

ATLAS action items request (still growing...)

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- Provide cross section and error for ggF production process;
- Provide prescription for jet bin uncertainty in the ggF process, enforce Stewart Tackman procedure for general case (VBF topology subtraction from inclusive 0 jet, for $\gamma\gamma$ and ZZ VBF analysis), can we use MCFM-VBF 2 jet uncertainty in the inclusive bins?
- Need to recompute uncertainties with HNNLO and MCFM (define a prescription and reference numbers for comparison?)
- Provide prescription for Higgs p_T reweighting:
 - ATLAS is running showering with Pythia8, our Higgs p_T reweighting with Pythia6 is not consistent with YR2. We reweight the Higgs p_T to HqT2.0 after UE and hadronisation;
 - We implemented last Powheg tag with heavy quark effects, an extra parameter (hfact) is present that allows to tune the P_t distribution before UE and hadronisation;
 - what could be the prescription? Just use recommended value of hfact? how to compute the error? define a range of hfact?
 - retune of hfact with Pythia8 needed?
- Heavy quark effect present now in Powheg, simulation on going with them inside (do we need to estimate an uncertainty?)

- how to compute higher order uncertainties also on topological cuts? (ex. p_{Tt} , $p_{T\gamma}$?) apply S.T. to events passing the cuts?
- $gg \rightarrow ZZ \rightarrow 4l$ will be simulated, how to handle the interference for the 4e and 4mu final state, fully interference seems present in MCFM 6.2 but only at LO (looking at the manual), why? Is the computation at NLO impossible with the interference between the two Z taken into account? How to compute the error on this? Assume the fractional error on the LO computation?
- Interference between $gg \rightarrow WW, ZZ$ background with the Higgs signal:
 - ZZ still missing in MCFM, it seems that people are working on it in aMC@NLO, Frixione and a student of him (involve them in the group discussions?)
 - WW is present at LO in MCFM (how to compute the effect?) probably propagating the full difference from LO to NLO would be too conservative, possible other approach:
 - set scale such that $\sigma_H(m_H)^{NLO} = \sigma_H(\mu)^{LO}$ and do scale variation?
- Heavy Higgs line shape uncertainty (clear prescription from Passarino, can we maintain it?), we need to define a prescription with the BSM and Heavy Higgs folk.
- VBF uncertainties: scale and pdf are quite small, we need to evaluate UE and hadronisation (how?), POWHEG+PYTHIA, HERWIG is fine? do they include all of them? Residual discrepancies between Parton level (MCFM) and showers MC (Powheg+X) should be added as uncertainties?

Statistics

- F. Dulat and B. Mistlberger (ETH, Zurich) <http://arxiv.org/abs/1204.3851>,
- how to treat theoretical error? profiling means assume they are gaussian error, is this aggressive?
- Is our statistical approach correct (does the exclusion plot for $\mu \neq 1$ has a meaning. Does have it for $\mu = 1$?)