Topical Workshop on top differential distributions

Organizers:
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Welcome and thank you for your participation

- ✓ Organizational. Talks over 3 days:
  - ✓ Friday afternoon
  - ✓ Saturday
  - ✓ Sunday morning
- ✓ Plenty of time for discussions; talks are to guide the discussions.
- ✓ Major point: the scope of the workshop is the LHC physics of the next few years – not just immediate future!

Physics case

- ✓ We are entering the precision physics stage of top physics but also LHC physics in general
- ✓ What does this mean?
- ✓ The idea of the Workshop is to help synchronize various developments in order to build solid cross-foundation for a culture of precision physics, not just individual bits and pieces.
  (but we don't want to regulate science! ☺)
- ✓ QCD related goals:
  - ✓ Fixed order fully differential calculations:
    → great, but what about soft/collinear resummation, top decay, shower?
  - ✓ A major question in QCD is how important are yet higher orders.
    Top has always been a front runner in perturbative QCD.
    Compare/validate approximate results with known exact results and draw conclusions.
  - ✓ Examples:
    - ✓ devise scale setting procedures that work well, even if in the context of a particular observable/final state.
    - ✓ sophisticated error estimates, etc.

Physics case

- ✓ Cross-applications (that will be discussed in this Workshop)
  - ✓ Experiment:
    - ✓ What can theory do for experiment?
    - ✓ How can experiment help theory?
    - ✓ What experiment really needs from theory?
  - ✓ Other QCD theory: PDF
    - ✓ Extraction and validation of pdf sets from top distributions.
    - ✓ Is top decay relevant here?
  - ✓ BSM physics. A major "potential customer". I think it is still largely unexplored.
  - ✓ I hear comments like:

    "top uncertainties are a major impediment to setting limits in searches"

  - ✓ Sounds great, but how do we put this to work in a systematic way?
  - ✓ What do we compute that is of interest and how the interested people know what is computed (or even better – what *can* be computed)?

Physics case: some ideas (with some help from Joey's wishlist)

- ✓ EW corrections: are they readily available and easy to include in th/exp analyses?
- ✓ Ratios 7,8 and 13,14: specific ideas for what to compute and measure. With motivation please…
- ✓ The role of top decay: when it matters much and when not so much.
- ✓ Using NNLO in showers: cross-validation
  (along the lines of Paolo Nason's talk at topWG @ CERN in may 2014)
  but also merging/matching, etc.
- ✓ Do we need to put much more work in top asymmetries at LHC (see next talk)
- ✓ Shapes of diff distributions: validate approximations; data is quite precise already
- ✓ Trans-TeV physics: what is actually needed there? What are the issues?
- ✓ How well do we distinguish/separate tt from single top? Is this a bottleneck of a sort and what needs to/can be done about it?
- ✓ My question regarding BSM: what physics can be done with high precision top physics that cannot be done with, say, Madgraph? Example recent work on stealth stop

  Czakon, Mitov, Papucci, Ruderman, Weiler '14
- ✓ Will not talk about top mass – there was/is plenty of activity there…

  Juste, Mantry, Mitov, Penin, Skands, Varnes, Vos, Wimpenny '13
  Moch, Weinzierl, Alekhin, Blümlein2, de la Cruz, Dittmaier, Dowling et al '14

White paper

- ✓ The idea is to try to make something coherent out of the Workshop
- ✓ Prepare a white-paper of a sort.
  - ✓ Could be written by the organizers (and all – if interested).
  - ✓ Could serve as a roadmap for LHC Run2.
  - ✓ It will not be big but should be useful.
- ✓ Let's talk again at the end of the Workshop – by then we all should have a much better idea about how to proceed!

Hope we all have an enjoyable, useful and productive Workshop!

And see you at Top2014 !