Richard E. Hughes
The Ohio State University
for
The CDF and D0 Collaborations

Low Mass SM Higgs
Search at the Tevatron
Tevatron and Experiments
Tevatron and Experiments
Highest $L = 3.1 \times 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$

March 17$^{\text{th}}$
Highest $L = 3.1 \times 10^{32}$ cm$^{-2}$ s$^{-1}$
March 17$^{th}$

Results in this talk
Constraints on the SM Higgs

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Fit</th>
<th>$\Delta \chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta \alpha^{(s)}_{\text{had}}(m_Z)$</td>
<td>0.02758 ± 0.00035</td>
<td>0.02767</td>
</tr>
<tr>
<td>$m_\gamma$ [GeV]</td>
<td>91.1875 ± 0.0021</td>
<td>91.1874</td>
</tr>
<tr>
<td>$\Gamma_\gamma$ [GeV]</td>
<td>2.4952 ± 0.0023</td>
<td>2.4959</td>
</tr>
<tr>
<td>$\sigma^0_{\text{had}}$ [nb]</td>
<td>41.540 ± 0.037</td>
<td>41.478</td>
</tr>
<tr>
<td>$R_i$</td>
<td>20.767 ± 0.025</td>
<td>20.743</td>
</tr>
<tr>
<td>$A_{l\bar{b}}^{0.1}$</td>
<td>0.01714 ± 0.00095</td>
<td>0.01643</td>
</tr>
<tr>
<td>$A_{l\bar{b}}(P_f)$</td>
<td>0.1465 ± 0.0032</td>
<td>0.1480</td>
</tr>
<tr>
<td>$R_b$</td>
<td>0.21629 ± 0.00066</td>
<td>0.21581</td>
</tr>
<tr>
<td>$R_c$</td>
<td>0.1721 ± 0.0030</td>
<td>0.1722</td>
</tr>
<tr>
<td>$A_{l\bar{b}}^{0.1b}$</td>
<td>0.0992 ± 0.0016</td>
<td>0.1038</td>
</tr>
<tr>
<td>$A_{l\bar{b}}^{0.1c}$</td>
<td>0.0707 ± 0.0035</td>
<td>0.0742</td>
</tr>
<tr>
<td>$A_{l\bar{b}}^{0.2}$</td>
<td>0.923 ± 0.020</td>
<td>0.935</td>
</tr>
<tr>
<td>$A_{l\bar{b}}$</td>
<td>0.670 ± 0.027</td>
<td>0.668</td>
</tr>
<tr>
<td>$A_{l\text{(SLD)}}^{0.1}$</td>
<td>0.1513 ± 0.0021</td>
<td>0.1480</td>
</tr>
<tr>
<td>$\sin^2 \theta_{\text{eff}}^{(Q_{fb})}$</td>
<td>0.2324 ± 0.0012</td>
<td>0.2314</td>
</tr>
<tr>
<td>$m_W$ [GeV]</td>
<td>80.398 ± 0.025</td>
<td>80.377</td>
</tr>
<tr>
<td>$\Gamma_W$ [GeV]</td>
<td>2.097 ± 0.048</td>
<td>2.092</td>
</tr>
<tr>
<td>$m_t$ [GeV]</td>
<td>172.6 ± 1.4</td>
<td>172.8</td>
</tr>
</tbody>
</table>

$m_H = 87^{+36}_{-27}$ GeV/c²
$m_H < 160$ GeV/c² @ 95% CL

Direct searches at LEP II: $M_h > 114.4$ GeV @ 95% CL

Indirect Constraints: Top, W-boson masses, EW meas.
Production and Decay

Low Mass Final States

$WH \rightarrow \ell \nu b \bar{b}$

$ZH \rightarrow \ell \ell b \bar{b}$

$ZH \rightarrow \nu \nu b \bar{b}$

$WH \rightarrow (\ell) \nu b \bar{b}$

$VH, VBF, H \rightarrow \tau \tau + 2j$
Production and Decay

Low Mass Final States

\( WH \rightarrow \ell \nu \bar{b} b \)

\( ZH \rightarrow \ell \ell \bar{b} b \)

\( ZH \rightarrow \nu \nu \bar{b} b \)

\( WH \rightarrow (\ell) \nu \bar{b} b \)

\( VH, VBF, H \rightarrow \tau \tau + 2j \)

1 High \( P_T \) Lepton + \( E_T \) + b jets
Production and Decay

Low Mass Final States

\[ WH \rightarrow \ell \nu \bar{b}b \] → 1 High \( P_T \) Lepton + \( \not{E}_T \) + b jets

\[ ZH \rightarrow \ell\ell \bar{b}b \] → 2 High \( P_T \) Leptons + b jets

\[ ZH \rightarrow \nu \nu \bar{b}b \]

\[ WH \rightarrow (\ell)\nu \bar{b}b \]

\[ VH, VBF, H \rightarrow \tau\tau + 2j \]
Production and Decay

Low Mass Final States

\[ WH \rightarrow \ell \nu b \bar{b} \quad \rightarrow \quad 1 \text{ High } P_T \text{ Lepton} + \not{E}_T + b \text{ jets} \]
\[ ZH \rightarrow \ell \ell b \bar{b} \quad \rightarrow \quad 2 \text{ High } P_T \text{ Leptons} + b \text{ jets} \]
\[ ZH \rightarrow \nu \nu b \bar{b} \]
\[ WH \rightarrow (\ell)\nu b \bar{b} \quad \rightarrow \quad 0 \text{ High } P_T \text{ Leptons} + \not{E}_T + b \text{ jets} \]

\[ VH, VBF, H \rightarrow \tau \tau + 2j \]
Production and Decay

Low Mass Final States

\[ \text{WH} \rightarrow \ell \nu b \bar{b} \rightarrow 1 \text{ High } P_T \text{ Lepton} + E_T + b \text{ jets} \]
\[ \text{ZH} \rightarrow \ell \ell b \bar{b} \rightarrow 2 \text{ High } P_T \text{ Leptons} + b \text{ jets} \]
\[ \text{ZH} \rightarrow \nu \nu b \bar{b} \rightarrow 0 \text{ High } P_T \text{ Leptons} + E_T + b \text{ jets} \]
\[ \text{WH} \rightarrow (\ell) \nu b \bar{b} \]
\[ \text{VH, VBF, } H \rightarrow \tau \tau + 2j \rightarrow 1 \text{ Lepton} + \text{Trk(s)+ jets} \]
### Production and Decay

#### Low Mass Final States

- 2 High \( P_T \) Leptons + b jets
- 0 High \( P_T \) Leptons + \( E_T \) + b jets
- 1 High \( P_T \) Lepton + \( E_T \) + b jets

#### Production Processes

- \( WH \rightarrow \ell \nu b \bar{b} \)
- \( ZH \rightarrow \nu \nu b \bar{b} \)
- \( WH \rightarrow (\ell) \nu b \bar{b} \)

### Graphical Representation

**Events produced at CDF in 1 fb\(^{-1}\)**

**Events**

**Higgs mass (GeV)**

- 110
- 120
- 130
- 140
- 150
- 160
- 170
- 180

**Total**

- \( H \rightarrow WW \rightarrow \ell \nu \nu \)
- \( WH \rightarrow \ell \nu bb \)
- \( ZH \rightarrow \nu \nu bb \)
- \( ZH \rightarrow lbb \)
The Challenge...

- Higgs Production is a low rate process at the Tevatron.
- Backgrounds are many orders of magnitude larger.
- Challenge: Separate Signal from Background
The Challenge...

Higgs Production is a low rate process at the Tevatron.

- Backgrounds are many orders of magnitude larger.

Challenge: Separate Signal from Background

Before Anything $S:B \sim 1:10^{11}$
Identification of High Pt Leptons

- Most final states produced by Higgs decay involve high-Pt leptons.
- CDF and D0 have efficient lepton triggers and high purity ID selection.
- Tau leptons are also starting to contribute.
Identification of B-jets

B-tagging

✦ ~ 50-70% efficient
✦ Dependent on $E_T$ and $\eta$ of jet.
✦ Mistag rates typically ~ 0.3 - 5%
✦ Loose tagging helpful in double tag situations
✦ D0 uses NN tagger based on 7 discriminating B-lifetime variables
✦ CDF uses secondary vertexing algorithm
✦ New tagging: Neural network using flavor separation
Using Advanced Algorithms

- Variety of methods: Artificial Neural Networks (ANN), Boosted Decision Trees (BDT), Matrix Element (ME)
- Example: ANN can be used to combine information from different kinematic variables: both Energy-based and Shape-based
- Improved discrimination and less sensitive to systematic effects
- Tested using already observed physics processes: identification of top in Lepton plus jets
Using Advanced Algorithms

- Variety of methods: Artificial Neural Networks (ANN), Boosted Decision Trees (BDT), Matrix Element (ME)
- Example: ANN can be used to combine information from different kinematic variables: both Energy-based and Shape-based
- Improved discrimination and less sensitive to systematic effects
- Tested using already observed physics processes: identification of top in Lepton plus jets

![Kinematic variables](image)

![Neural Network](image)

![Final discriminant](image)

CDF Preliminary (760 pb$^{-1}$)

- multijet: 78.0 ± 4.2 events
- Wjets: 1698.1 ± 49.7 events
- signal: 324.6 ± 31.6 events
ZH $\rightarrow \ell\ell b\bar{b}$ Channel

- Two High $P_T$ Leptons
- No (direct) Missing $E_T$
- 2 jets
  - Split up 1 and 2 b-tags

**Features:**

1. Small $\sigma \cdot BR$
2. Several tight constraints
   - i. $M_{\ell\ell} \equiv M_Z$
   - ii. $E_T$ → improve jet resol.
3. ~1 evt/fb

**Primary Backgrounds**

- $Zb\bar{b}$, $Zc\bar{c}$, $Zqq'$
- $t\bar{t}$
- $WW + jj$, $WZ$, $ZZ$
- $Z \rightarrow \tau\tau$
**ZH → ℓℓb̄b̄** Channel

- Two High $P_T$ Leptons
- No (direct) Missing $E_T$
- 2 jets
- Split up 1 and 2 b-tags

**Features:**

1. Small $\sigma \cdot BR$
2. Several tight constraints
   i. $M_{ll} \approx M_Z$
   ii. "$E_T$" → improve jet resol.
3. $\sim 1$ evt/fb$^{-1}$

**Primary Backgrounds**

- $Zb\bar{b}$, $Zc\bar{c}$, $Zqq'$
- $t\bar{t}$
- $WW + jj$, $WZ$, $ZZ$
- $Z \rightarrow \tau\tau$
ZH → ℓℓb¯b Channel

Lepton types: ee and μμ
b-Tagging: 1Tight tag
2Loose Tag

ANN

\[ M_{bb}, \ P_{T1}^{j}, \ P_{T2}^{j}, \ \Delta R_{ℓℓ}, \]

Inputs

\[ |\Delta η_{jj}|, \ |\Delta φ_{jj}|, \ \Delta R_{Z-j1}, \]

\[ |η_{Z}|, \ MET, \ ΣE_{T}^{i} \]

Tagging split into double tag and single Tag

2D ANN

\[ E_{T}, \ H_{T}, \ M_{jj}, \ Sph, \ η_{j2} \]

Inputs

\[ \Delta R_{j1,Z}, \ \Delta R_{j2,Z}, \ \Delta R_{j1,j2} \]
**Z H → ℓℓb̄b** Channel

Lepton types: ee and μμ

b-Tagging: 1 Tight tag

2 Loose Tag

ANN

\( M_{bb}, \ P_{T}^{j_1}, \ P_{T}^{j_2}, \ ΔR_{ℓℓ}, \)

Inputs

\( |Δ\eta_{jj}|, \ |Δϕ_{jj}|, \ ΔR_{Z-j_1}, \)

\( |η_Z|, \ MET, \ ΣE_T^{i} \)

Tagging split into double tag and single Tag

2D ANN

\( E_T, \ H_T, \ M_{jj}, \ Sph, \ η_{j_2} \)

Inputs

\( ΔR_{j_1,Z}, \ ΔR_{j_2,Z}, \ ΔR_{j_1,j_2} \)
Most Higgs-like Event

Run 196170 Event 6577

Background in this bin
60% Z+bb
11% tt
9% Z+cc
9% ZZ
5% Z+qq (light)

Dijet mass 119.7 GeV

Jet 2 37.1 GeV

MET 7.25 GeV

Dilepton mass 101 GeV

Jet 1 127 GeV

Muon 55.1 GeV

Muon 102 GeV

Higgs ~ 2 times tt

S:B ~ 1:4
$ZH \rightarrow \ell\ell b\bar{b}$

**Channel**

**Search for $ZH \rightarrow \ell^+\ell^- b\bar{b}$**

- **DØ Preliminary, $L=1.1 \text{ fb}^{-1}$**

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Lum</th>
<th>Obs/SM</th>
<th>Exp/SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>D0</td>
<td>1.1 fb$^{-1}$</td>
<td>17.8</td>
<td>20.4</td>
</tr>
<tr>
<td>CDF</td>
<td>1.0 fb$^{-1}$</td>
<td>16</td>
<td>16</td>
</tr>
</tbody>
</table>

$M_h = 115 \text{ GeV }/ c^2$
$Z H \rightarrow \nu \nu \bar{b} \bar{b}$

Channel

- No High $P_T$ Leptons
- Large Missing $E_T$
- 2 jets
  - Require 2 $b$-tags

Features:
1. Trigger is more challenging
2. Large QCD/Fake Bkg: Difficult to Simulate: use data
3. **Use tracks to help bkg identification.**
4. Large contribution (~35%) from WH
5. ~2-3 evts/fb$^{-1}$

Primary Backgrounds

- QCD Heavy Flavor, $t\bar{t}$, $W/Z + bb/c\bar{c}$,
- Single Top,
- $ZZ$, $WZ$, $WW$
$$Z H \rightarrow \nu\nu b\bar{b}$$ Channel

- No High $P_T$ Leptons
- Large Missing $E_T$
- 2 jets
- Require 2 b-tags

Features:
1. Trigger is more challenging
2. Large QCD/Fake Bkg: Difficult to Simulate: use data
3. Use tracks to help bkg identification.
4. Large contribution (~35%) from WH
5. ~2-3 evts/fb⁻¹

Primary Backgrounds
- QCD Heavy Flavor, $t\bar{t}$, $W/Z + b\bar{b}/c\bar{c}$, Single Top,
- $ZZ$, $WZ$, $WW$
**ZH \rightarrow \nu\nu b\bar{b}** Discriminants

Double b-tagging (loose + tight) required.

Boosted Decision Tree

Inputs: 24 variables

- double tight btag
- 1 tight + 1 loose btag

**ANN**

Inputs: $M_{bb}$, $MET$, $\Delta R_{j_1-j_2}$, $MET_{cal} \cdot MET_{trk}$, $Trk_{NN}$
**ZH → ννb̅b** Discriminants

Double b-tagging (loose + tight) required.

Boosted Decision Tree

Inputs: 24 variables

**ANN Inputs**

- $M_{bb}$, $MET$, $\Delta R_{j_1-j_2}$
- $MET_{cal} \cdot MET_{trk}$, $Trk_{NN}$

D0 preliminary (1.2 fb$^{-1}$)

- Data
- Top
- Z+b/c-jets
- Z-jets(l.f.)
- W+b/c-jets
- W-jets(l.f.)
- Diboson
- Multijet
- VH25 (115 GeV)

CDF Run II Preliminary (1.7 fb$^{-1}$)

- Top
- Z+hf
- Single Top
- WZ/WW
- ZZ
- Mistags
- QCD

Trk NN
\[ ZH \rightarrow \nu \nu b\bar{b} \text{ Limits} \]

### DØ Preliminary (2.1 fb\(^{-1}\))

- **ZH→ννbb DT, VH Signal**
- **Observed Limit**
- **Expected Limit**

### CDF Run II Preliminary (1.7 fb\(^{-1}\))

- **Met+Jets Search for ZH/WH**
- **Observed Limit**
- **Expected Limit ± 1σ**

### Limit Results

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Lum</th>
<th>Obs/SM</th>
<th>Exp/SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DØ</td>
<td>2.1 fb(^{-1})</td>
<td>7.5</td>
<td>8.4</td>
</tr>
<tr>
<td>CDF</td>
<td>1.7 fb(^{-1})</td>
<td>8.0</td>
<td>8.3</td>
</tr>
</tbody>
</table>

\[ M_h = 115 \text{ GeV} / c^2 \]
$WH \rightarrow \ell \nu b\bar{b}$ Channel

- High $P_T$ Lepton
- Missing $E_T$
- 2 jets: Split up 1 and 2 b-tags

**Features:**

1. Good Acceptance
2. Final state similar to single top prod.
3. ~2-3 evts/fb$^{-1}$

**Primary Backgrounds**

- $Wb\bar{b}$, $Wc\bar{c}$, $Wqq'$
- $t\bar{t}$
- Single top
- non-W QCD
- $WZ$, $WW$
- $Z \rightarrow \tau\tau$
$W H \rightarrow \ell \nu b \bar{b}$ Channel

- High $P_T$ Lepton
- Missing $E_T$
- 2 jets: Split up 1 and 2 b-tags

**Primary Backgrounds**

- $Wb\bar{b}$, $Wc\bar{c}$, $Wqq'$
- Single top $t\bar{t}$
- Non - $W$ QCD
- $WZ$, $WW$
- $Z \rightarrow \tau\tau$

**Features:**

1. Good Acceptance
2. Final state similar to single top prod.
3. $\sim 2-3$ evts/$fb^{-1}$
$WH \rightarrow \ell \nu b\bar{b}$ Discriminants

Lepton types: elec and muon
Two b-Tagging: 1 double tag
1 single Tag

ANN $P_T^{j1}, P_T^{j2}, \Delta R_{jj}, \Delta \phi_{jj},$

Inputs $P_T^{jj}, M_{jj}, P_T^{\ell-}MET$

Lepton types: Central and Forward
b-Tagging: 2 double tag
1 Single Tag using NN

ANN $M_{jj}, P_{T}^{imb}, P_{T}^{sys},$

Inputs $M_{\ell\nu j}^{min}, \Delta R_{\ell\nu}, E_T^{jets}$
**WH → ℓνbb** Discriminants

**DØ**

Lepton types: elec and muon

Two b-Tagging: 1 double tag

1 single Tag

**ANN**

\[ P_{T}^{j_1}, P_{T}^{j_2}, \Delta R_{jj}, \Delta \phi_{jj}, \]

Inputs

\[ P_{T}^{jj}, M_{jj}, P_{T}^{\ell-MET} \]

**CDF Run II Preliminary (1.9 fb⁻¹)**

Lepton types: Central and Forward

b-Tagging: 2 double tag

1 Single Tag using NN

**ANN**

\[ M_{jj}, P_{T}^{imb}, P_{T}^{sys}, \]

Inputs

\[ M_{\ell\nu j}^{min}, \Delta R_{\ell\nu}, E_{T}^{jets} \]

17
$WH \rightarrow \ell \nu b\bar{b}$ Limits

DØ Preliminary, $L=1.7$ fb$^{-1}$

WH $\rightarrow$ l $\nu$ $b\bar{b}$

95% CL Limit/SM

CDF II Preliminary

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Lum</th>
<th>Obs/SM</th>
<th>Exp/SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>DØ</td>
<td>1.7 fb$^{-1}$</td>
<td>10.9</td>
<td>8.9</td>
</tr>
<tr>
<td>CDF</td>
<td>1.9 fb$^{-1}$</td>
<td>8.2</td>
<td>7.3</td>
</tr>
</tbody>
</table>

$M_h = 115 \text{ GeV} / c^2$
Looking for WH events which fail standard lepton selection
- Use MET + 2jet trigger
- Only use track info: no CAL or Muon chamber info
- Increases acceptance by 25%!
Adding Acceptance to WH: ISOTRack

- Look for WH events which fail standard lepton selection
- Use MET + 2jet trigger
- Only use track info: no CAL or Muon chamber info
- Increases acceptance by 25%!
• Expected rate low (BR ~0.22% @ Mh=130 GeV)
• BUT, every little bit helps and nature could be different.

\[ \bar{p}p \rightarrow H \rightarrow \gamma\gamma \]

<table>
<thead>
<tr>
<th>Observed</th>
<th>13827</th>
<th>----</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z-&gt;ee</td>
<td>741+/-102</td>
<td>MC</td>
</tr>
<tr>
<td>jet jet</td>
<td>4779+/-1265</td>
<td>data</td>
</tr>
<tr>
<td>gamma jet</td>
<td>4677+/-1246</td>
<td>data</td>
</tr>
<tr>
<td>QCD gamma</td>
<td>3400+/-711</td>
<td>MC</td>
</tr>
</tbody>
</table>
Expected rate low (BR \sim 0.22\% @ M_h=130 \text{ GeV})

BUT, every little bit helps and nature could be different.
- Expected rate low (BR ~0.22% @ Mh=130 GeV)
- BUT, every little bit helps and nature could be different.
1. Require 1 hadronic tau and 1 opp sign Lepton (45%BR)
2. Uses lepton+track trigger
3. 1 and 3 prong taus
4. Two jets and Z veto

<table>
<thead>
<tr>
<th>Process</th>
<th>Evt (2fb⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WH</td>
<td>0.18</td>
</tr>
<tr>
<td>ZH</td>
<td>0.11</td>
</tr>
<tr>
<td>VBF</td>
<td>0.12</td>
</tr>
<tr>
<td>ggH</td>
<td>0.26</td>
</tr>
<tr>
<td>Total</td>
<td>0.67</td>
</tr>
<tr>
<td>Background</td>
<td>374</td>
</tr>
</tbody>
</table>
$H \rightarrow \tau\tau$ Plus 2 Jets

Minimum of 3 trained Networks:
NN(Signal vs $Z \rightarrow \tau\tau$)
NN(Signal vs $tt$)
NN(Signal vs QCD)
$H \rightarrow \tau\tau$ Plus 2 Jets

Minimum of 3 trained Networks:
- $\text{NN(Signal vs } Z \rightarrow \tau\tau)$
- $\text{NN(Signal vs tt)}$
- $\text{NN(Signal vs QCD)}$

CDF Run II Preliminary (L = 2.0 fb$^{-1}$)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed Limit</td>
<td></td>
<td></td>
<td>Standard Model (NLO)</td>
</tr>
<tr>
<td>Expected Limit</td>
<td></td>
<td></td>
<td>Standard Model (NLO)</td>
</tr>
<tr>
<td>Band</td>
<td></td>
<td></td>
<td>Standard Model (NLO)</td>
</tr>
</tbody>
</table>

CDF Run II Preliminary

KS prob = 68.4%
## Conclusion: Tevatron Combination

<table>
<thead>
<tr>
<th>Channel</th>
<th>CDF Limits: σxB/SM</th>
<th>DZero Limits σxB/SM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>obs (exp)</td>
<td>obs (exp)</td>
</tr>
<tr>
<td>$WH \rightarrow l\nu b\bar{b}$</td>
<td>8.2 (7.3)</td>
<td>10.9 (8.9)</td>
</tr>
<tr>
<td>$ZH \rightarrow l\ell b\bar{b}$</td>
<td>16 (16)</td>
<td>17.8 (20.4)</td>
</tr>
<tr>
<td>$ZH \rightarrow \nu\nu b\bar{b}$</td>
<td>8.0 (8.3)</td>
<td>7.5 (8.4)</td>
</tr>
<tr>
<td>$H \rightarrow \tau\tau$</td>
<td>30.5 (24.8)</td>
<td>-</td>
</tr>
<tr>
<td>adds 10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$pp \rightarrow H \rightarrow \gamma\gamma$</td>
<td>-</td>
<td>~50</td>
</tr>
<tr>
<td>Combined</td>
<td>4.95 (4.6)</td>
<td>6.4 (5.5)</td>
</tr>
<tr>
<td>Tevatron Combined</td>
<td><strong>3.7 (3.3)</strong></td>
<td></td>
</tr>
</tbody>
</table>
Conclusion: Tevatron Combination

Tevatron Run II Preliminary, L=1.0-2.4 fb⁻¹

LEP Limit

Tevatron Expected

Tevatron Observed

CDF Exp

±1σ

±2σ

DØ Exp

April 9, 2008
Conclusion: Tevatron Combination

Tevatron Run II Preliminary, L=1.0-2.4 fb⁻¹

LEP Limit

Tevatron Expected
Tevatron Observed
CDF Exp
±1σ
±2σ
DØ Exp

See Next Talk

April 9, 2008
Improvements in the Higgs analyses have been exceeded that expected from more data

- Analyses can add ideas from other channels
  - e.g. Use of flavor separation NN for single tags
- Combination of techniques within channels
  - e.g. Combine ME plus NN
- Some new ideas still out there? (WH Isotrack added 25%!)
Improvements in the Higgs analyses have been exceeded that expected from more data

- Analyses can add ideas from other channels
  - e.g. Use of flavor separation NN for single tags
- Combination of techniques within channels
  - e.g. Combine ME plus NN
- Some new ideas still out there? (WH Isotrack added 25%!)
Improvements in the Higgs analyses have been exceeded that expected from more data

- Analyses can add ideas from other channels
  - e.g. Use of flavor separation NN for single tags
- Combination of techniques within channels
  - e.g. Combine ME plus NN
- Some new ideas still out there? (WH Isotrack added 25%!)