

How, Then, Will We Find BSM Physics?

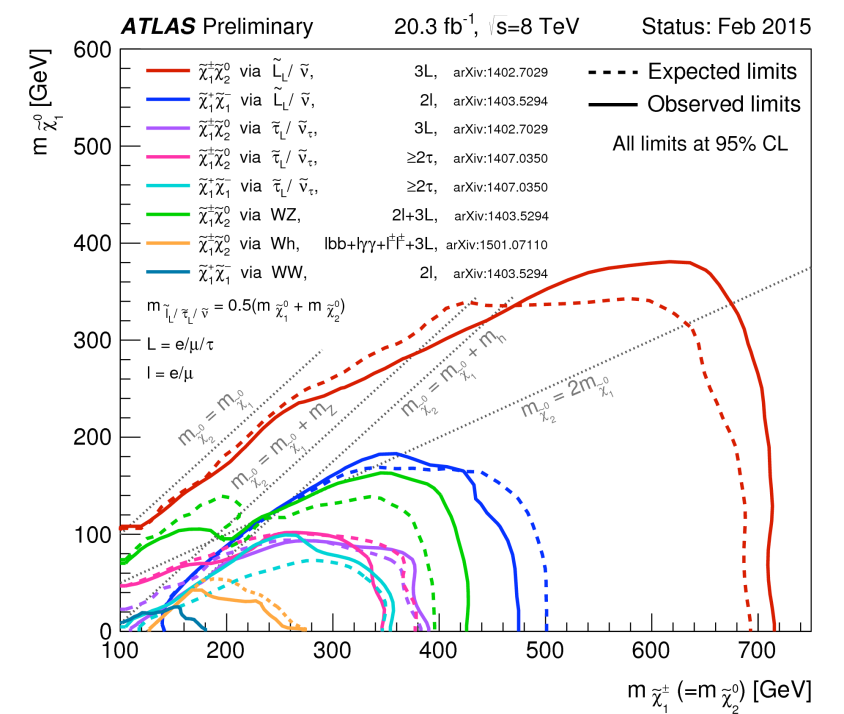
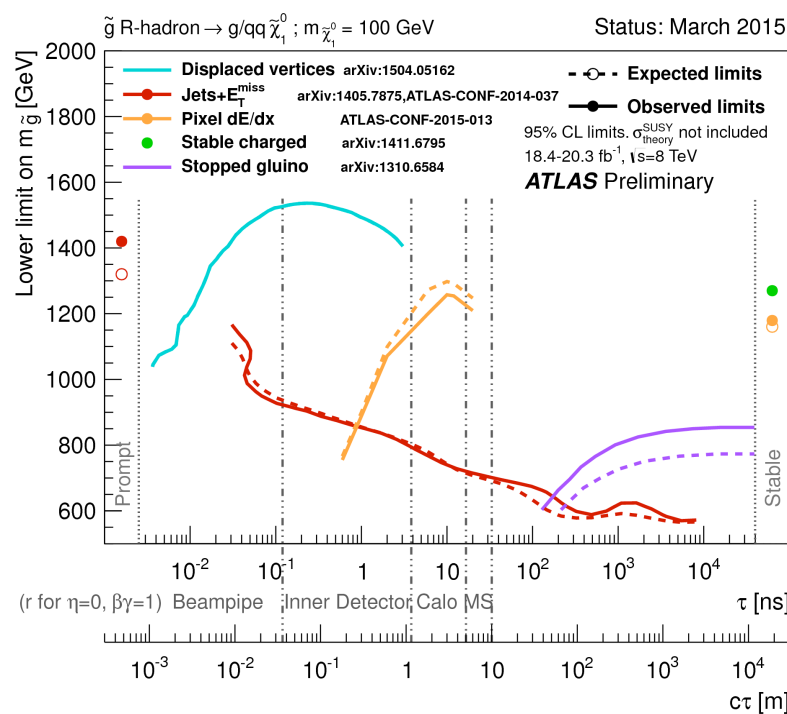
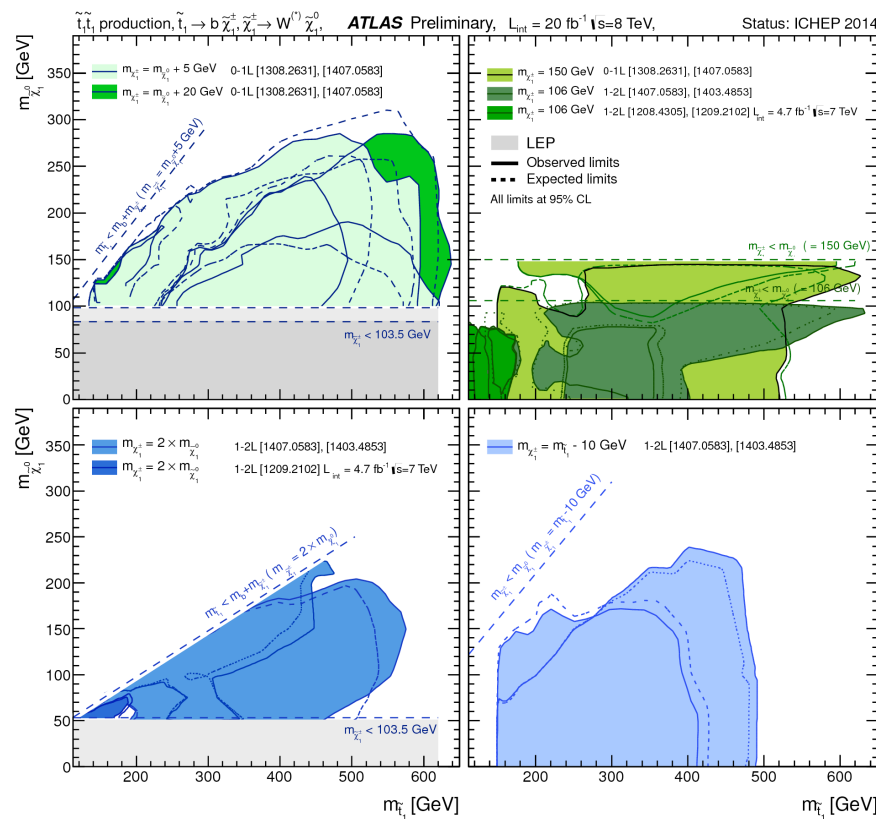
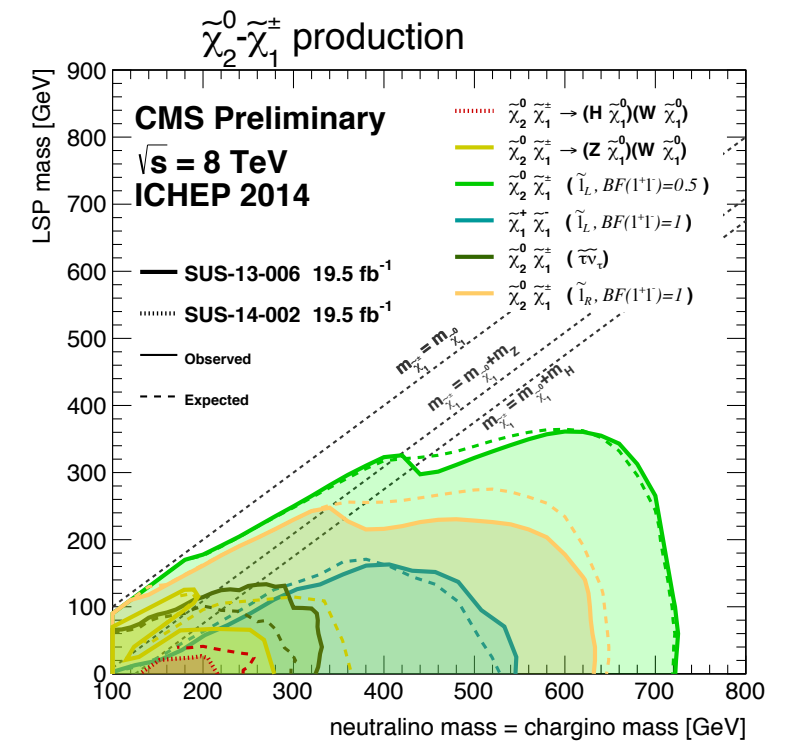
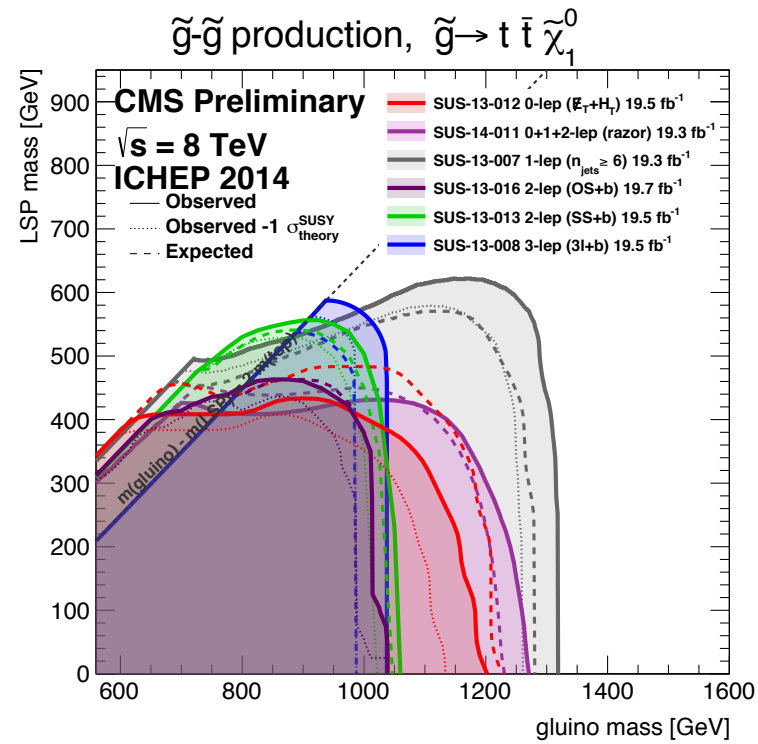
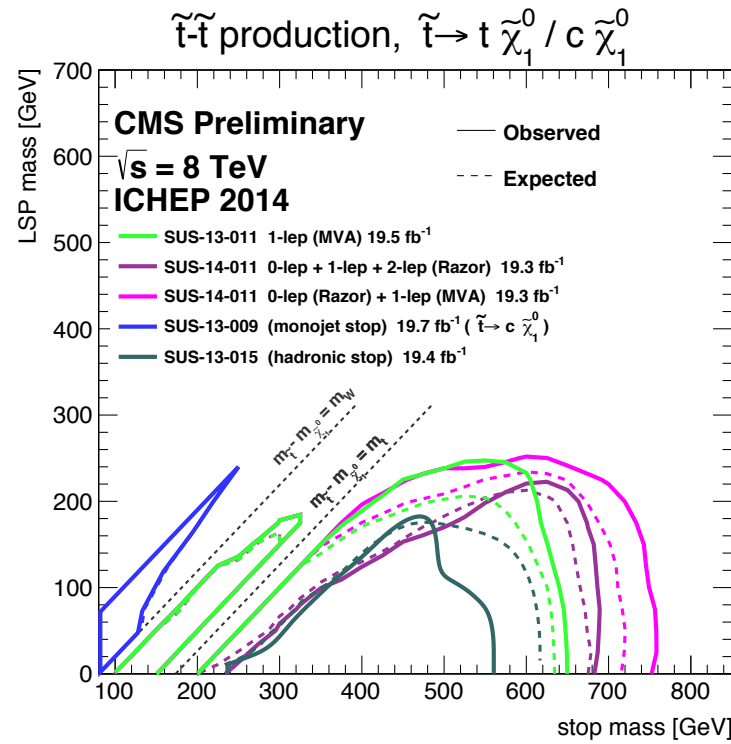
Gustaaf Brooijmans



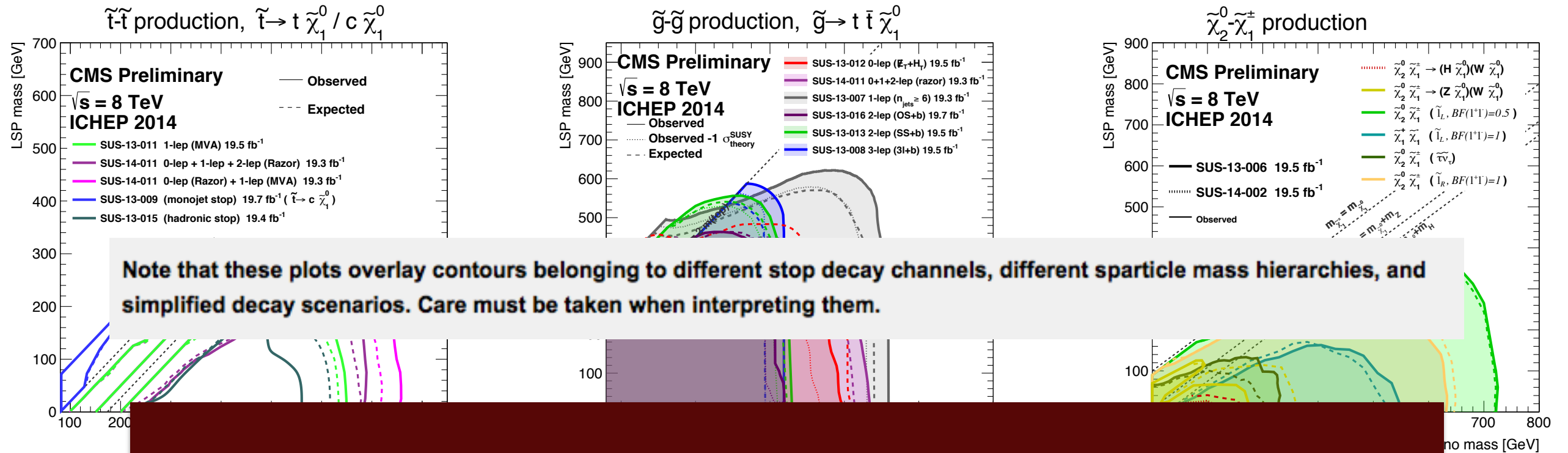
Experimental Thoughts

- ❖ What's new?
 - ❖ LHC 13 TeV era has started
 - ❖ Hard to say how much data in 2015: $5 \text{ fb}^{-1} \pm ??$
 - ❖ But 2016 should be rich
 - ❖ Higgs exists, light
 - ❖ Naturalness: Increased focus on new physics closely linked to top, W, Z, i.e. producing top, W, Z ...
 - ❖ ... and Higgs
 - ❖ Strong limits in place
 - ❖ Natural to ask: did we miss it?

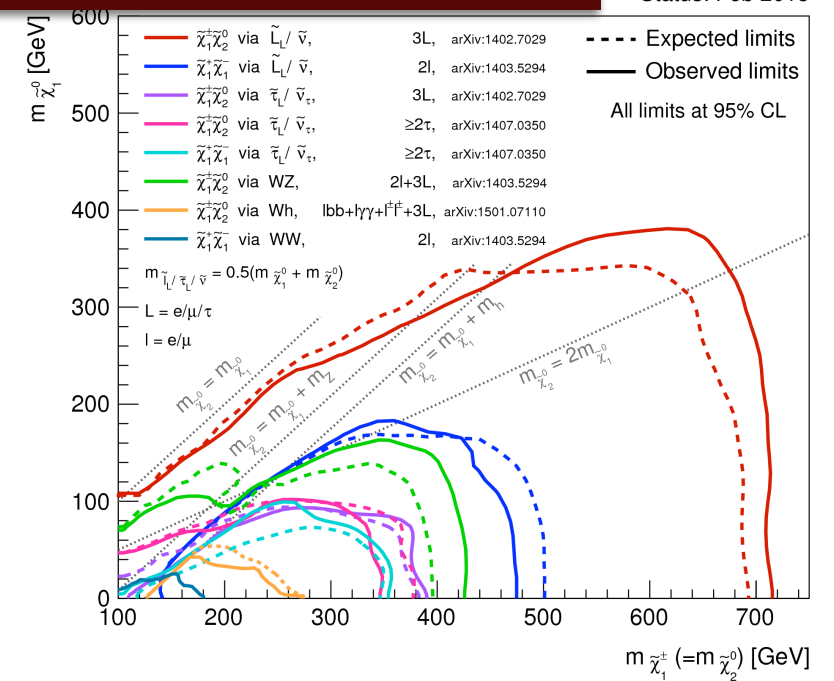
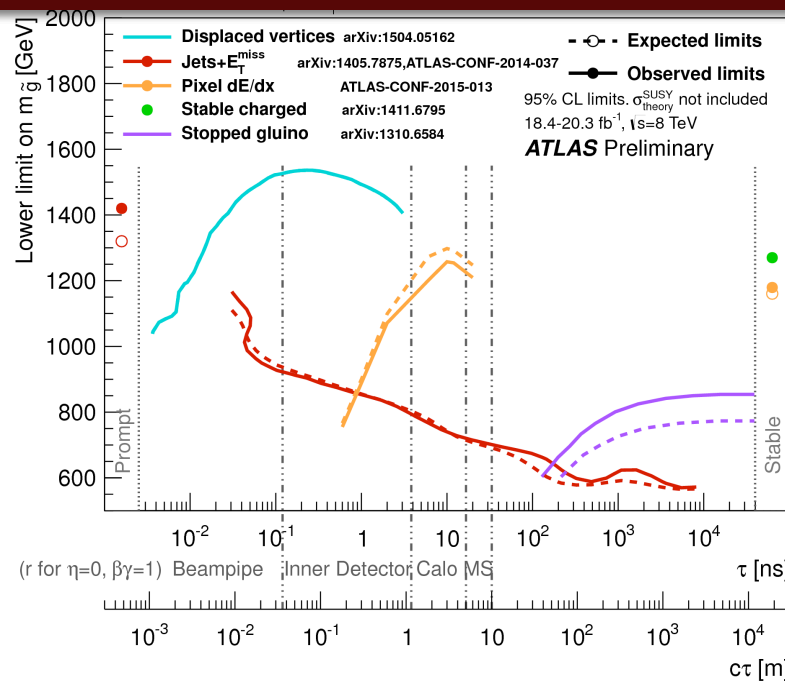
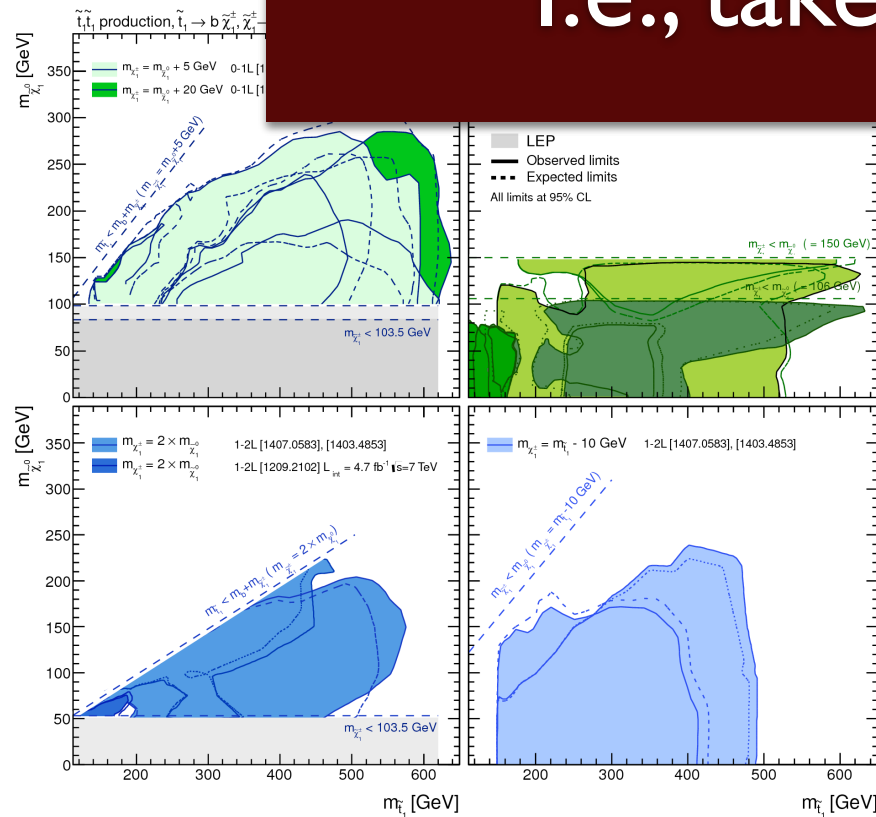
Current Limits: With Dark Matter



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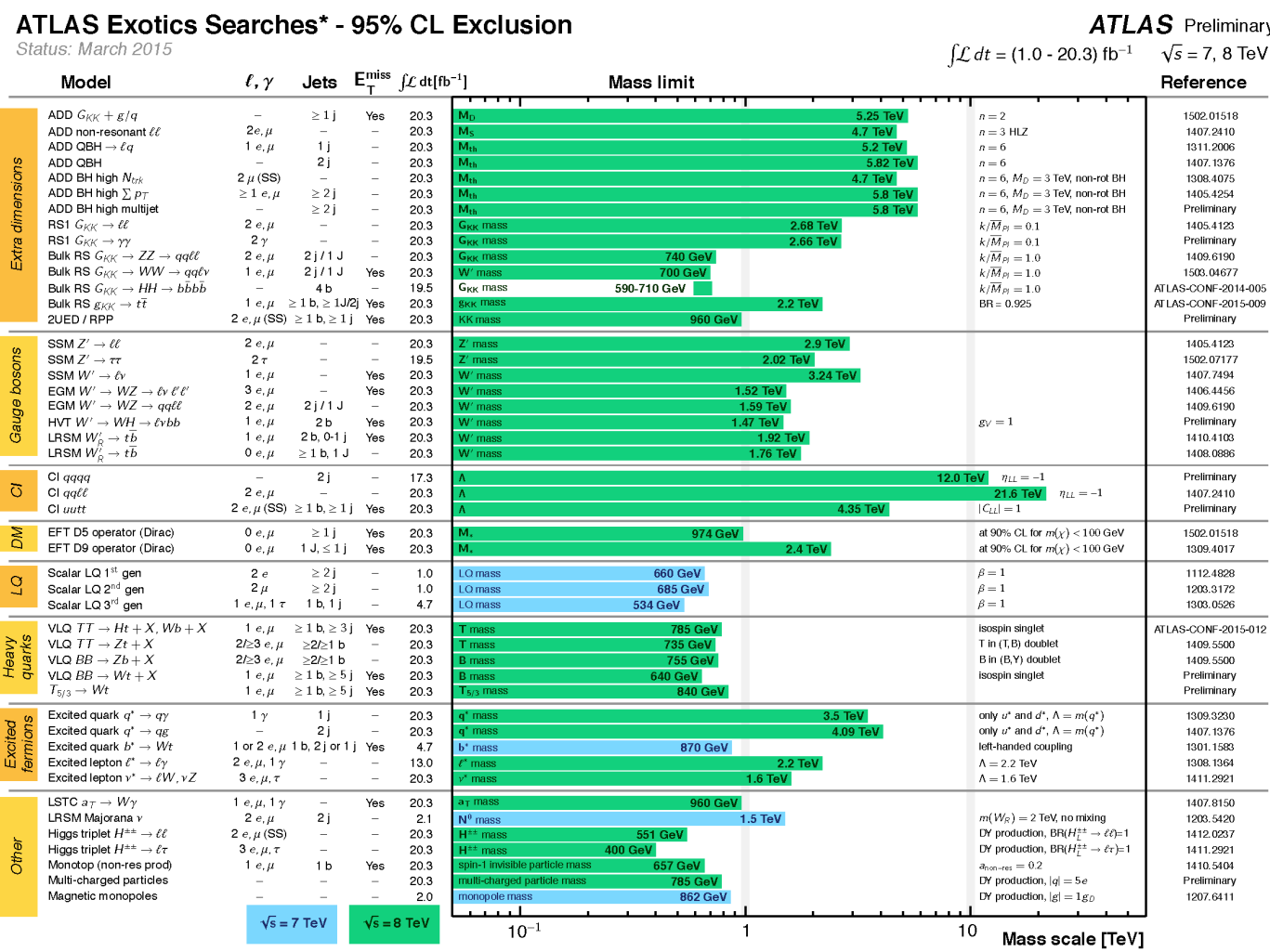
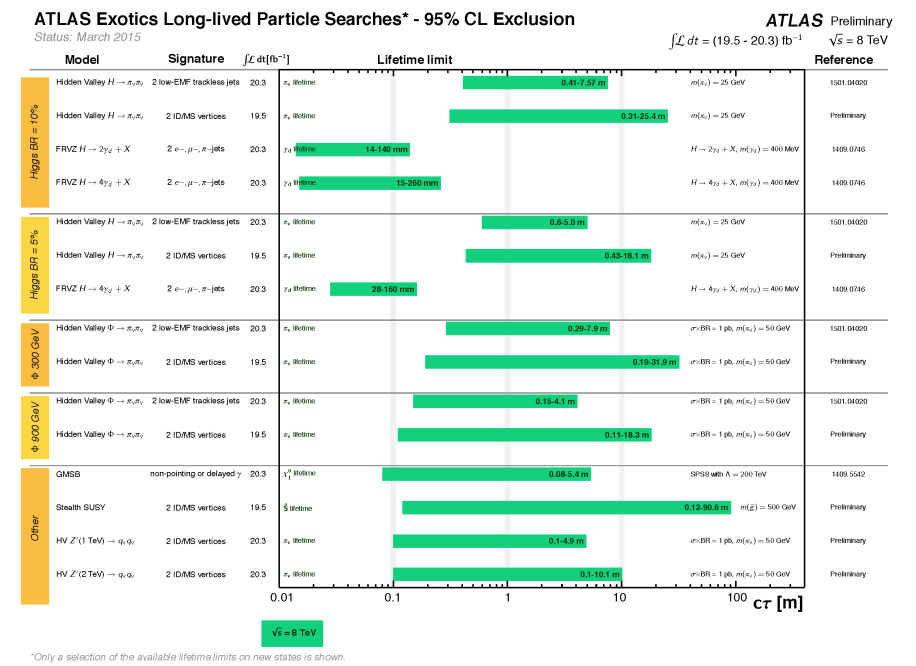
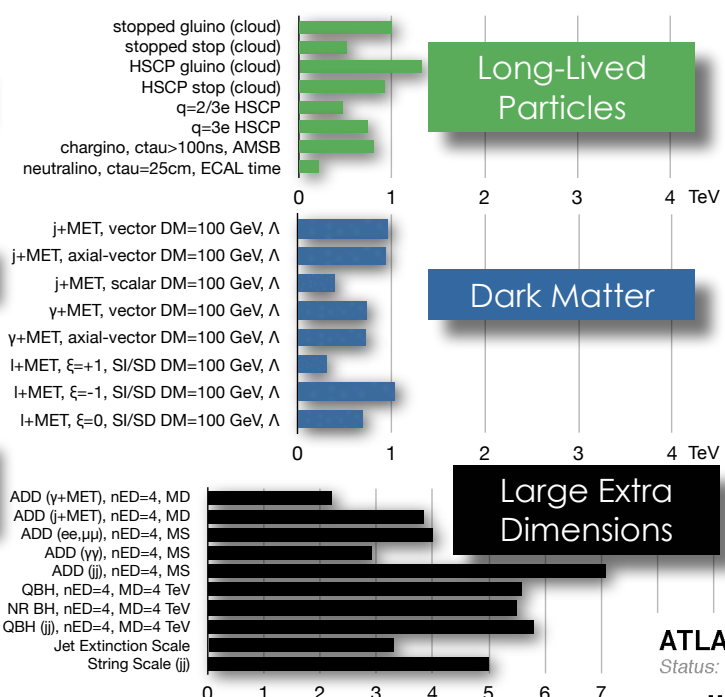
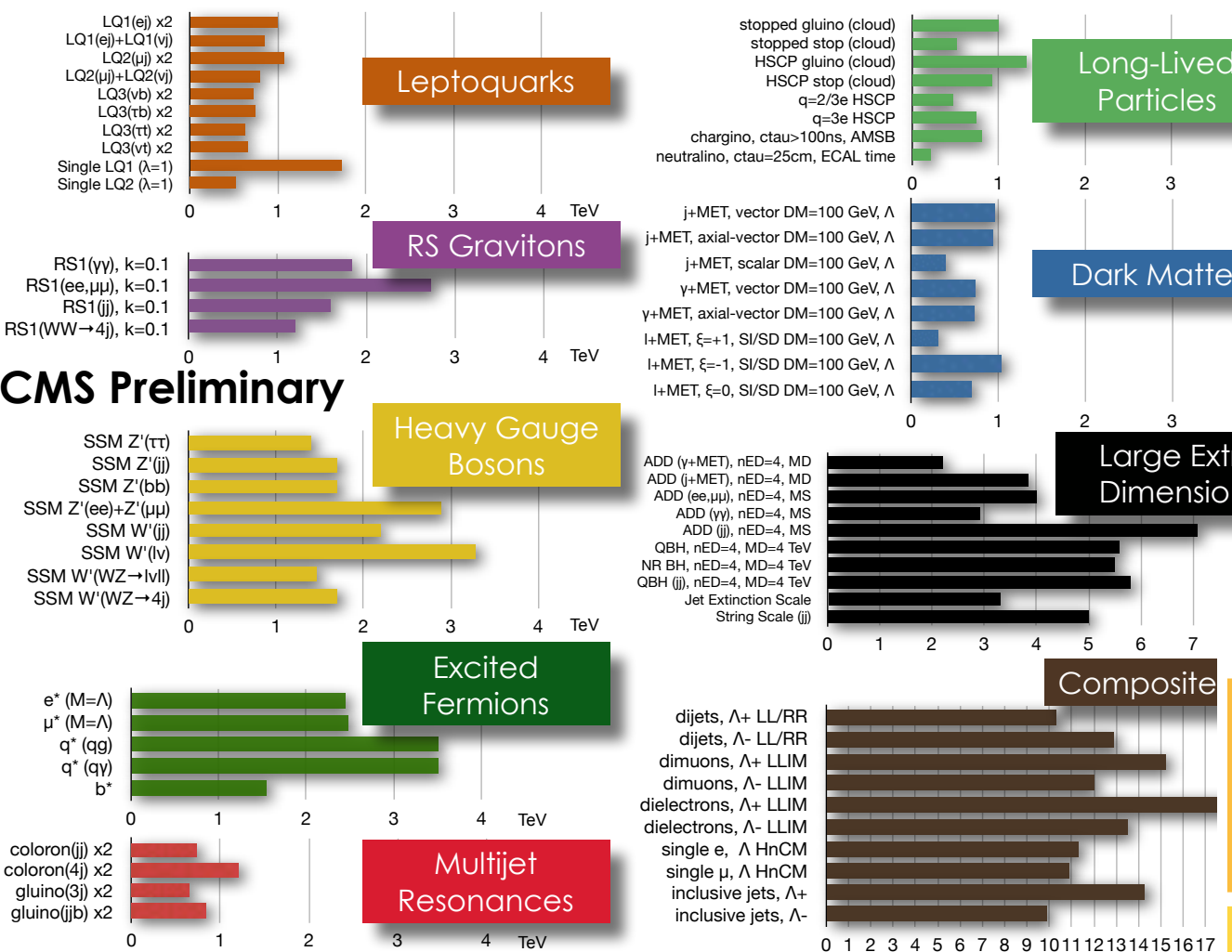


I.e., take with appropriate gain of salt!



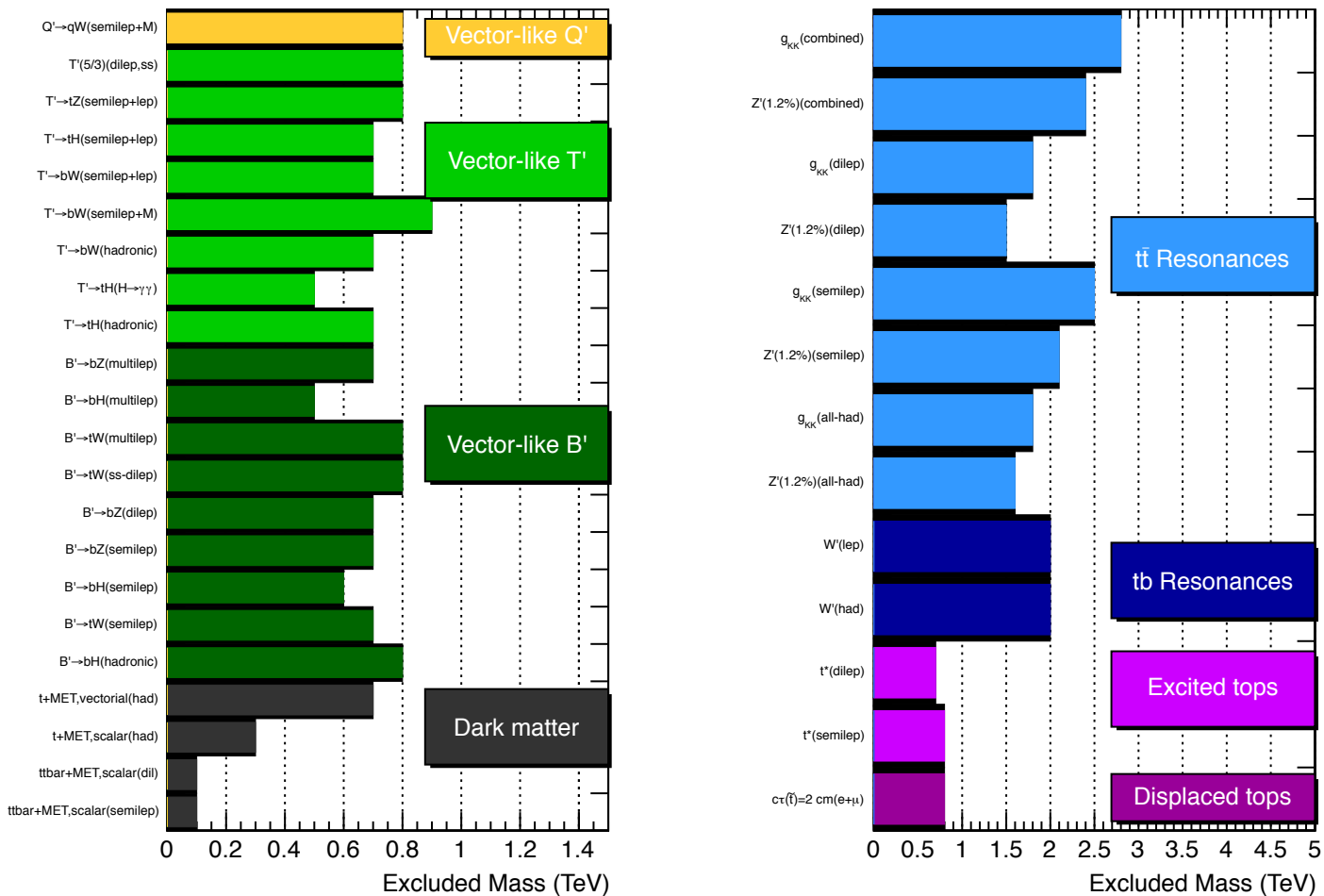
Status: Feb 2015

Current Limits: Non-SUSY

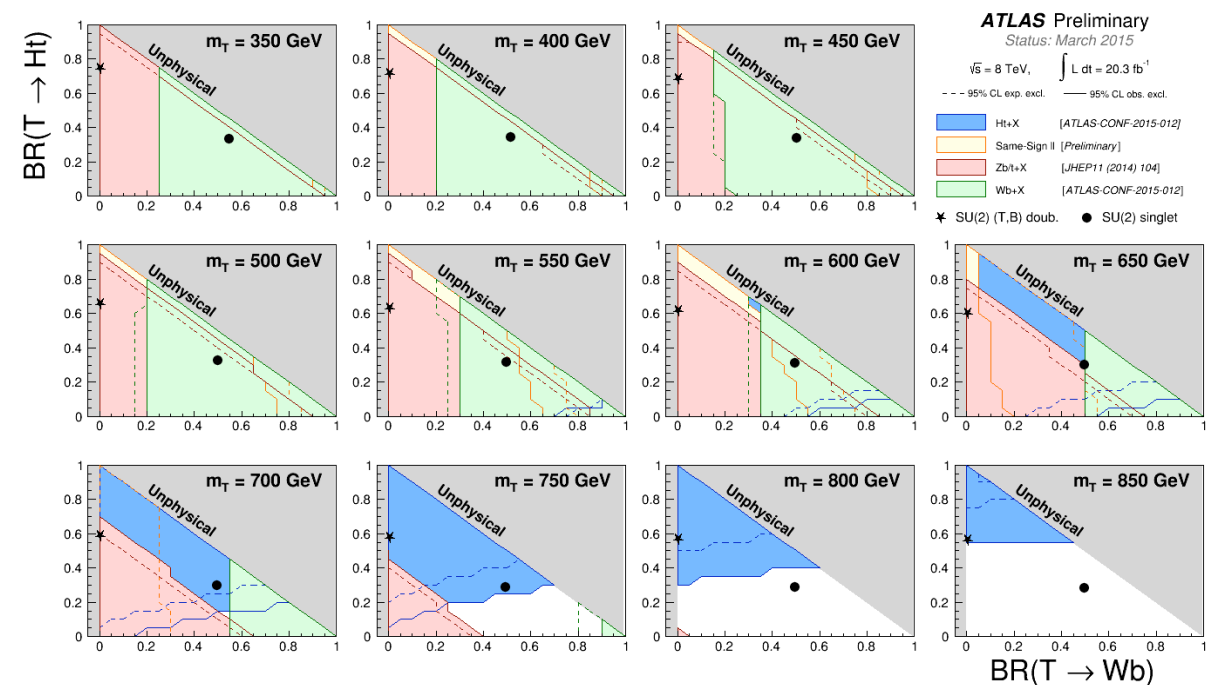
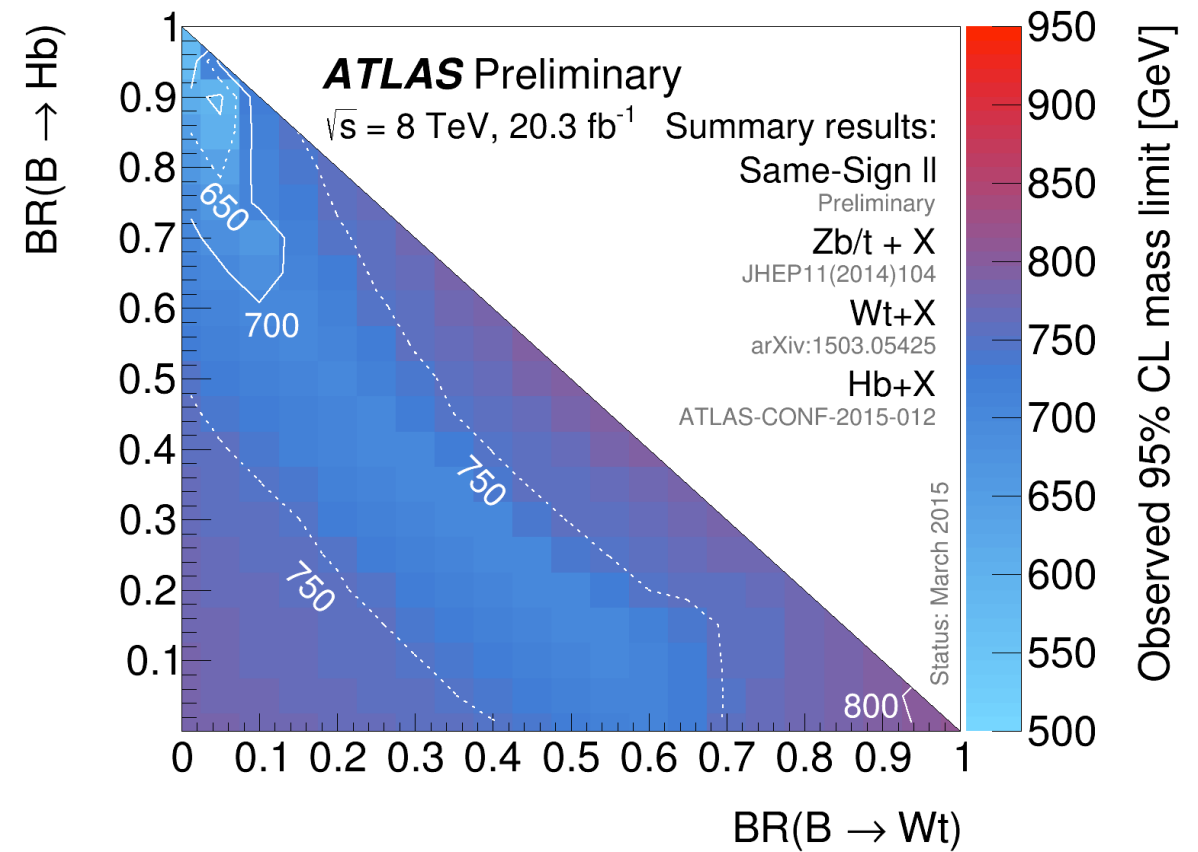


Current Limits: 3rd Generation

CMS Searches for New Physics Beyond Two Generations (B2G)
95% CL Exclusions (TeV)

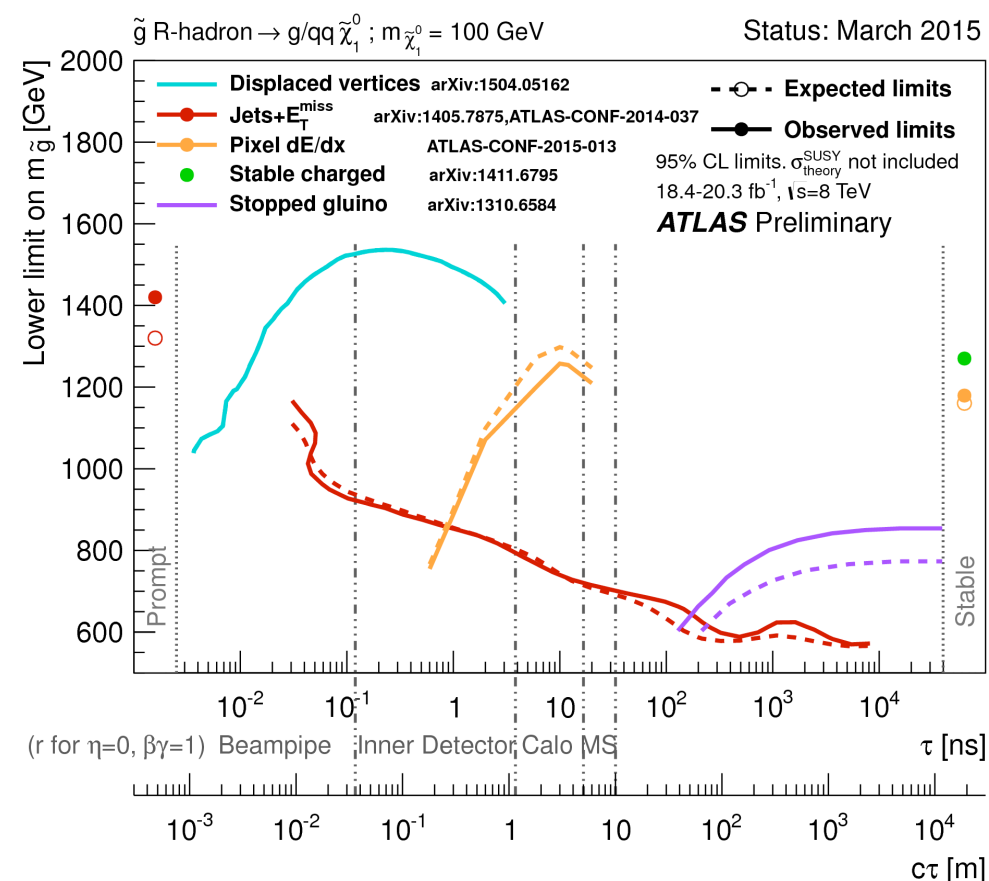
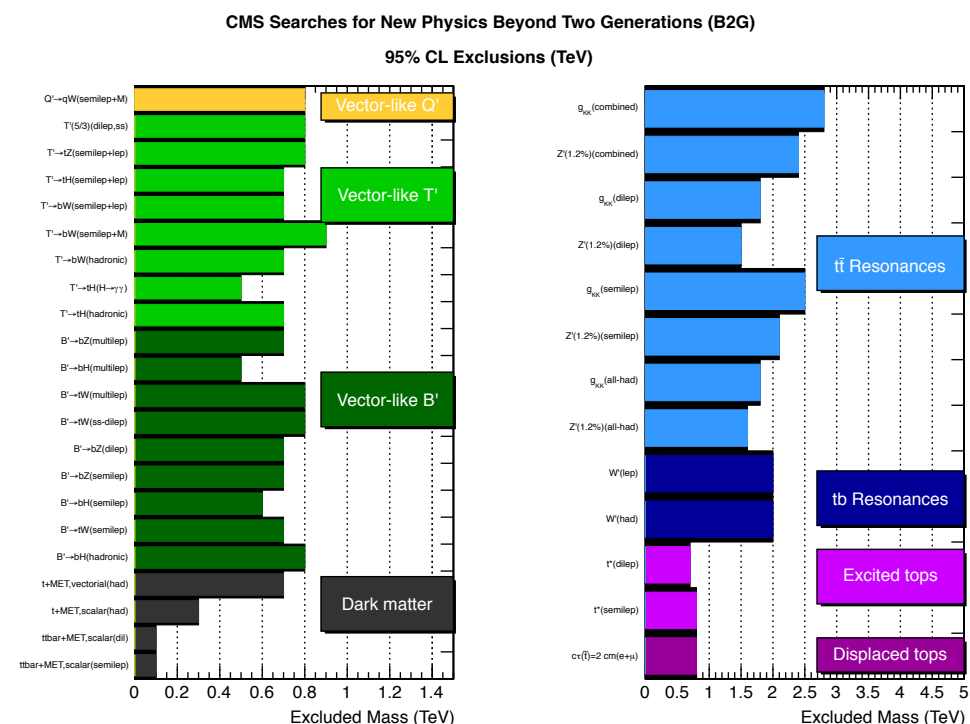


Even here, grain of salt appropriate:
E.g. tt resonance at 380 GeV viable
even with substantial coupling



Top-Down vs Bottom-Up

- ❖ Theory: model \Rightarrow signatures
- ❖ Experiment: signature \Rightarrow discovery (or limit)
- ❖ Resonant?
 - ❖ Many many things done, still gaps though...
- ❖ Dark matter in the decay chains?
 - ❖ Novel signatures from complex dark matter
- ❖ Semi-long-lived?
 - ❖ Can gaps be addressed?
- ❖ ...



Experimenters at Les Houches

- ❖ Profit from many discussions with theorists - learn
- ❖ Help theorists understand what is (not) possible
 - ❖ Particularly important to fill “gaps”
 - ❖ What can we trigger on?
 - ❖ How soft a lepton can we tag with low background?
 - ❖ The realities of hadronic calorimetry
 - ❖ Experimental uncertainties
 - ❖ ...

- ❖ Collaborate (with theorists) on studying sensitivity to new approaches/signatures
 - ❖ Enough theorists here to generate 1000(s) years of experimental work
 - ❖ Be selective
 - ❖ Remember that publication in proceedings (important!) requires the use of generic tools, e.g. Delphes (which are also faster)
 - ❖ Approval of MC studies using ATLAS/CMS tools will be difficult
 - ❖ Similarly, do not discuss non-approved work/results

Organizationally

- ❖ Conveners try to facilitate interactions
 - ❖ “Group” people with similar interests
 - ❖ Subgroups will coalesce in next few days
 - ❖ Wiki!
- ❖ ... but encourage participation well beyond primary topic of interest during stay in Les Houches
 - ❖ Exchange of ideas, brainstorming are key to making this productive
 - ❖ Ideas developed in one context often valuable in another
- ❖ No talks scheduled; favor black-board discussions (mainly in mornings (?)) so can get some work started in afternoons)
 - ❖ Work towards write-ups continues after our stay