Imperial College London

Uncertainty Pruning

G. Davies, P. Dunne, N. Wardle

14/05/2013

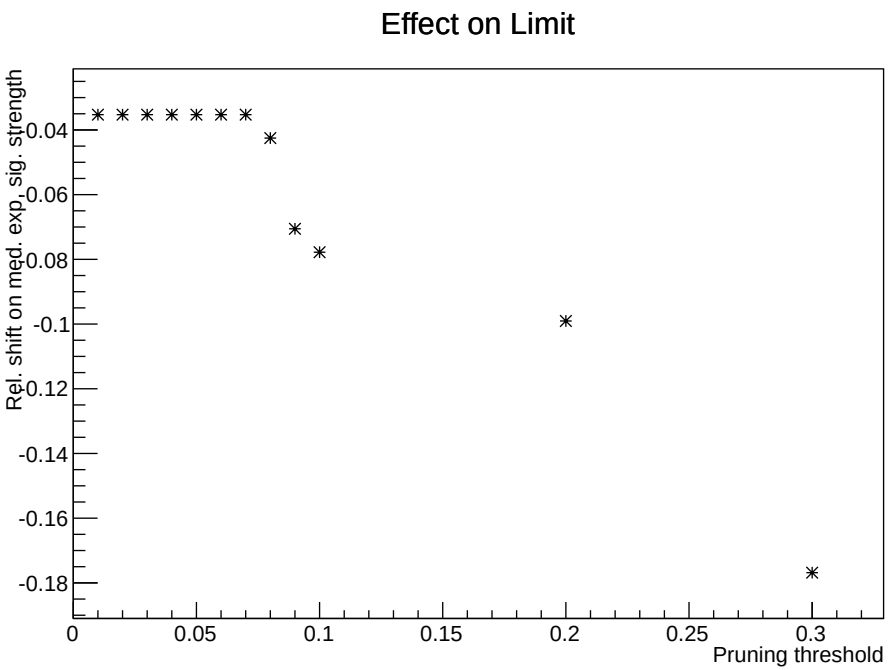
Intention

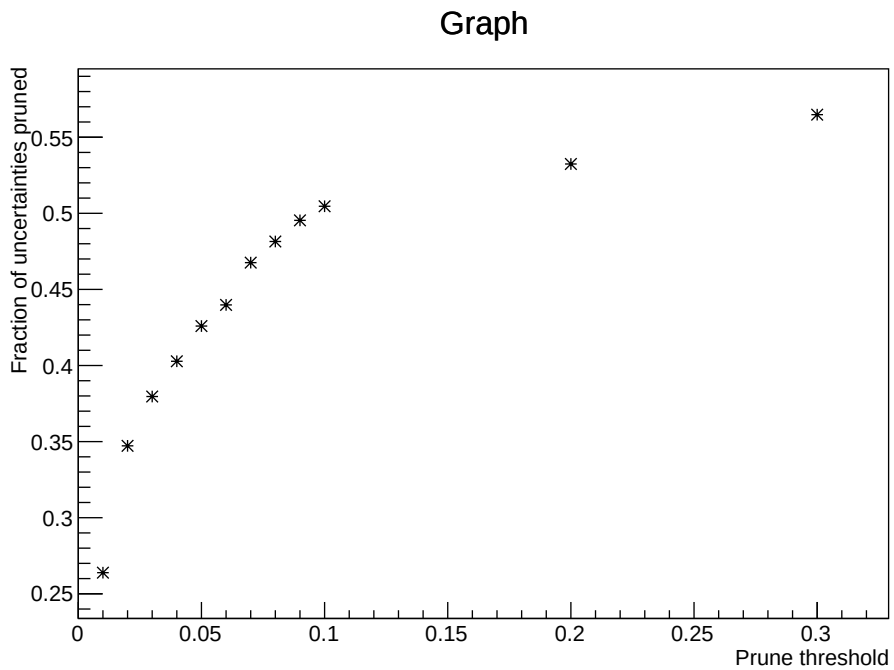
- Use Roger Wolf's pruning tool developed for H $\rightarrow \tau\tau$ to produce lists of uncertainties that can be pruned
- Study how much pruning affects the result by channel and for several pruning thresholds
- Measure how much time this saves

Method

- The tool compares the pull of bin-by-bin uncertainties multiplied by the size of the original uncertainty to a threshold to decide which ones to keep.
- More details are in Roger's slides here.
- All plots are for a second Higgs at 140 GeV
- The effect on the result was worked out by running combine -M Asymptotic –noFitAsimov before and after pruning

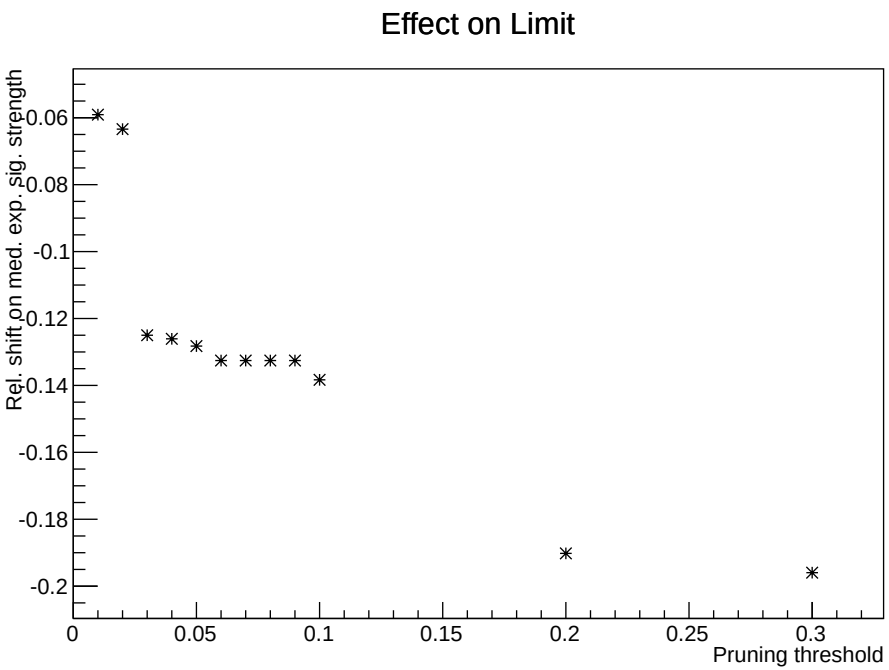
$H \rightarrow WW$

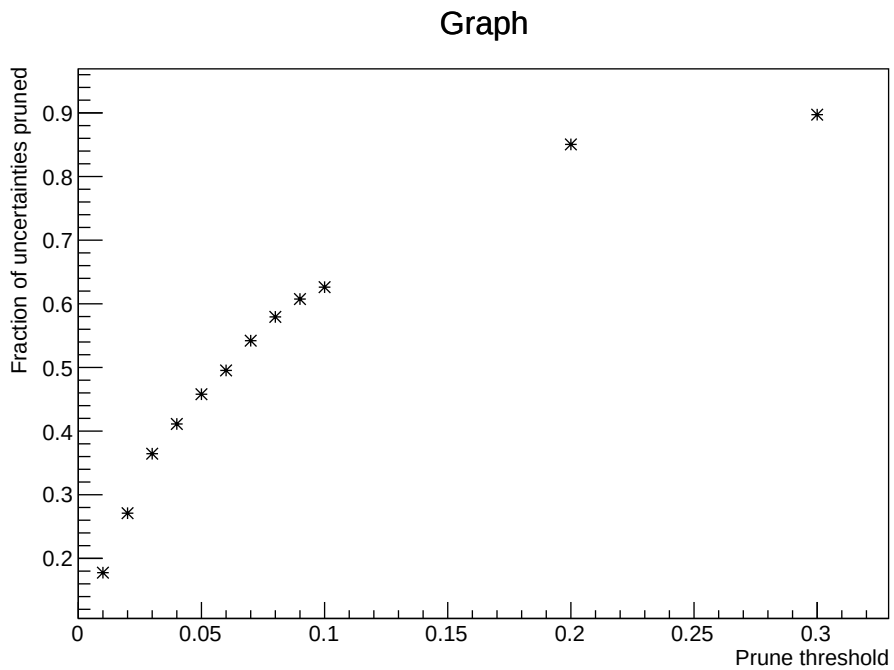




- Timing: Unpruned 0.86 min, Pruned 0.08 threshold 0.34 min

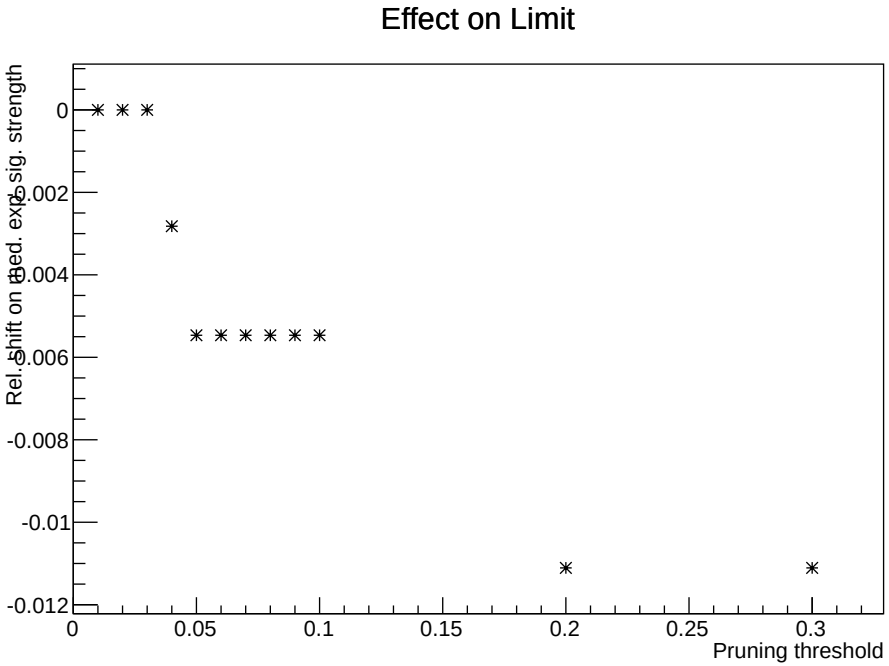
$H \rightarrow bb$

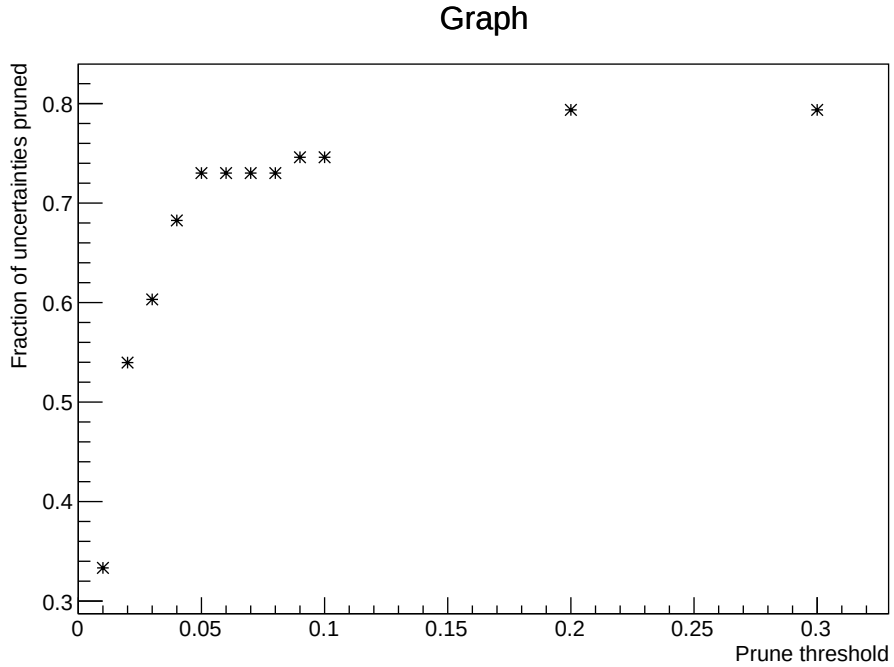




- Timing: Unpruned 0.85 min, Pruned 0.02 threshold 0.41 min

$H \rightarrow \gamma\gamma$





- Timing: Stays the same

Conclusions

- We have lists of parameters to drop for several thresholds, can commit these to the SVN
- We can greatly reduce time taken to fit
- So far all results are for a 140 GeV second Higgs
- I'm having some issues getting MaxLikelihoodFit to converge for $H \rightarrow ZZ$

BACKUP

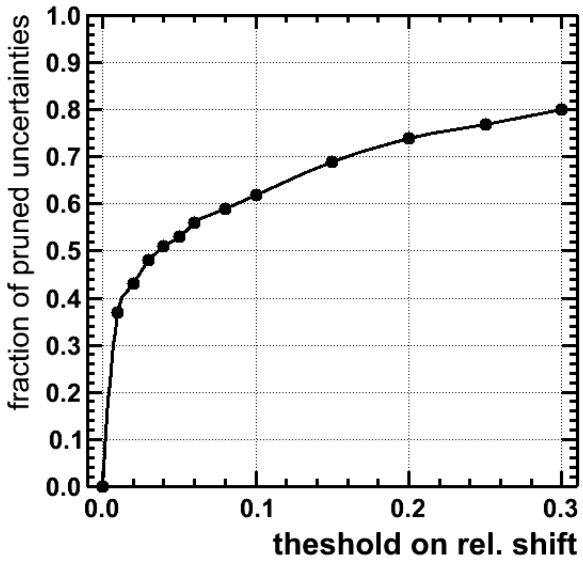
Nuisances Removed at Steps

- HWW Step at 0.08: CMS_hww_0j_WW_8TeV, CMS_eff_e, QCDscale_ggH1in
- HBB Step at 0.02: CMS_eff_b, QCDscale_ttH, zjets_ge3t_8TeV_ANNbin7, ttbar_ljets_j5_tge4_8TeV_ANNbin1, ttbar_ljets_j4_t4_8TeV_ANNbin5, ttbarPlusBBbar_ljets_jge6_tge4_8TeV_ANNbin6, ttbar_ljets_j4_t4_7TeV_ANNbin9, CMS_ttH_PUcorr, ttbarPlusBBbar_ge3t_8TeV_ANNbin7, Q2scale_ttH_ttbar_bb
- HGG Step at 0.04: CMS_eff_j, CMS_hgg_n_pdf_10, CMS_hgg_n_sigmae, lumi_7TeV, CMS_hgg_n_sc_gf
- HGG Step at 0.05: CMS_hgg_n_pdf_15, CMS_hgg_n_pdf_9, pdf_qqbar

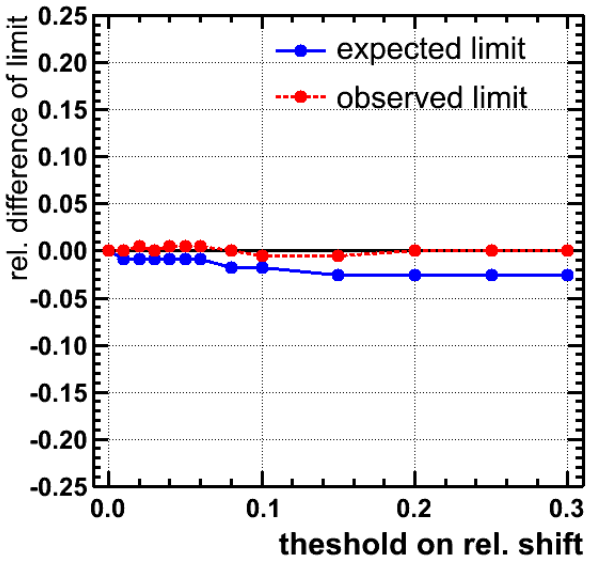
Test of --byShift implementation (w/o 'shielding')

- Checking effects on Limit and (Bayesian) Significance

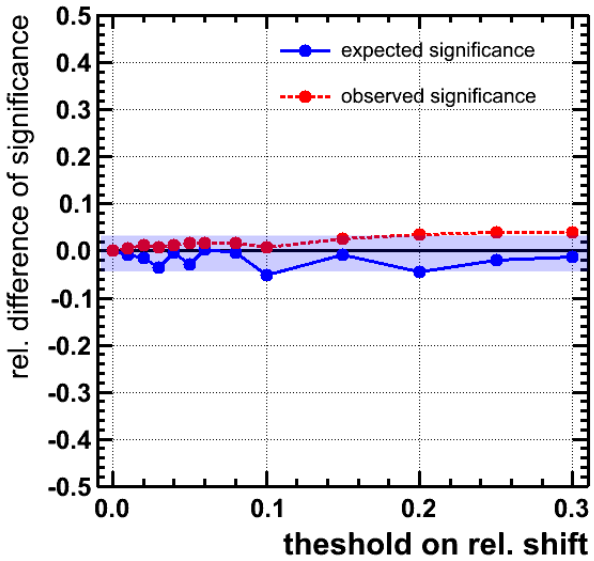
From 689 uncerts.



Limit



Significance



App. ±3.2% stat. uncertainty from 1000 independent toys.

Effects < 3% shifts on limit, < 5 % in significance