Interpretation of experimental results 13TeV perspectives

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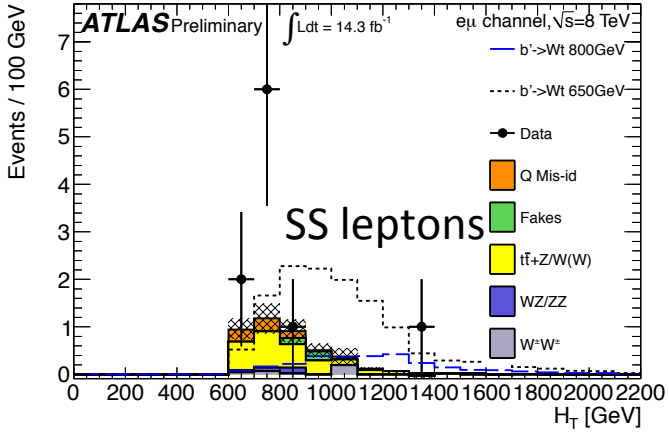
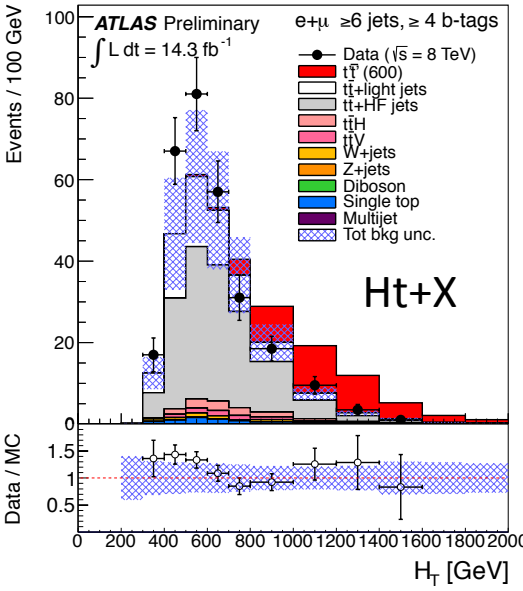
Interpretation

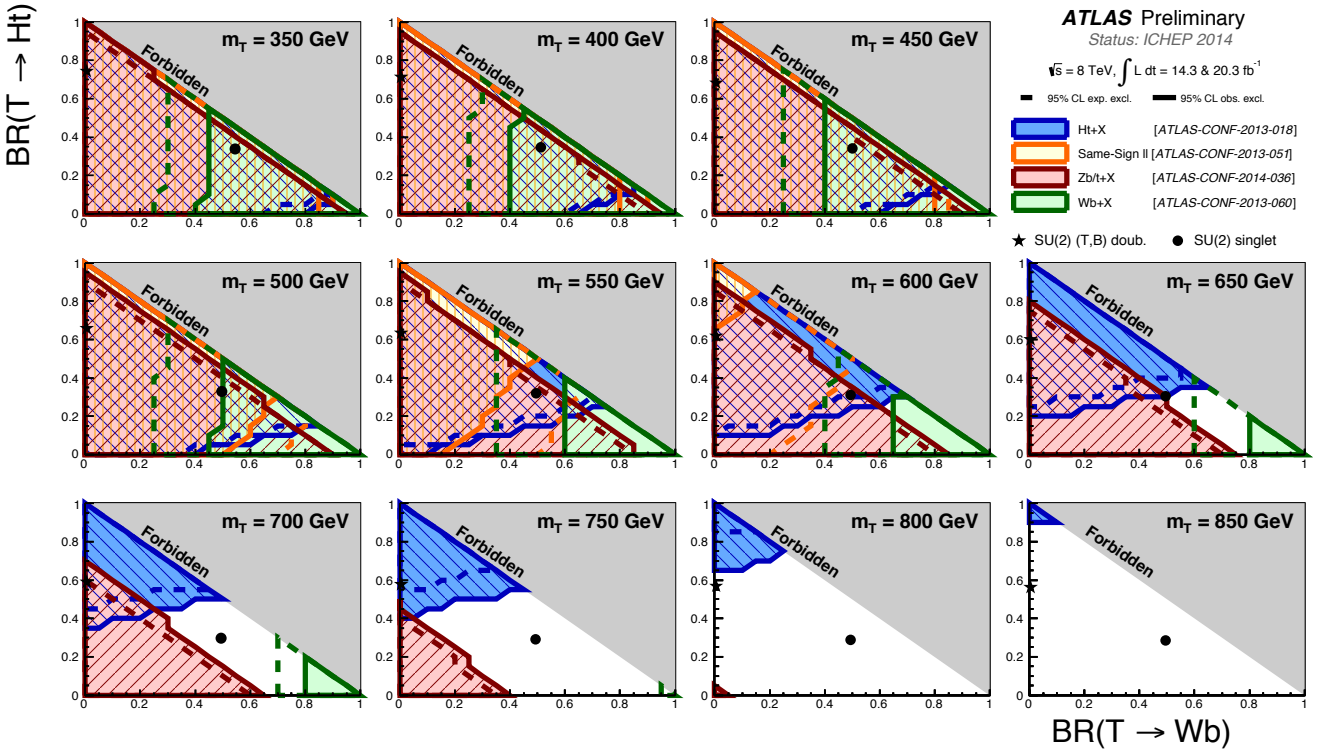
- Is there constraints we really can put on composite higgs models and with the Run I data
- Selections are sensitive to both pair and single production of VLQs:
  - How do we properly treat this when we have model dependent signals?
- Presentation of the results:
  - Is there other preferred ways of presenting the VLQ exclusion results than usual triangles
  - Assuming sum of branching ratios T -> Ht,Zt,Wb B -> Hb,Zb,Wt =1 best thing to do?

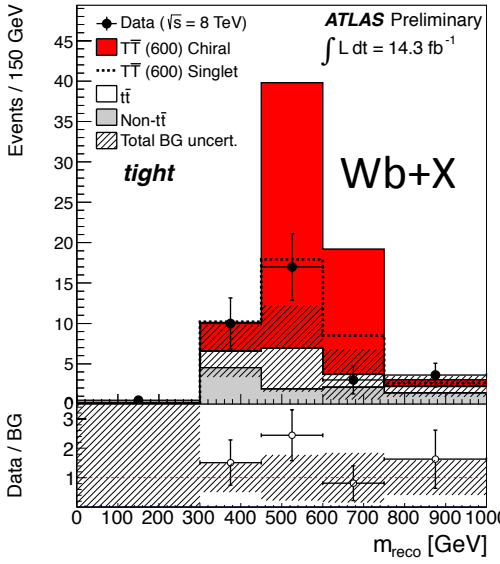
Personal biased Interpretation

- Is it still important to search at “low” mass?
- Some excesses of data at low mass…









Perspectives

- Importance of the VLQ single production:
  - Since the production is model dependent there are quite some differences in what various theorists have proposed and probably also what ATLAS and CMS are doing.
  - While at some level this will always be the case for various models it would be nice to have some benchmarks or discussion over the assumptions that are being followed so that we can discuss this in a reasonable way.
  - Ideally it would be nice to have few same benchmarks between CMS/ATLAS that were well motivated theoretically.
- ATLAS and CMS have different models of production:
  - ATLAS has considered Protos and one theorists Madgraph implementation.
  - CMS has not said anything in public about what they are going to do for single production but for the pair production they use Madgraph
  - Important to combine ATLAS and CMS results? ☺ (as seen in top measurements)

Perspectives

- Increased importance of boosted objects in these searches, Larger sensitivity for Run II for larger masses
  - CMS has done this for a few of their searches
  - ATLAS just started

- What theorists find most useful:
  - From experimentalists point of view we typically have some specific models which we design the search around and then produce limits for in the case of a null result
  - In the Z+tag single production case we just put limits on the cross-section times branching ratio. Are there other parameters that it would be interesting for us to produce limits for? coupling/mixing?
  - How to perform the most model independent searches

- Are there any new developments in the theory community that we should be aware of as experimentalists?
- Importance of mixing to light generations

Personal biased perspectives

- We always try to push the mass limits to higher masses
- We already have performed, I hope, interesting VLQ searches
- I think we should to continue to design analyses sensitive to different regions of the VLQ decay plane
  - In case of signal, that will allow to naively categorize it
- Not sure we should be already working on ways to discriminate between models, if something shows up in data will have enough manpower to study it!
- But we need to decide on the benchmark models to consider
- As manpower is sometimes very limited, the simplest it is to implement, the better