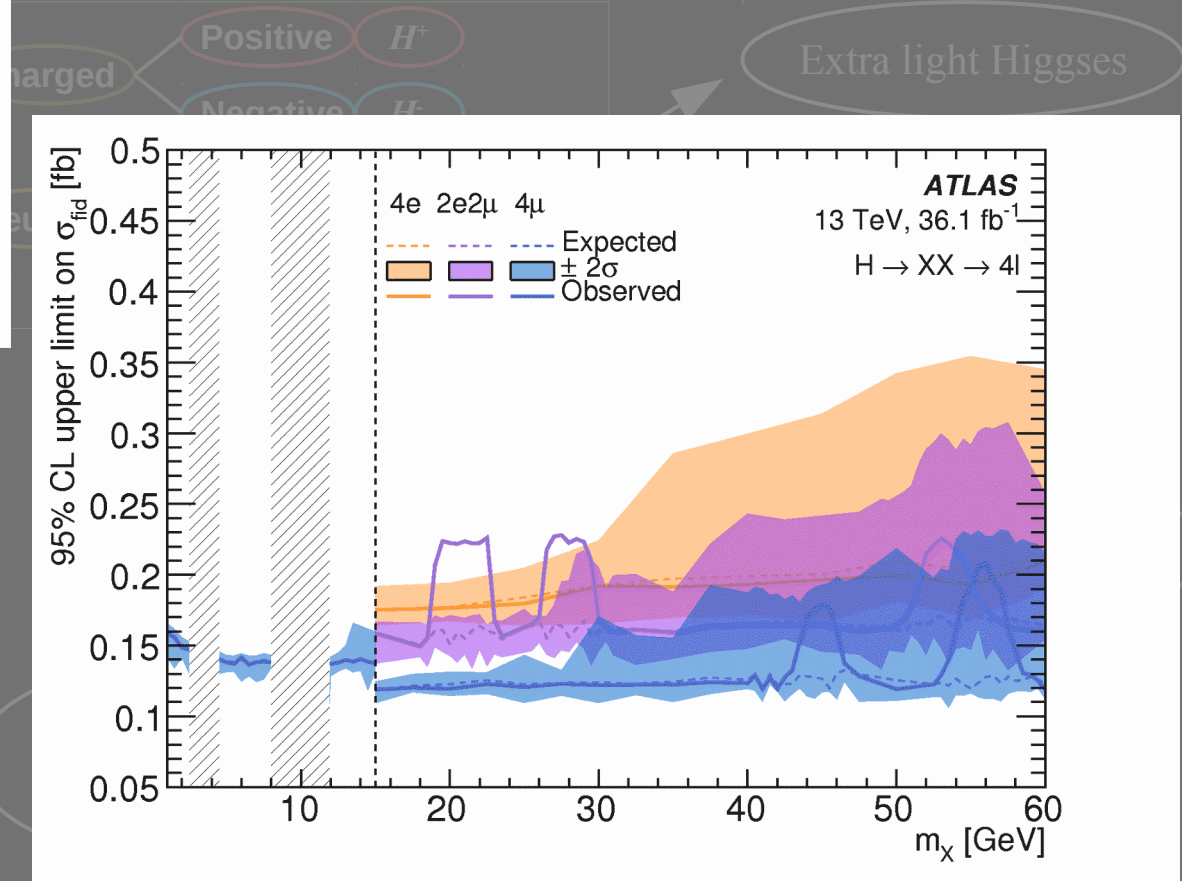


# Diversity in ideas and search topics



Degenerate Higgses  
at 125 GeV

- Many nice experimental results!
- We have been mostly focused on Higgs decays



Exotic decays

# From the theory corner: *an example of ideas*

Optimized searches would need dedicated MC samples

- Where are we in MC for NMSSM?

Benchmarks for/to reinterpret direct sparticle searches

- Some existing experimental searches could be reinterpreted in NMSSM
- *NMSSM-specific scenarios* with singlet LSP would involve  $\tilde{t}$  cascade decays:  
 $\tilde{t}_1 \rightarrow t + \tilde{\chi}_2^0$  (higgsino-like)  $\rightarrow$  top + Z/h(125) +  $\tilde{\chi}_1^0$  (singlino)
- Couplings of the singlino to (s)quarks & (s)leptons are small
  - used for decays only if this is the only available decay channel
- **None of existing searches with Z/h(125) seems optimised for this scenario**

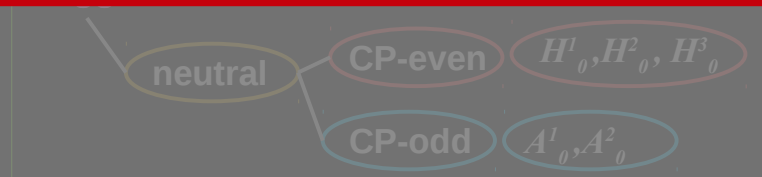
# Inspired by SUSY?



In CMS **simplified models (SMS)** are being heavily used in SUSY

- Could they be an option for us to go beyond decay analyses?

Benchmarks for/to reinterpret direct sparticle searches



So far in Higgs exotic decays we in CMS use NMSSMHET model in MadGraph

- Need to see if this can be used for exotic Higgs productions for new analyses ...

Dark matter & global constraints?

# The way to go until the benchmarks are available

Degenerate Higgses  
at 125 GeV

CP violation at tree level!

Heavy to light Higgs decays

While we don't have yet the benchmarks, which kind of constraints we need to consider?

- Not all MSSM constraints are necessarily applicable for us
  - We have more parameters so could be less constrained
- Any concrete recommendation of which parts of the parameter space are *forbidden*, using the available results?

Exotic decays

Dark matter &  
global constraints?

Benchmark points to  
benchmark planes?