Imperial College London

VBF Higgs to Invisible - Update

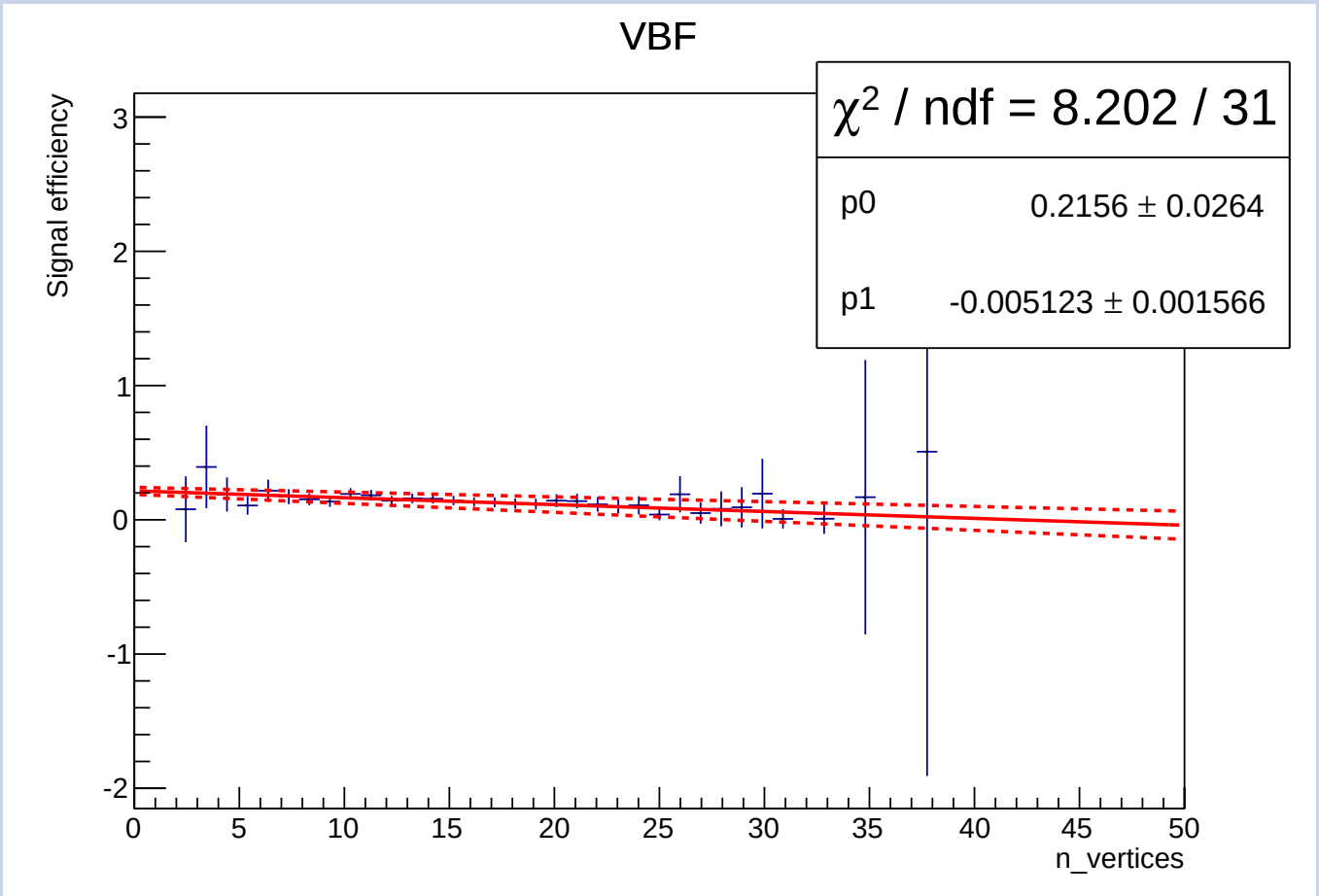
HIG-14-038, AN-14-243

P. Dunne

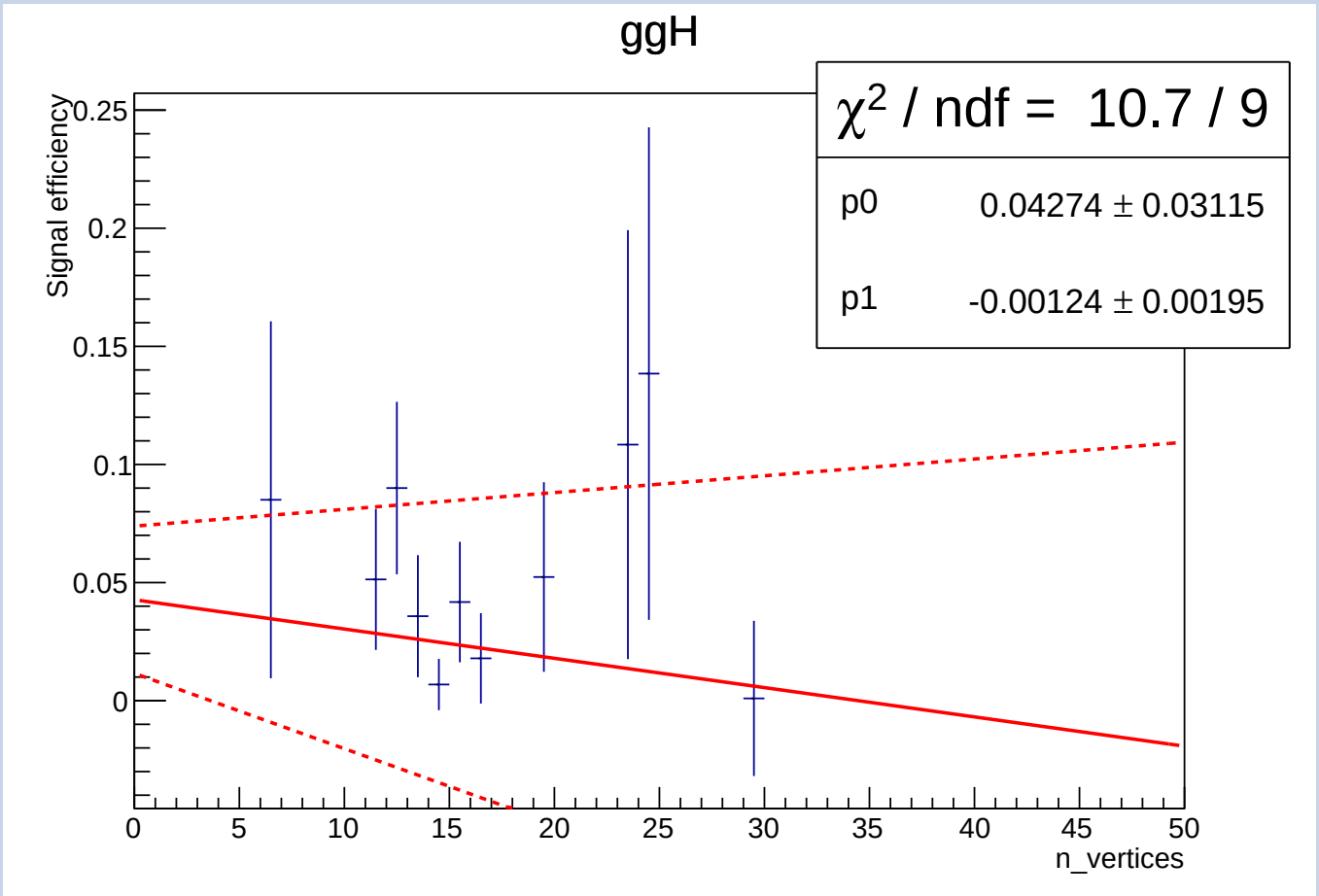
Overview

- CADI line HIG-14-038 in place with AN and paper draft attached
  - Frozen for preapproval on Thursday
- Will show today work on studies asked for by Paolo:
  - Signal efficiency variation with PU
  - Muon veto efficiency in signal as a function of PU
  - First look at closure test

Signal efficiency as a function of PU

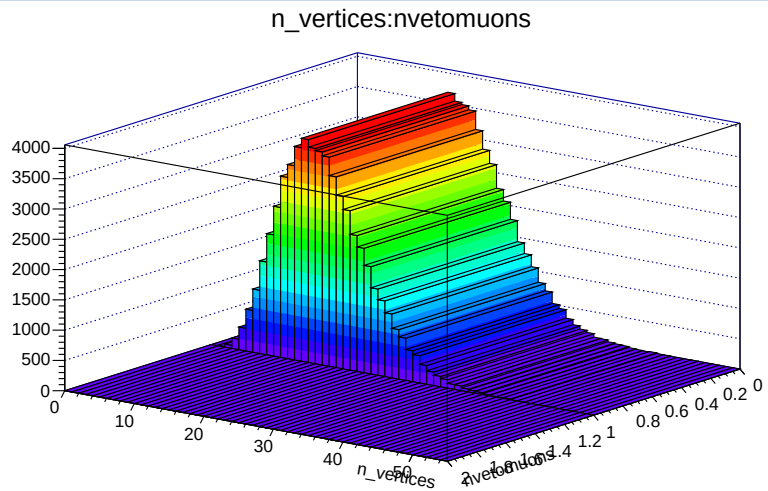


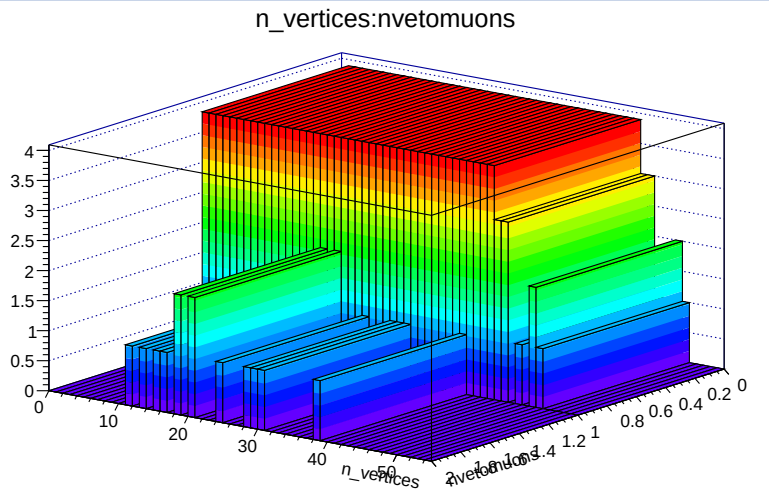
Signal efficiency as a function of PU



Veto muons in signal MC

- Veto muons don't have a dz or dxy cut
- Concern that we would be vetoing muons from a different vertex
- Muon veto efficiency turns out to be very high:
  - ∼10 signal MC events with a veto muon out of ∼55000
- nvetomuons doesn't seem correlated with PU



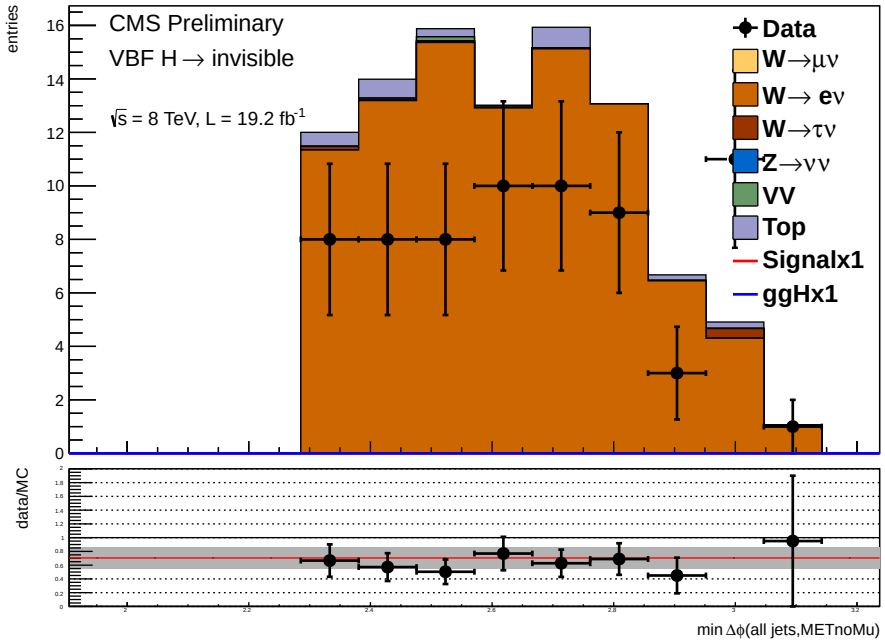


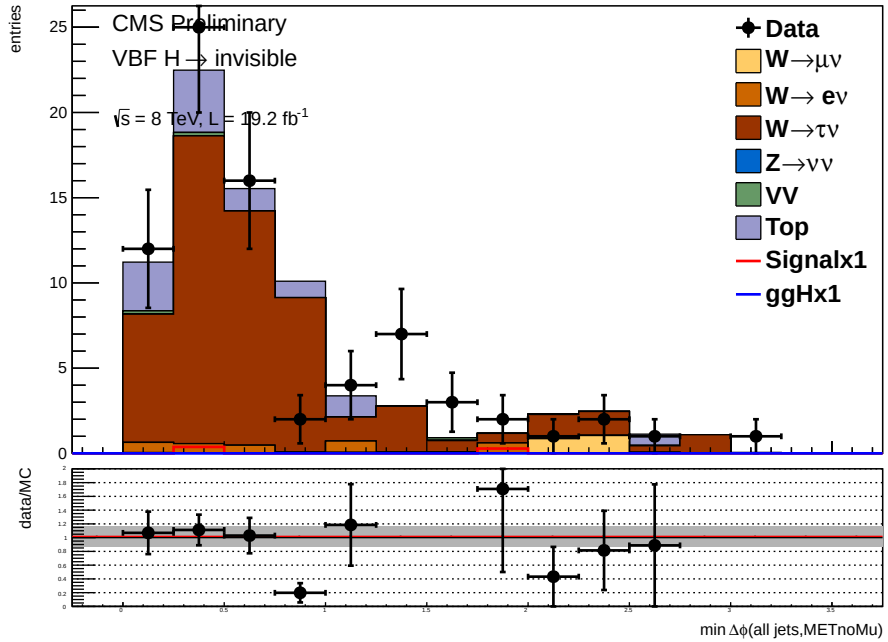
- Right plot is zoom of left

Closure tests

- Use $W \to \mu\nu$ data driven weight for other backgrounds to check agreement
- For prompt analysis $W \to e\nu$ and $W \to \tau\nu$ agreed to 1σ
  - $Z \to \mu\mu$ was just outside error bands
- Instead of fitting a pol0 I have taken $\int \text{Data} / \int \text{MC}$

Closure tests





Closure tests

- Errors shown are data and MC statistics only
  - Other errors are highly correlated
- Don't have $Z \to \mu\mu$ yet
- $W \to \tau\nu$ consistent to within errors
- $W \to e\nu$ shows $\sim 2\sigma$ difference
  - Flat across all variables
- Have tried adding an m_T cut
  - no significant change
- Have tried adding an $\eta < 2.1$ cut to make e and μ acceptance the same
  - No significant change

Conclusion

- Muon veto shows no evidence of pileup dependancy
- Signal efficiency shows slight pileup dependancy
  - Not an issue as we model pileup distribution and uncertainty which gives a small systematic
- Closure tests underway
  - $W \to \tau\nu$ consistent
  - $W \to e\nu$ has 2σ deviation
- Preapproval on Thursday

Backup