

OPEN DISCUSSION: EXPERIMENTAL PLANS

HL/HE WORKSHOP, FERMILAB, 4-6TH APRIL 2018

Current Wishlist

	CMS	ATLAS	LHCb
Couplings Studies	✓✓★	✓✓★	
Differential CrossSections	✓★	✓★	
Width		✓	
Anomalous couplings	✓★	✓	
Rare Decays	μμ, cc	Zγ, J/ψγ, FCNC μμ, ργ, cc	Hcc/Hbb
Exotic Decays	LFV; Invisible, DarkSusy; 4jets		
DiHiggs	✓✓★	✓✓★	
Additional Scalars	A->Zh, high mass ττ, low mass γγ	μμ, ZZ, A->Zh, ττ, WW	

Legend: Past Studies, 2017 TDRs, Wishlist for 2018

Comments on the wishlist so far...

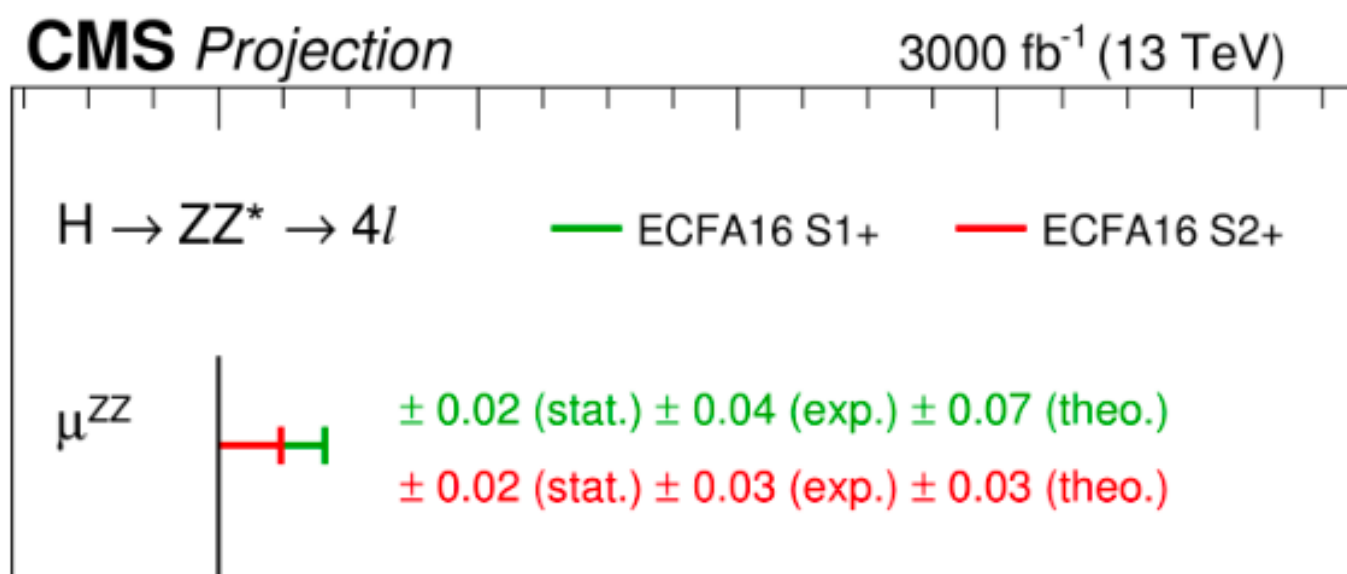
- Why not study $H+b$ and $H+c$? (<https://arxiv.org/pdf/1507.02916.pdf>)
- Should we go with EFT interpretations when probing (anomalous) couplings to very (low values) high precision?
 - Or we simply provide/project the results as we do it today (this is for k appas, anomalous projections, HH , etc.)?
- Interest in results for further width measurements (from interference effects in $H\gamma\gamma$ mass line-shape, or from off-shell production in HZZ)?
- What about HE ?
- On the experimental side: time&personpower-wise it is difficult to add completely new analysis at this stage (the wishlist is already optimistic!), but depending on the feedback of the community we can push for additional projections
- What are we missing?

Where do we need input?

- First of all: thanks a lot to the Higgs xsec WG for the 27 TeV cross sections (as shown in yesterday's summary by John)
- Further points for discussion:
 - Modelling of $p_T(H)$ shape in high- p_T region (e.g. what TH uncertainty is sensible to assume for k_g/k_t interpretations?)
 - Similar question for low- p_T region and k_b/k_c interpretations
 - TH uncertainty is sensible to assume for $tt+bb$ and $tt+V$ modeling (also ttH , tHq)?

Systematic uncertainties

- Current plan for both experiments contemplates a “conservative” scenario based on Run2 scenario, and an “optimistic” scenario that targets floor values for experimental uncertainties
- How aggressive do we want to be?. Eg: Is 1% for lepton efficiency (ECFA16 floor) enough? Would 0.5% be achieved?
- What about modelling/common systematics? - improvements from future measurements, but to what level (e.g. fragmentation, hadronisation, underlying event, PDFs,)?



- Is factorising the key measurements in stat/theo/experimental/lumi indicative enough ?

Systematic uncertainties

- Should theoretical projections follow this schema as well? (for coherence of the report...)
- From Chris' talk of this morning on SMEFT Fits...

▶ Scale all uncertainties for the i th measurement by...

▶ HL-LHC: $\sqrt{\frac{L_i}{3/\text{ab}}}$

▶ HE-LHC: $\sqrt{\frac{\sigma_{13,i}}{\sigma_{27,i}} \frac{L_i}{15/\text{ab}}}$

- Question: do you have all the experimental inputs needed (eg: have we provided enough information on the systematic splitting?). What do you need from us?

15 TeV?

- Brought up as a possibility in the Chamonix Workshop (for instance Bordry's talk)
- How do we fold it in?
- From Michelangelo: report the estimates of the rate increase for various processes of potential interest (Higgs and HH production, very-high mass states)