Quick update on tth $\rightarrow$ hadronic analysis at $\sqrt{s}$= 1.4 TeV

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CLICdp Analysis Meeting
CERN

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Current Status

- All tools running and verified
- Small subset of MC samples (~4000 events per channel) run through full process for verification of tools, sanity checks, etc.
- Running through full sample set right now
  - Unable to run these on CERN farm/batch – any way to “industrialise” this?
- Existing files have hit the Eos storage limit (~1.8TB?), so also reducing current data by using Treemaker on processed samples, then deleting .slcio files

Tools Used

- Samples were generated in Physsim
- Pre-processing
- Jet clustering, vertex finding
- Isolated lepton finding, jet reclustering and tau finding
- Treemaker (analysis)
- TMVA to create BDTs

CP Violation Search

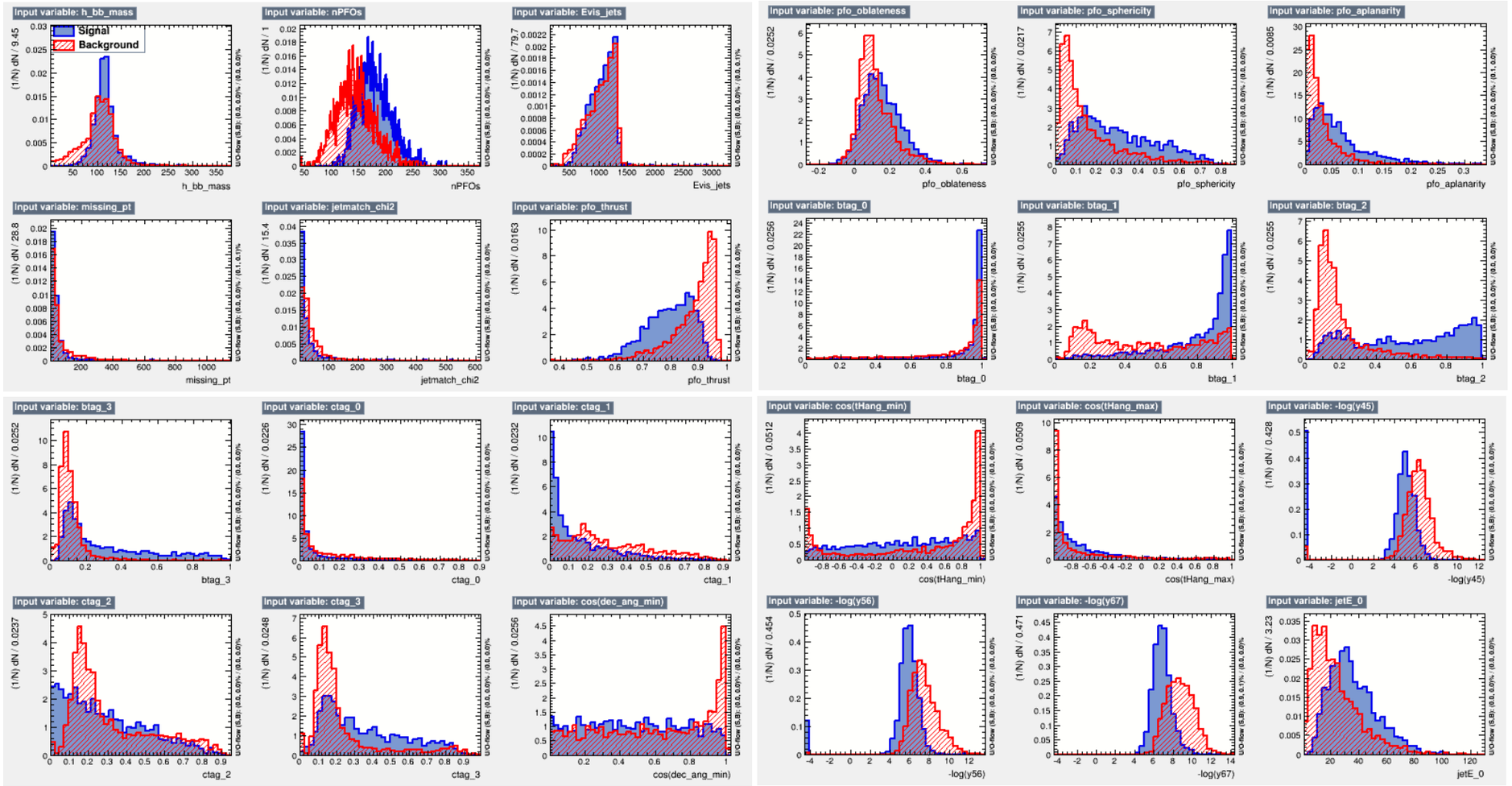
- Searching for sensitivity to CP-violation with CP-even Higgs
- Will need to generate new samples – Whizard? Physsim?
- Analysis *should* be model-independent, since we're only measuring sensitivity to CP quantum numbers (?)
- Also means the model used for generation doesn't matter, as long as *some* Higgs are CP-even

CP Violation Observables

- Currently reviewing literature for observables to use for sensitivity to CP-violation
- Current candidates:
  - Cross-section
  - Up-down asymmetry – normally used only for the semileptonic channel but the CP-sensitive process happens during the $t \rightarrow W^{+}b$ decay (?), so the hadronic channel theoretically *should* be sensitive to it
    - Main issue would be uncertainties on jet angles compounding to give high uncertainty (?)
- Open to suggestions for observables/literature!

Next Steps

- Continuing to process samples (approx. halfway through)
- Once all samples processed, final analysis and BDTs will take ~1 day
- Generating CP-violating samples
- Changing analysis code for CP-sensitive observables
- Testing, iteration, etc. over analysis code



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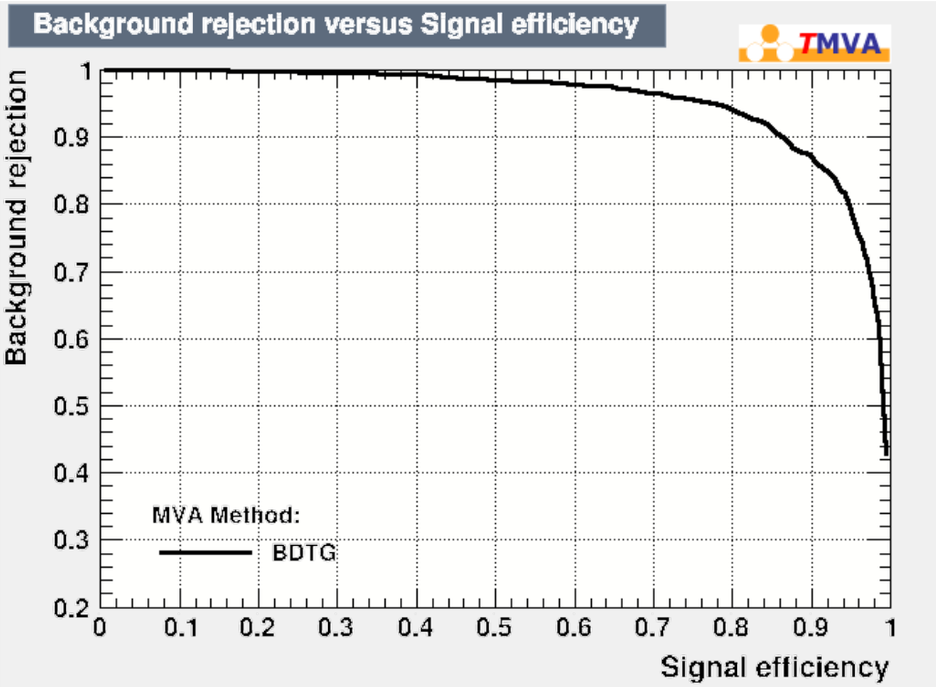
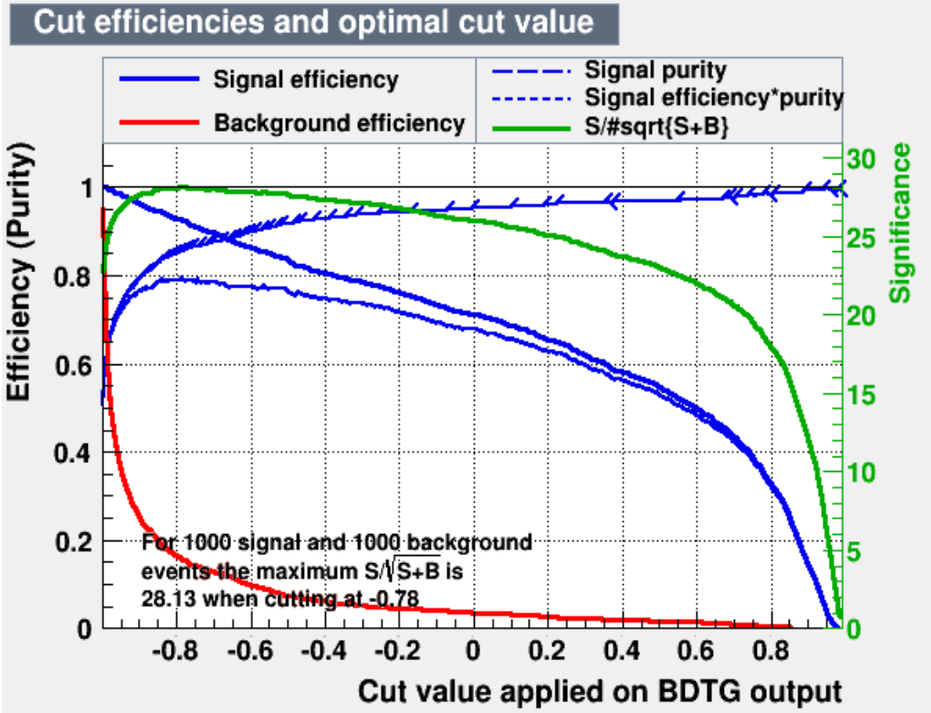
Rejection & Efficiencies





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Thank you

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