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Where is the Higgs Hiding?

By: Doug Schaefer with Dr. Brian Winer, Dr. Richard Hughes, Brandon Parks, and Jason Slatinwhite
Ohio State Department of Physics

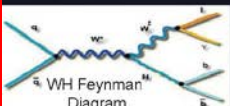


Tevatron: Accelerating protons and anti-protons to approximately 2 TeV

Collider
Detector
Fermilab



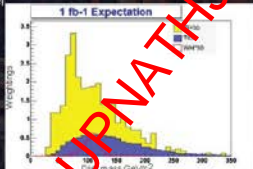
Where is WH?



Quarks: u, d, s, b; Leptons: e, μ, τ; Forces: Z, W, γ

Standard Model

- Higgs is the only undiscovered particle in the Standard Model
- One Mechanism for Higgs Production at the Tevatron



Weighting

mass GeV/c²

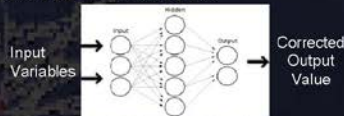
Problems

- Large Background
- Small Cross-section

Tools and Results

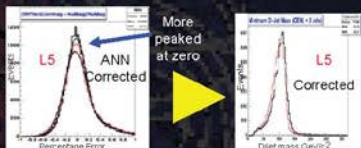
Artificial Neural Network

- Advanced analysis technique
- Based on the human brain's ability to recognize patterns
- Varies weights in a series of tests called training to improve the E_T



Input Variables → [ANN] → Corrected Output Value

Improving the MET measurement to correct the jet measurement




More peaked at zero

How to make Improvements?

Resolution = $\frac{\sigma}{\mu}$


Want to sharpen this peak by improving the measurement of the neutrino



L5

Dijet mass GeV/c²

- Every one percent improvement in resolution leads to a 10% increase in sensitivity
- This analysis aims for an improvement of at least a 2-3%.
- This analysis may require improvement in the measurement of the missing energy from the neutrino

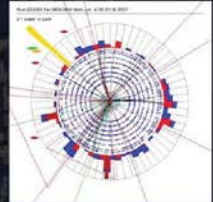


Schematic of WH Decay

Lepton, W System, Jet, Imbalance

Future?

- Use track met variables to try to eliminate some fake MET from events
- Develop cuts to eliminate events with poorly measured MET
- Examine these cuts on previously eliminated signal regions



Track and cone definition for jets

Photo credit: <http://www.fnal.gov/>