

Roundtable Discussion - Theory: SM and beyond

- Theory community after Higgs-boson discovery:
 - ▷ focus on Higgs-boson properties and include them in EW precision fits
 - ▷ focus on non-discovery channels (ex.: VH , $t\bar{t}H/tH$)
 - ▷ develop adequate tools to reduce the theoretical (SM) systematic
 - ▷ be ready to interpret new resonances/anomalies in the LHC-Run 2
- The experience of the LHC-Run 1 shows that for SM studies a concerted effort is very successful: LHC Higgs XS Working Group
 - ▷ new phase started in preparation for the LHC-Run 2
 - ▷ provides the framework for theorists and experimentalist to interact in a well defined and efficient way
 - ▷ should provide a natural forum to present and validate new QCD+EW results and all available tools
- Excellent summaries and new ideas presented at this workshop
 - ▷ some remarks
 - ▷ we had daily discussions: anything else?

Example of ongoing activities within the LHC-HXSWG

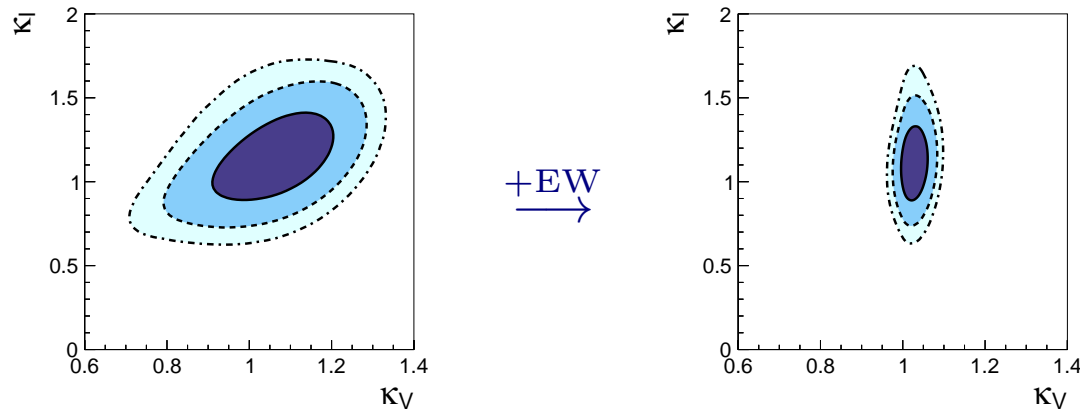
The $t\bar{t}H/tH$ subgroup

(<https://twiki.cern.ch/twiki/bin/view/LHCPhysics/LHCHXSWGTTTH>)

- series of weekly/biweekly meetings with in-depth discussion of specific topics (started on Oct. 20 2014):
 - ▷ Signal modeling in $t\bar{t}H$
 - ▷ Backgrounds and uncertainties in experimental $t\bar{t}H, H \rightarrow b\bar{b}$ searches
 - ▷ Theory perspectives on $t\bar{t}$ +jets and $t\bar{t}$ +HF production
 - ▷ Backgrounds and uncertainties in $t\bar{t}H, H \rightarrow \gamma\gamma$
 - ▷ Backgrounds and uncertainties in $t\bar{t}H, H \rightarrow$ multileptons
 - ▷ Signal modeling in tHq
 - ▷ Backgrounds and uncertainties in tHq
 - ▷ $t\bar{t}H$ Combination: Systematics and correlations
- can subscribe to mailing list
- next overall meeting: CERN January 22-24, 2015

EFT@LHC: exploring new physics effects

- Overall rescaling factors (κ_i) useful to parametrize total cross sections, need to include them in global EW fits:



(Ex.: Ciuchini et al., arXiv:1410:6940,1410.4204)

- Need to shift paradigm to explore the fine structure of LHC data and the relation to more specific BSM theories: use EFT ($\mathcal{L}_{eff} = C_i(\mu)O_i(\mu)$)
 - ▷ LHC physics: very new environment (compared to flavor physics)
 - ▷ Λ_{NP} ? (highest invariant mass probed?, beyond LHC reach?)
 - ▷ important to understand the extent of the bounds on C_i
 - ▷ the future of this approach depends on Run 2!