

## DØ Abstracts for Summer 2011 Conferences

### b-physics

**Measurement of the production fraction times branching fraction  $f(b \rightarrow \Lambda_b) \cdot \mathcal{B}(\Lambda_b \rightarrow J/\psi\Lambda)$**

**DPF: abstract 196 - Heavy Flavor Physics (bottom, charm, tau) session**

**EPS: abstract 131 - Flavour Physics and Fundamental Symmetries session**

The  $\Lambda_b(udb)$  baryon is observed in the decay  $\Lambda_b \rightarrow J/\psi\Lambda$  using  $6.1 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions collected with the D0 detector at  $\sqrt{s} = 1.96 \text{ TeV}$ . The production fraction multiplied by the branching fraction for this decay relative to that for the decay  $B^0 \rightarrow J/\psi K_s^0$  is measured to be  $0.345 \pm 0.034 \text{ (stat.)} \pm 0.033 \text{ (syst.)} \pm 0.003 \text{ (PDG)}$ . Using the world average value of  $f(b \rightarrow B^0) \cdot \mathcal{B}(B^0 \rightarrow J/\psi K_s^0) = (1.74 \pm 0.08) \times 10^{-5}$ , we obtain  $f(b \rightarrow \Lambda_b) \cdot \mathcal{B}(\Lambda_b \rightarrow J/\psi\Lambda) = (6.01 \pm 0.60 \text{ (stat.)} \pm 0.58 \text{ (syst.)} \pm 0.28 \text{ (PDG)}) \times 10^{-5}$ . This measurement represents an improvement in precision by about a factor of three with respect to the current world average.

**Measurement of the relative branching fraction of  $B_s^0 \rightarrow J/\psi f_0(980)$ ,  $f_0(980) \rightarrow \pi^+\pi^-$  to  $B_s^0 \rightarrow J/\psi\phi$ ,  $\phi \rightarrow K^+K^-$**

**DPF: abstract 197 - Heavy Flavor Physics (bottom, charm, tau) session**

**EPS: abstract 132 - Flavour Physics and Fundamental Symmetries session**

A measurement of the relative branching fraction of  $B_s^0 \rightarrow J/\psi f_0(980)$ ,  $f_0(980) \rightarrow \pi^+\pi^-$  to  $B_s^0 \rightarrow J/\psi\phi$ ,  $\phi \rightarrow K^+K^-$  is presented. The decay mode  $B_s^0 \rightarrow J/\psi f_0(980)$  is an interesting mode since it is a CP eigenstate and allows the measurement of the CP-violating phase  $\phi_s$ . Using approximately  $8 \text{ fb}^{-1}$  of data recorded with the D0 detector at the Fermilab Tevatron Collider, a relative branching fraction of  $0.210 \pm 0.032 \text{ (stat)} \pm 0.036 \text{ (syst)}$  is found.

**Anomalous like-sign dimuon charge asymmetry at D0**

**DPF: abstract 198 - CP Violation session**

**EPS: abstract 133 - Flavour Physics and Fundamental Symmetries session**

**SUSY: abstract 13 - Intensity frontier: experiment session**

We present an improved measurement of the charge asymmetry  $A$  of like-sign dimuon events in  $9 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions recorded with the D0 detector at a center-of-mass energy  $\sqrt{s} = 1.96 \text{ TeV}$  at the Fermilab Tevatron collider. From  $A$ , we extract the like-sign dimuon charge asymmetry in semileptonic  $b$ -hadron decays. We also study the dependence of charge asymmetry on muon impact parameter. Additional constraints on the CP violation in the  $B$  meson sector are also derived from a measurement of the flavor-specific semileptonic asymmetry in the  $B_d^0 \rightarrow \mu D + X$  channel.

**Measurement of CP violating parameters in the decay  $B_s^0 \rightarrow J/\psi\phi$**

**DPF: abstract 199 - CP Violation session**

**EPS: abstract 134 - Flavour Physics and Fundamental Symmetries session**

**SUSY: abstract 14 - Intensity frontier: experiment session**

We report a new measurement of the CP-violating phase  $\phi_s$ , of the decay width difference for the two mass eigenstates  $\Delta\Gamma_s$ , of the mean  $B_s^0$  lifetime  $\bar{\tau}_s$ , and of magnitudes of the decay amplitudes,

from the flavor-tagged decay  $B_s^0 \rightarrow J/\psi\phi$ . For the first time, we consider possible contributions from the decay  $B_s^0 \rightarrow J/\psi K^+ K^-$ , with the  $K^+ K^-$  in a  $s$  wave. This measurement is based on  $8 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions recorded with the D0 detector at a center-of-mass energy  $\sqrt{s} = 1.96 \text{ TeV}$  at the Fermilab Tevatron collider.

**Precise measurement of the  $B_s^0$  lifetime**

**DPF: abstract 200 - Heavy Flavor Physics (bottom, charm, tau) session**

**EPS: abstract 135 - Flavour Physics and Fundamental Symmetries session**

We report a new measurement of the lifetime of the  $B_s^0$  meson obtained from a sample of semileptonic  $B_s^0 \rightarrow D_s^+ \mu X$  decays. This analysis uses a data set corresponding to an integrated luminosity of  $8.9 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions recorded with the D0 detector at a center-of-mass energy  $\sqrt{s} = 1.96 \text{ TeV}$  at the Fermilab Tevatron collider. This is the most precise measurement of the  $B_s^0$  reported to date.

**Combination D0 constraints on the CP violating phase  $\phi_s$**

**DPF: abstract 201 - CP Violation session**

**EPS: abstract 136 - Flavour Physics and Fundamental Symmetries session**

**SUSY: abstract 15 - Intensity frontier: experiment session**

We present a combination of the D0 measurements of the  $B_s^0$  width difference,  $\Delta\Gamma_s$ , and of the  $CP$ -violating phase,  $\phi_s$ . We include in this combination the measurement of the  $B_s^0$  mixing parameters obtained from flavor-tagged  $B_s^0 \rightarrow J/\psi\phi$  decays, the search for  $CP$  violation in semileptonic  $B_s^0 \rightarrow \mu^+ D_s^- X$  decays, the measurement of the branching ratio for the decay  $B_s^0 \rightarrow D_s^{(*)+} D_s^{(*)-}$  and the measurement of the like-sign asymmetry for semileptonic  $b$  decays.

**Electroweak**

**Measurement of  $\sin^2 \theta_{\text{eff}}^\ell$  and  $Z$ -light quark couplings using the forward-backward charge asymmetry in  $p\bar{p} \rightarrow Z/\gamma^* \rightarrow e^+ e^-$  events with  $\mathcal{L} = 5.0 \text{ fb}^{-1}$  at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 204 - Electroweak physics session**

**EPS: abstract 137 - Top and Electroweak physics session**

We measure the mass dependence of the forward-backward charge asymmetry in  $157,553 p\bar{p} \rightarrow Z/\gamma^* \rightarrow e^+ e^-$  interactions, corresponding to  $5.0 \text{ fb}^{-1}$  of integrated luminosity collected by the D0 experiment at the Fermilab Tevatron Collider at  $\sqrt{s} = 1.96 \text{ TeV}$ . The effective weak mixing angle ( $\theta_{\text{eff}}^\ell$ ) from this process involving predominantly the first generation of quarks is extracted as  $\sin^2 \theta_{\text{eff}}^\ell = 0.2309 \pm 0.0008 \text{ (stat.)} \pm 0.0006 \text{ (syst.)}$ . We also present the most precise direct measurement of the vector and axial-vector couplings of  $u$  and  $d$  quarks to the  $Z$  boson.

**Measurement of the  $ZZ$  production cross section in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 205 - Electroweak physics session**

**EPS: abstract 138 - Top and Electroweak physics session**

We present a new measurement of the production cross section  $\sigma(p\bar{p} \rightarrow ZZ)$  at a center-of-mass energy  $\sqrt{s} = 1.96 \text{ TeV}$ , obtained from the analysis of the four charged lepton final state  $\ell^+ \ell^- \ell'^+ \ell'^-$

( $\ell, \ell' = e$  or  $\mu$ ). We observe ten candidate events with an expected background of  $0.37 \pm 0.13$  events. The measured cross section  $\sigma(p\bar{p} \rightarrow ZZ) = 1.26_{-0.37}^{+0.47}$  (stat)  $\pm 0.14$  (syst) pb is in agreement with NLO QCD predictions. This result is combined with a previous result from the  $ZZ \rightarrow \ell^+ \ell^- \nu \bar{\nu}$  channel resulting in a combined cross section of  $\sigma(p\bar{p} \rightarrow ZZ) = 1.40_{-0.37}^{+0.43}$  (stat)  $\pm 0.14$  (syst) pb.

**Precise study of the  $Z/\gamma^*$  boson transverse momentum distribution in  $p\bar{p}$  collisions using a novel technique**

**DPF: abstract 206 - Electroweak physics session**

**EPS: abstract 139 - Top and Electroweak physics session**

Using  $7.3 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions collected by the D0 detector at the Fermilab Tevatron, we measure the distribution of the variable  $\phi_\eta^*$ , which probes the same physical effects as the  $Z/\gamma^*$  boson transverse momentum, but is less susceptible to the effects of experimental resolution and efficiency. A QCD prediction is found to describe the general features of the  $\phi_\eta^*$  distribution, but is unable to describe its detailed shape or dependence on boson rapidity. A prediction that includes a broadening of transverse momentum for small values of the parton momentum fraction is strongly disfavored.

**Measurement of the charge asymmetry in  $W + X \rightarrow \mu\nu + X$  events with the D0 detector**

**DPF: abstract 207 - Electroweak physics session**

**EPS: abstract 140 - Top and Electroweak physics session**

We present a measurement of the muon charge asymmetry from  $W \rightarrow \mu\nu$  decays using  $7.3 \text{ fb}^{-1}$  of data collected with D0 detector from July 2002 to July 2010. The measurement for muons with pseudorapidity  $|\eta| < 2$  probes the charge asymmetry in the range of momentum fraction  $x$  from 0.005 to 0.3. The charge asymmetry is compared with the theory prediction generated from POWHEG using the CT10W and MSTW2008NLO PDFs. We also measure the charge asymmetry for muons in different transverse momentum ranges. This is the most precise lepton charge asymmetry measurement performed so far at the Tevatron.

**Measurement of the production cross sections  $p\bar{p} \rightarrow WZ$  and  $p\bar{p} \rightarrow ZZ$  in final states with multiple leptons and missing energy with the D0 detector**

**DPF: abstract 208 - Electroweak physics session**

**EPS: abstract 142 - Top and Electroweak physics session**

Using  $8.6 \text{ fb}^{-1}$  of  $p\bar{p}$  collision we obtain new measurements of the production cross sections for the production of  $WZ$  and  $ZZ$  boson pairs at  $\sqrt{s} = 1.96 \text{ TeV}$ . We consider the final states with 2 or 3 leptons and a momentum imbalance caused by the unobserved neutrino(s). The distributions of the final state products are used to investigate possible anomalous couplings in triple gauge boson vertices.

**$W$  boson mass and width measurements at D0**

**DPF: abstract 209 - Electroweak physics session**

**EPS: abstract 143 - Top and Electroweak physics session**

We present a precise measurement of W boson mass measurement in electron decay channel using data collected by the D0 detector at the Fermilab Tevatron collider. A binned likelihood fit method is used to extract the mass information from the transverse mass, the electron transverse momentum and missing transverse energy distributions. We also present a precise direct measurement of W boson width using the events with large transverse mass. The W mass result can be used to put stringent indirect limits on the SM Higgs boson mass.

**$W\gamma$  production at D0 and limits on triple gauge couplings**

**DPF: abstract 210 - Electroweak physics session**

**EPS: abstract 144 - Top and Electroweak physics session**

We describe the cross section measurement for  $p\bar{p} \rightarrow W\gamma + X$  and a search for  $WW\gamma$  anomalous couplings using data from the D0 experiment at the Fermilab Tevatron Collider corresponding to an integrated luminosity of  $4.2 \text{ fb}^{-1}$ . The measured cross section is in agreement with the standard model predictions and limits are set on possible anomalous triple gauge couplings. The charge-signed rapidity difference between the lepton from the W decay and the photon is used to observe the radiation-amplitude zero in the  $W\gamma$  system.

**Higgs**

**Search for associated production of W and Higgs bosons in  $\ell\nu b\bar{b}$  final states in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 263 - Higgs physics session**

**EPS: abstract 107 - Higgs and New Physics session**

**SUSY: abstract 17 - Higgs: experiment session**

We present a search for a low mass Standard Model Higgs boson produced in association with a W boson at a center-of-mass energy of  $\sqrt{s} = 1.96 \text{ TeV}$  with the D0 detector at the Fermilab Tevatron collider. The search is performed in events containing one lepton (electron, muon or tau), an imbalance in the transverse energy, and one or two  $b$ -tagged jets with up to  $8.5 \text{ fb}^{-1}$  of data. This channel is one of the most powerful in the search for a low mass Higgs at the Tevatron. Inclusion of the full data set and recent sensitivity improvements will be discussed.

**Search for associated production of Z and Higgs bosons in  $\nu\nu b\bar{b}$  final states in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 264 - Higgs physics session**

**EPS: abstract 108 - Higgs and New Physics session**

**SUSY: abstract 18 - Higgs: experiment session**

We present a search for a low mass Standard Model Higgs boson produced in association with a Z boson decaying invisibly into a pair of neutrinos at a center-of-mass energy of  $\sqrt{s} = 1.96 \text{ TeV}$  with the D0 detector at the Fermilab Tevatron collider. The final state is characterised by the presence of two  $b$ -tagged jets from the Higgs boson decay and a large imbalance in the transverse energy of the event. This channel is very powerful because of the large signal yields, but is experimentally challenging due to the large QCD backgrounds and absence of visible leptons in the final state.

Inclusion of the full data set, up to  $8.5 \text{ fb}^{-1}$ , and recent improvements to the sensitivity will be discussed.

**Search for associated production of Z and Higgs bosons in  $\ell b b$  final states in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 265 - Higgs physics session**

**EPS: abstract 109 - Higgs and New Physics session**

**SUSY: abstract 19 - Higgs: experiment session**

We present a search for a low mass Standard Model Higgs boson produced in association with a Z boson decaying to charged leptons at a center-of-mass energy of  $\sqrt{s} = 1.96 \text{ TeV}$  with the D0 detector at the Fermilab Tevatron collider. The search is performed in events containing two opposite-sign leptons (electron or muon) and one or two  $b$ -tagged jets with up to  $8.5 \text{ fb}^{-1}$  of data. Inclusion of the full data set and recent sensitivity improvements will be discussed.

**Search for the Standard Model Higgs boson in the  $\tau\tau q\bar{q}$  final state in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 266 - Higgs physics session**

**EPS: abstract 110 - Higgs and New Physics session**

**SUSY: abstract 20 - Higgs: experiment session**

We present a search for a Standard Model Higgs boson in events with a final state containing two taus and two jets, in which one tau decays to either a muon or an electron and the other tau decays to hadrons at a center-of-mass energy of  $\sqrt{s} = 1.96 \text{ TeV}$  with the D0 detector at the Fermilab Tevatron collider. The final states are sensitive to a combination of associated production of a  $W/Z$  boson with a Higgs boson, vector boson fusion and gluon-gluon fusion production processes. Inclusion of data up to  $7.3 \text{ fb}^{-1}$ , and recent improvements to the sensitivity will be discussed.

**Search for the Higgs boson in the  $WW^{(*)} \rightarrow \ell\ell'$  decays at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 267 - Higgs physics session**

**EPS: abstract 111 - Higgs and New Physics session**

**SUSY: abstract 21 - Higgs: experiment session**

We present a search for the Standard Model Higgs boson produced via the  $H \rightarrow WW^{(*)} \rightarrow \ell^+\ell'^-$  ( $\ell, \ell' = e, \mu, \tau$ ) process at a center-of-mass energy of  $\sqrt{s} = 1.96 \text{ TeV}$  with the D0 detector at the Fermilab Tevatron collider. A Higgs particle with a mass greater than  $140 \text{ GeV}$  primarily decays into a pair of  $W$ -bosons and the leptonic decay channels of the  $W$  provide a clear signature. This channel provides the greatest sensitivity to the Higgs boson at the Tevatron, and sensitivity to the Standard Model Higgs is expected with this data set. Inclusion of the full data set, approximately  $8.5 \text{ fb}^{-1}$ , and recent improvements to the sensitivity will be discussed.

**Search for the Higgs boson in the  $VH \rightarrow VWW^{(*)} \rightarrow \ell^\pm\ell'^\pm + X$  decays in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 268 - Higgs physics session**

**EPS: abstract 112 - Higgs and New Physics session**

**SUSY: abstract 22 - Higgs: experiment session**

We present a search for the Standard Model Higgs boson produced via the  $VH \rightarrow VWW^{(*)} \rightarrow \ell^\pm \nu \ell'^\pm \nu' + X$  process at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV with the D0 detector at the Fermilab Tevatron collider. We require two like-sign leptons (electrons or muons). This channel provides significant sensitivity in the intermediate Higgs boson mass range. Inclusion of data up to  $7.3 \text{ fb}^{-1}$ , and recent improvements to the sensitivity will be discussed.

**Search for the Higgs boson in the  $VH \rightarrow VWW^* \rightarrow \ell \ell' \ell'' + X$  decays in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 269 - Higgs physics session**

**EPS: abstract 113 - Higgs and New Physics session**

**SUSY: abstract 23 - Higgs: experiment session**

We present a search for the Standard Model Higgs boson produced via the  $VH \rightarrow VWW^{(*)} \rightarrow \ell \ell' \ell'' + X$  process at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV with the D0 detector at the Fermilab Tevatron collider. We require three identified leptons (electrons or muons). This channel provides significant sensitivity in the intermediate Higgs boson mass range. Inclusion of data up to  $7.3 \text{ fb}^{-1}$ , and recent improvements to the sensitivity will be discussed.

**Search for the Higgs boson in the  $H \rightarrow \gamma\gamma$  decays in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 270 - Higgs physics session**

**EPS: abstract 114 - Higgs and New Physics session**

**SUSY: abstract 24 - Higgs: experiment session**

We present a search for Higgs bosons decaying to the di-photon final state using up to  $8.5 \text{ fb}^{-1}$  of data at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV with the D0 detector at the Fermilab Tevatron collider. Both gluon fusion and associated production processes are exploited. Whilst the branching ratio to the diphoton final state is small in the Standard Model, this channel contributes appreciably to the overall Higgs sensitivity at Tevatron. In parallel, the limit is interpreted in fermiophobic models where the diphoton branching ratio is considerably larger. This decay channel will be of major importance in the light mass Standard Model Higgs search at the LHC.

**Search for the Higgs boson in semileptonic  $WW^{(*)}$  decays in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 271 - Higgs physics session**

**EPS: abstract 115 - Higgs and New Physics session**

**SUSY: abstract 25 - Higgs: experiment session**

We present a search for the Standard Model Higgs boson produced via the  $H \rightarrow WW^{(*)} \rightarrow \ell \nu jj$  process at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV using up to  $8.5 \text{ fb}^{-1}$  of data collected with the D0 detector at the Fermilab Tevatron collider. We search in events with one lepton (electron or muon), two jets and missing transverse energy. A Higgs particle with a mass greater than 140 GeV primarily decays into a pair of  $W$ -bosons. Whilst the di-lepton channels provide a clean signature, the semi-leptonic decay mode has a significantly larger cross section times branching ratio. While

this channel presents the possibility of directly reconstructing the Higgs mass, the difficulty resides in overcoming the very large  $W$ +jets background, and the procedures developed to achieve this will be discussed.

**Search for the Higgs boson in semileptonic  $ZZ^{(*)} \rightarrow \ell^+\ell^-jj$  final state in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 272 - Higgs physics session**

**EPS: abstract 116 - Higgs and New Physics session**

**SUSY: abstract 26 - Higgs: experiment session**

We present a search for the Standard Model Higgs boson produced via the  $H \rightarrow ZZ^{(*)}$  process at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV using up to  $8.5 \text{ fb}^{-1}$  of data collected with the D0 detector at the Fermilab Tevatron collider. We search in events with two charged leptons (electron or muon) and two jets. While this channel presents the possibility of directly reconstructing the Higgs mass, the difficulty resides in overcoming the very large  $Z$ +jets background, and the procedures developed to achieve this will be discussed.

**Combined upper limit on Standard Model Higgs boson production in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV at D0**

**DPF: abstract 273 - Higgs physics session**

**EPS: abstract 117 - Higgs and New Physics session**

**SUSY: abstract 27 - Higgs: experiment session**

We present the combination of the searches for the Standard Model Higgs boson at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV, using up to  $8.5 \text{ fb}^{-1}$  of data collected with the D0 detector at the Fermilab Tevatron collider. The major contributing processes include associated production ( $WH \rightarrow \ell\nu bb$ ,  $ZH \rightarrow \nu\nu bb$ ,  $ZH \rightarrow \ell\ell bb$ , and  $WH \rightarrow WWW^{(*)}$ ) and gluon fusion ( $gg \rightarrow H \rightarrow WW^{(*)}$ ). The significant improvements across the full mass range resulting from the larger data sets, improved analyses and inclusion of additional channels are discussed. The combination of all channels results in significantly improved sensitivity across the 100-200 GeV mass range, and in particular around 160 GeV.

**Measurement of diboson production in lepton plus jets decays in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 274 - Higgs physics session**

**EPS: abstract 118 - Higgs and New Physics session**

**SUSY: abstract 28 - Higgs: experiment session**

We present a measurement of the cross section for the simultaneous production of two vector bosons ( $WW$ ,  $WZ$ ,  $ZZ$ ) in lepton plus jets decays at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV using up to  $5.4 \text{ fb}^{-1}$  of data collected with the D0 detector. This final state is a direct analog to SM Higgs searches in final states of leptons plus bottom quark pairs, and thus provides a crucial validation benchmark of the Higgs boson signal isolation techniques involved.

**Measurement of  $WZ/ZZ$  ( $Z \rightarrow b\bar{b}$ ) production cross section in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 275 - Higgs physics session**

**EPS: abstract 119 - Higgs and New Physics session**

**SUSY: abstract 29 - Higgs: experiment session**

We present a measurement of the cross section for the simultaneous production of two vector bosons ( $WZ, ZZ$ ), where one of the bosons decays leptonically ( $W \rightarrow \ell\nu$ ,  $Z \rightarrow \ell^+\ell^-$  or  $Z \rightarrow \nu\bar{\nu}$ ) and the other  $Z$  boson decays to  $b\bar{b}$ . The measurement uses up to  $8.5 \text{ fb}^{-1}$  of data collected with the D0 detector in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV, and combines the three leptonic decay modes mentioned above. This final state is a direct analog to SM Higgs searches in final states of leptons plus bottom quark pairs, and thus provides a crucial validation benchmark of the Higgs boson signal isolation techniques involved.

**Study of the dijet invariant mass distribution in  $W + 2$  jet candidate events in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 276 - Higgs physics session**

**EPS: abstract 120 - Higgs and New Physics session**

**SUSY: abstract 30 - Higgs: experiment session**

We present a study of the dijet invariant mass spectrum in events with at least two jets produced in association with a  $W$  boson, using data collected with the D0 detector which correspond to an integrated luminosity of  $4.3 \text{ fb}^{-1}$ . We perform a detailed comparison of the observed distribution with the background prediction, taking into account systematic uncertainties, to check the presence of an excess in the 120-160 GeV region recently claimed by the CDF Collaboration.

**Search for neutral Supersymmetric Higgs bosons in  $bbb(b)$  final states in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 277 - Higgs physics session**

**EPS: abstract 121 - Higgs and New Physics session**

**SUSY: abstract 31 - Higgs: experiment session**

We present a search for Higgs bosons in the  $bh(\rightarrow b\bar{b})$  and  $bbh(\rightarrow b\bar{b})$  channels at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV using up to  $8.5 \text{ fb}^{-1}$  of data collected with the D0 detector. In many Supersymmetric models the cross-section for production of neutral Higgs bosons in association with bottom quarks is greatly enhanced compared to the Standard Model, and over much of the parameter space the dominant decay process is  $h \rightarrow b\bar{b}$ . We search for an excess of events above the multijet background in events with 3 and 4  $b$ -jets. Understanding the multijet background in this channel is particularly challenging. The treatment of the background, the multivariate techniques used to improve the sensitivity and the limit setting procedure are discussed.

**Search for neutral Supersymmetric Higgs bosons in di- $\tau$  final states in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 278 - Higgs physics session**

**EPS: abstract 122 - Higgs and New Physics session**

**SUSY: abstract 32 - Higgs: experiment session**

We present a search for Higgs bosons in the di-tau modes at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV using up to  $5.4 \text{ fb}^{-1}$  of data collected with the D0 detector at the Fermilab Tevatron collider. In Supersymmetric models Higgs boson production cross section can be significantly enhanced compared to the Standard Model. In such models, the Higgs boson has a significant branching ratio to  $\tau$  leptons at all masses, and the gluon fusion production process can be exploited directly. The di- $\tau$  channels complement the  $hb$  associated production modes through reduced dependence on the details of the Supersymmetric model under test.

**Search for neutral Supersymmetric Higgs bosons in  $b\tau\tau$  final states in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 279 - Higgs physics session**

**EPS: abstract 123 - Higgs and New Physics session**

**SUSY: abstract 33 - Higgs: experiment session**

We present a search for Higgs bosons produced via the associated  $p\bar{p} \rightarrow h + b \rightarrow \tau^+\tau^-b$  process at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV using up to  $7.3 \text{ fb}^{-1}$  of data collected with the D0 detector at the Fermilab Tevatron collider. In Supersymmetric models Higgs boson production cross section can be significantly enhanced compared to the Standard Model; additionally the Higgs boson has a significant branching ratio to  $\tau$  leptons at all masses. This hybrid “ $b - \tau$ ” channel complements the di- $\tau$  search channel, in particular providing sensitivity around the  $Z$  mass.

**Combined upper limits on MSSM Higgs boson production with up to  $8.5 \text{ fb}^{-1}$  of data at D0**

**DPF: abstract 280 - Higgs physics session**

**EPS: abstract 124 - Higgs and New Physics session**

**SUSY: abstract 34 - Higgs: experiment session**

We present the combination of the searches for neutral Supersymmetric Higgs bosons at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV, using up to  $8.5 \text{ fb}^{-1}$  of data collected with the D0 detector at the Fermilab Tevatron collider. The searches considered cover the main production and decay mechanisms for Higgs bosons in these models:  $gg, bb \rightarrow h \rightarrow \tau^+\tau^-$ ,  $hb(b) \rightarrow b\bar{b}b(b)$  and  $hb(b) \rightarrow \tau^+\tau^-b(b)$ . The resulting combination is interpreted in the context of different scenarios within the Minimal Supersymmetric Standard Model.

**Search for doubly charged Higgs boson production in  $H^{\pm\pm} \rightarrow \tau\tau, \mu\mu, \mu\tau$  in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 281 - Higgs physics session**

**EPS: abstract 125 - Higgs and New Physics session**

**SUSY: abstract 35 - Higgs: experiment session**

We present a search for pair production of doubly charged Higgs boson in the processes  $q\bar{q} \rightarrow H^{++}H^{--}$  decaying through  $H^{\pm\pm} \rightarrow \tau\tau, \mu\mu, \mu\tau$ . The search is performed in  $p\bar{p}$  collisions at a centre of mass energy of 1.96 TeV using an integrated luminosity of  $7 \text{ fb}^{-1}$  collected by the D0 experiment at the Fermilab Tevatron Collider. This represents the first search for pair production

of doubly-charged Higgs bosons decaying into tau leptons at a hadron collider.

**Combined CDF and D0 upper limits on Standard Model Higgs boson production at the Tevatron in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 282 - Higgs physics session**

**EPS: abstract 126 - Higgs and New Physics session**

**SUSY: abstract 57 - Higgs: experiment session**

We present the combined results from the CDF and D0 Collaborations on direct searches for a standard model Higgs boson in  $p\bar{p}$  collisions at the Fermilab Tevatron at  $\sqrt{s} = 1.96$  TeV. The major contributing processes include associated production ( $WH \rightarrow \ell\nu bb$ ,  $ZH \rightarrow \nu\nu bb$ ,  $ZH \rightarrow \ell\ell bb$ , and  $WH \rightarrow WWW^{(*)}$ ) and gluon fusion ( $gg \rightarrow H \rightarrow WW^{(*)}$ ). Compared to the previous Tevatron Higgs search combination more data have been added and some previously used channels have been reanalyzed to gain sensitivity. The combination of all channels results in significantly improved sensitivity across the 100-200 GeV mass range, in particular around 160 GeV.

**Combined CDF and D0 upper limit on Standard Model  $H \rightarrow \gamma\gamma$  decays in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 283 - Higgs physics session**

**EPS: abstract 127 - Higgs and New Physics session**

**SUSY: abstract 58 - Higgs: experiment session**

We present combined results on the search for the Standard Model Higgs boson decaying to the di-photon final state using up to  $8.5 \text{ fb}^{-1}$  of data at a center-of-mass energy of  $\sqrt{s} = 1.96$  TeV collected with the CDF and D0 detectors at the Fermilab Tevatron collider. Both gluon fusion and associated production processes are exploited. Whilst the branching ratio to the di-photon final state is small in the Standard Model, this channel contributes appreciably to the overall Higgs sensitivity at the Tevatron. This decay channel will be of major importance in the light mass Standard Model Higgs search at the LHC.

**Combined CDF and D0 upper limit on  $gg \rightarrow H \rightarrow W^+W^-$ ,  $ZZ$  and constraints on the Higgs boson mass in fourth generation models**

**DPF: abstract 284 - Higgs physics session**

**EPS: abstract 128 - Higgs and New Physics session**

**SUSY: abstract 59 - Higgs: experiment session**

We present the combined results from CDF and D0 on direct searches for a standard model Higgs boson in the process  $gg \rightarrow H \rightarrow W^+W^-$ ,  $ZZ$  in  $p\bar{p}$  collisions at the Fermilab Tevatron at  $\sqrt{s} = 1.96$  TeV. We derive limits on the Higgs Boson mass assuming the presence of a sequential generation of fermions with large masses, which results in a significant enhancement of the gluon fusion production cross section relative to the Standard Model prediction.

**Combined CDF and D0 upper limit on MSSM Higgs boson production in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 285 - Higgs physics session**

**EPS: abstract 129 - Higgs and New Physics session**

**SUSY: abstract 60 - Higgs: experiment session**

We present combined results on the search for a neutral Supersymmetric Higgs bosons with data collected at the CDF and D0 experiments. Data were collected in  $p\bar{p}$  collisions at a centre of mass energy of 1.96 TeV during Run II of the Tevatron. The searches considered cover the main production and decay mechanisms for Higgs bosons in these models:  $gg, bb \rightarrow h \rightarrow \tau^+\tau^-$ ,  $hb(b) \rightarrow b\bar{b}b(b)$  and  $hb(b) \rightarrow \tau^+\tau^-b(b)$ . The resulting combination is interpreted in the context of different scenarios within the Minimal Supersymmetric Standard Model.

**Combined CDF and D0 upper limit on Fermiophobic Higgs boson production in in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 286 - Higgs physics session**

**EPS: abstract 130 - Higgs and New Physics session**

**SUSY: abstract 61 - Higgs: experiment session**

We present combined results on the search for a Fermiophobic Higgs boson with data collected at the CDF and D0 experiment. Data were collected in  $p\bar{p}$  collisions at a centre of mass energy of 1.96 TeV during Run II of the Tevatron. The searches considered cover the main production and decay mechanisms in this model: associated production ( $VH$ ,  $V = W, Z$ ) and vector-boson fusion ( $VV \rightarrow H$ ,  $V = W, Z$ ), with  $H \rightarrow \gamma\gamma, WW$ . This combination significantly improves upon previous results from the combination of searches at LEP experiments.

## New Phenomena

**Search for resonant  $WW$  and  $WZ$  production in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 248 - Beyond the Standard Model session**

**EPS: abstract 429 - Higgs and New Physics session**

**SUSY: abstract 44 - Alternatives to SUSY: experiment session**

We search for resonant  $WW$  or  $WZ$  production using up to  $5.4 \text{ fb}^{-1}$  of integrated luminosity collected by the D0 experiment in Run II of the Fermilab Tevatron Collider. The data are consistent with the standard model background expectation, and we set limits on a resonance mass using the sequential standard model (SSM)  $W'$  boson and the Randall-Sundrum model graviton  $G$  as benchmarks. We exclude an SSM  $W'$  boson in the mass range 180 – 690 GeV and a Randall-Sundrum graviton in the range 300 – 754 GeV at 95% CL.

**Search for single vector-like quarks in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 249 - Beyond the Standard Model session**

**EPS: abstract 430 - Higgs and New Physics session**

**SUSY: abstract 45 - Alternatives to SUSY: experiment session**

We present a search for hypothetical vector-like quarks in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV. The data were collected by the D0 detector at the Fermilab Tevatron Collider and correspond to an integrated luminosity of  $5.4 \text{ fb}^{-1}$ . We select events with a final state composed of a  $W$  or  $Z$  boson and a jet consistent with a heavy object decay. We observe no significant excess in comparison to the

background prediction and set limits on production cross sections for vector-like quarks decaying to  $W$ +jet and  $Z$ +jet. These are the most stringent limits to date for electroweak single vector-like quark production at hadron colliders.

**Search for pair production of the scalar top quark in the  $e + \mu$  and  $\mu + \tau$  final states**

**DPF: abstract 250 - Beyond the Standard Model session**

**EPS: abstract 431 - Higgs and New Physics session**

**SUSY: abstract 56 - SUSY: experiment session**

We report the result of a search for the pair production of the lightest supersymmetric partner of the top quark ( $\tilde{t}_1$ ) in  $p\bar{p}$  collisions at a center-of-mass energy of 1.96 TeV at the Fermilab Tevatron collider corresponding to an integrated luminosity of  $5.4 \text{ fb}^{-1}$ . The scalar top quarks are assumed to decay into a  $b$  quark, a charged lepton, and a scalar neutrino ( $\tilde{\nu}$ ), and the search is performed in the  $e + \mu$  and  $\mu + \tau$  final states. No significant excess of events above the standard model prediction is detected, and improved exclusion limits at the 95% C.L. are set in the  $(M_{\tilde{t}_1}, M_{\tilde{\nu}})$  mass plane.

**Search for diphoton events with large missing transverse energy in  $6.3 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 251 - Beyond the Standard Model session**

**EPS: abstract 432 - Higgs and New Physics session**

**SUSY: abstract 55 - SUSY: experiment session**

We report a search for diphoton events with large missing transverse energy produced in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$ . The data were collected with the D0 detector at the Fermilab Tevatron Collider, and correspond to  $6.3 \text{ fb}^{-1}$  of integrated luminosity. The observed missing transverse energy distribution is well described by the standard model prediction, and 95% C.L. limits are derived on two realizations of theories beyond the standard model. In a gauge mediated supersymmetry breaking scenario, the breaking scale  $\Lambda$  is excluded for  $\Lambda < 124 \text{ TeV}$ . In a universal extra dimension model including gravitational decays, the compactification radius  $R_c$  is excluded for  $R_c^{-1} < 477 \text{ GeV}$ .

**Search for new fermions (“quirks”) at the Fermilab Tevatron Collider**

**DPF: abstract 252 - Beyond the Standard Model session**

**EPS: abstract 433 - Higgs and New Physics session**

**SUSY: abstract 46 - Alternatives to SUSY: experiment session**

We report results of a search for particles with anomalously high ionization in events with a high transverse energy jet and large missing transverse energy in  $2.4 \text{ fb}^{-1}$  of integrated luminosity collected by the D0 experiment at the Fermilab Tevatron  $p\bar{p}$  collider. Production of such particles (quirks) is expected in scenarios with extra QCD-like  $SU(N)$  sectors, and this study is the first dedicated search for such signatures. We find no evidence of a signal and set a lower mass limit of 107 GeV, 119 GeV and 133 GeV for the mass of a charged quirk with strong dynamics scale  $\Lambda$  in the range from 10 keV to 1 MeV and  $N = 2, 3$ , and 5, respectively.

**Search for events with leptonic jets and missing transverse energy in  $p\bar{p}$  collisions at**

$\sqrt{s} = 1.96$  TeV

**DPF: abstract 253 - Beyond the Standard Model session**

**EPS: abstract 434 - Higgs and New Physics session**

**SUSY: abstract 47 - Alternatives to SUSY: experiment session**

We present the first search for pair production of isolated jets of charged leptons in association with a large imbalance in transverse energy in  $p\bar{p}$  collisions using  $5.8 \text{ fb}^{-1}$  of integrated luminosity collected by the D0 detector at the Fermilab Tevatron Collider. No excess is observed above Standard Model background, and the result is used to set upper limits on the production cross section of pairs of supersymmetric chargino and neutralino particles as a function of “dark-photon” mass, where the dark photon is produced in the decay of the lightest supersymmetric particle.

**Search for a heavy neutral gauge boson in the dielectron channel with  $5.4 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 254 - Beyond the Standard Model session**

**EPS: abstract 435 - Higgs and New Physics session**

**SUSY: abstract 48 - Alternatives to SUSY: experiment session**

We report the results of a search for a heavy neutral gauge boson  $Z'$  decaying into the dielectron final state using data corresponding to an integrated luminosity of  $5.4 \text{ fb}^{-1}$  collected by the D0 experiment at the Fermilab Tevatron Collider. No significant excess above the standard model prediction is observed in the dielectron invariant-mass spectrum. We set 95% C.L. upper limits on  $\sigma(p\bar{p} \rightarrow Z') \times BR(Z' \rightarrow ee)$  depending on the dielectron invariant mass. These cross section limits are used to determine lower mass limits for  $Z'$  bosons in a variety of models. For the sequential standard model  $Z'$  boson a lower mass limit of 1023 GeV is obtained.

**Model independent search for new phenomena in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 255 - Beyond the Standard Model session**

**EPS: abstract 436 - Higgs and New Physics session**

**SUSY: abstract 49 - Alternatives to SUSY: experiment session**

We present a model independent search for physics beyond the standard model in lepton final states. We examine data in 120 unique final states from  $1.07 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV collected with the D0 detector. We conclude that all discrepancies seen can be attributed to modeling issues and do not claim evidence of new physics.

**A search for charged massive long-lived particles at D0**

**DPF: abstract 257 - Beyond the Standard Model session**

**EPS: abstract 437 - Higgs and New Physics session**

**SUSY: abstract 50 - Alternatives to SUSY: experiment session**

We report on a search for charged massive long-lived particles (CMLLPs), based on  $5.2 \text{ fb}^{-1}$  of data collected with the D0 detector at the Fermilab Tevatron  $p\bar{p}$  collider. CMLLPs are predicted in many theories of physics beyond the Standard Model. We look for events in which one or more particles are reconstructed as muons but have speed and ionization energy loss  $dE/dx$  inconsistent with muons produced in beam collisions. We present 95% C.L. upper limits on the production cross

section for  $\tilde{\tau}$  and exclusion mass ranges for  $\tilde{\chi}^\pm$  in two SUSY scenarios and for long-lived  $\tilde{t}$  squarks.

**Search for supersymmetry with the  $Z\gamma$  plus missing energy final state**

**DPF: abstract 258 - Beyond the Standard Model session**

**EPS: abstract 438 - Higgs and New Physics session**

**SUSY: abstract 54 - SUSY: experiment session**

A first search for a supersymmetry signature with events containing  $Z\gamma$  and large missing transverse energy is conducted using  $6.2 \text{ fb}^{-1}$  of data collected by the D0 experiment in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$ . This signature is predicted in a gauge mediated supersymmetry breaking (GMSB) model in which pairs of neutralinos or charginos are produced and decay via lighter higgsino-like neutralinos. These neutralinos further decay to either a  $Z$  or a photon plus an undetected gravitino. Limits are set at the 95% C.L. on the breaking scale GMSB model and on the neutralino masses.

**Search for first generation leptoquark pair production in the electron +  $\cancel{E}$  + jets final state in  $5.4 \text{ fb}^{-1}$  of  $p\bar{p}$  collision data at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 259 - Beyond the Standard Model session**

**EPS: abstract 439 - Higgs and New Physics session**

**SUSY: abstract 51 - Alternatives to SUSY: experiment session**

We present a search for pair production of first generation scalar leptoquarks ( $LQ$ ) in  $5.4 \text{ fb}^{-1}$  of data collected with the D0 detector at the Fermilab Tevatron collider in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$ . In the channel  $LQ\bar{L}\bar{Q} \rightarrow e^\pm q\nu_e q'$ , no significant excess of data over the background prediction is observed and we set 95% C.L. lower limit on the leptoquark mass.

**Search for universal extra dimensions and supersymmetry in like-sign dimuon events using  $7.3 \text{ fb}^{-1}$  of D0 data**

**DPF: abstract 260 - Beyond the Standard Model session**

**SUSY: abstract 53 - SUSY: experiment session**

We present a search for universal extra dimensions (UED) and supersymmetry (SUSY) in the two like-sign muons final state. The data set corresponds to an integrated luminosity of  $7.3 \text{ fb}^{-1}$  collected by the D0 detector at a  $p\bar{p}$  center of mass energy of 1.96 TeV at the Fermilab Tevatron Collider. No evidence for physics beyond the standard model is observed and limits are set on the size of the compactification scale  $R_c^1$  in the minimal UED model and on the SUSY parameter space in supergravity inspired models.

**Search for associated production of charginos and neutralinos in the trilepton final state using  $7.3 \text{ fb}^{-1}$  of data**

**DPF: abstract 261 - Beyond the Standard Model session**

**SUSY: abstract 52 - SUSY: experiment session**

We report the results of a search for associated production of charginos and neutralinos using a data set corresponding to an integrated luminosity of  $7.3 \text{ fb}^{-1}$  collected with the D0 experiment during Run II of the Tevatron proton-antiproton collider. Final states containing three charged leptons

and missing transverse energy are probed for a signal from supersymmetry with four dedicated trilepton event selections. No evidence for a signal is observed, and we set limits on the product of production cross section and leptonic branching fraction.

## QCD

**Measurement of three-jet differential cross sections  $d\sigma_{3\text{jet}}/dM_{3\text{jet}}$  in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 212 - Perturbative and non-perturbative QCD session**

**EPS: abstract 145 - QCD session**

We present the first measurement of the inclusive three-jet differential cross section as a function of the invariant mass of the three jets with the largest transverse momenta in an event in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV. The measurement is made in different rapidity regions and for different jet transverse momentum requirements and is based on a data set corresponding to an integrated luminosity of  $0.7 \text{ fb}^{-1}$  collected with the D0 detector at the Fermilab Tevatron Collider. The results are used to test the three-jet matrix elements in perturbative QCD calculations at next-to-leading order in the strong coupling constant. The data allow discrimination between parametrizations of the parton distribution functions of the proton.

**Azimuthal decorrelations and multiple parton interactions in  $\gamma + 2$  jet and  $\gamma + 3$  jet events in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 213 - Perturbative and non-perturbative QCD session**

**EPS: abstract 146 - QCD session**

Samples of inclusive  $\gamma + 2$  jet and  $\gamma + 3$  jet events collected by the D0 experiment with an integrated luminosity of about  $1 \text{ fb}^{-1}$  in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV are used to measure cross sections as a function of the angle in the plane transverse to the beam direction between the transverse momentum ( $p_T$ ) of the  $\gamma$ +leading jet system (jets are ordered in  $p_T$ ) and  $p_T$  of the other jet for  $\gamma + 2$  jet, or  $p_T$  sum of the two other jets for  $\gamma + 3$  jet events. The results are compared to different models of multiple parton interactions (MPI) in the PYTHIA and SHERPA Monte Carlo (MC) generators. The data indicate a contribution from events with double parton (DP) interactions and are well described by predictions provided by the PYTHIA MPI models with  $p_T$ -ordered showers and by SHERPA with the default MPI model. The  $\gamma + 2$  jet data are also used to determine the fraction of events with DP interactions as a function of the azimuthal angle and as a function of the second jet  $p_T$ .

**A measurement of the ratio of inclusive cross sections  $\sigma(p\bar{p} \rightarrow Z + b \text{ jet})/\sigma(p\bar{p} \rightarrow Z + \text{jet})$  at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 214 - Perturbative and non-perturbative QCD session**

**EPS: abstract 147 - QCD session**

The ratio of the cross section for  $p\bar{p}$  interactions producing a  $Z$  boson and at least one  $b$  quark jet to the inclusive  $Z + \text{jet}$  cross section is measured using  $4.2 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions collected with the D0 detector at the Fermilab Tevatron collider at  $\sqrt{s} = 1.96$  TeV. The  $Z \rightarrow \ell^+\ell^-$  candidate events with at least one  $b$  jet are discriminated from  $Z + \text{charm}$  and light jet(s) events by a novel technique that

exploits the properties of the tracks associated to the jet. The measured ratio is  $0.0193 \pm 0.0027$  for events having a jet with transverse momentum  $p_T > 20$  GeV and pseudorapidity  $|\eta| \leq 2.5$ , which is the most precise to date and is consistent with theoretical predictions.

**Measurements of inclusive  $W$ +jets production rates as a function of jet transverse momentum in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 215 - Perturbative and non-perturbative QCD session**

**EPS: abstract 148 - QCD session**

We present measurements of inclusive  $W(\rightarrow \ell\nu) + n$  jet cross sections ( $n = 1 - 4$ ), presented as total inclusive cross sections and differentially in the  $n^{\text{th}}$  jet transverse momentum and rapidity. The measurements are made using  $4.2 \text{ fb}^{-1}$  of data collected by the D0 detector at the Fermilab Tevatron Collider and achieve considerably smaller uncertainties on  $W$ +jets production than previous measurements. The measurements are compared to next-to-leading order (NLO) perturbative QCD calculations in the  $n = 1 - 3$  jet multiplicity bins and to LO pQCD calculations in the 4 jet bin. We also present differential cross section measurements for the lepton  $p_T$  and rapidity for the various jet bins, and for dijet invariant mass and rapidity difference between jets in 2 jet production. The measurements are generally in agreement with pQCD predictions, although certain regions of phase space are identified where the calculations could be improved.

**Measurement of the elastic  $p\bar{p}$  differential cross section in the range  $0.25 < |t| < 1.2$  GeV at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 216 - Perturbative and non-perturbative QCD session**

**EPS: abstract 149 - QCD session**

The elastic proton-antiproton scattering process is studied as a function of the four-momentum transfer squared  $|t|$  at a center-of-mass energy of 1.96 TeV. Scattered protons and antiprotons are selected by using forward roman pot detectors that were installed around the D0 interaction point of the Tevatron. The data presented correspond to a dedicated period of low luminosity running of the D0 experiment. Comparison to data from other experiments at lower energies is presented.

**Measurements of the strong coupling constant from inclusive and multijet production in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 218 - Perturbative and non-perturbative QCD session**

**EPS: abstract 150 - QCD session**

The strong coupling constant  $\alpha_s$  and its energy dependence are determined from the  $p_T$  dependence of the inclusive jet cross section in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV in the range  $50 < p_T < 145$  GeV. Using perturbative QCD calculations we obtain  $\alpha_s(M_Z) = 0.1161^{+0.0041}_{-0.0048}$ . The range in which this measurement is performed is extended to higher energies by investigating the ratio of inclusive three-jet and dijet cross sections,  $R_{3/2}$ , as function of transverse jet momenta and by introducing a new observable that probes spatial correlations of jets.

**Heavy flavor production in association with  $W$  bosons at D0**

**DPF: abstract 244 - Perturbative and non-perturbative QCD session**

**EPS: abstract 151 - QCD session**

Measurements of W boson production in association with heavy flavor jets are important tests of LO and NLO QCD predictions and crucial for the precision study of processes such as top and diboson production as well as searches for Higgs production and other new physics both at the Tevatron and LHC. We present a measurement of the heavy flavor content in the  $W$ +jet production mode in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV using the D0 detector Fermilab in RunII is presented. The measurement is based on an integrated luminosity of  $6 \text{ fb}^{-1}$ , and includes events with up to two jets. The measurements are unfolded to particle level to account for detector effects and the data are compared to predictions from Monte Carlo simulations.

**top**

**Precise measurements of the top quark mass in the dilepton channel at D0**

**DPF: abstract 220 - Top quark physics session**

**EPS: abstract 440 - Top and Electroweak physics session**

We measure the top quark mass ( $m_t$ ) in  $p\bar{p}$  collisions at a center of mass energy  $\sqrt{s} = 1.96$  TeV using dilepton  $t\bar{t} \rightarrow W^+bW^-\bar{b} \rightarrow \ell^+\nu_\ell b\ell^-\bar{\nu}_\ell\bar{b}$  events, where  $\ell$  denotes an electron, a muon, or a tau that decays leptonically. The data correspond to an integrated luminosity of  $5.4 \text{ fb}^{-1}$  collected with the D0 detector at the Fermilab Tevatron Collider. We obtain  $m_t = 174.0 \pm 1.8(\text{stat}) \pm 2.4(\text{syst})$  GeV, which is in agreement with the current world average  $m_t = 173.3 \pm 1.1$  GeV. This is currently the most precise measurement of  $m_t$  in the dilepton channel. We also report a measurement obtained using the “neutrino weighting technique” in which distributions are generated from event weights obtained from comparing the calculated and reconstructed missing transverse energy.

**Measurements of spin correlation in  $t\bar{t}$  production at D0**

**DPF: abstract 221 - Top quark physics session**

**EPS: abstract 441 - Top and Electroweak physics session**

We measure the correlation between the spin of the top quark and the spin of the anti-top quark in  $t\bar{t} \rightarrow W^+bW^-\bar{b}$  final states produced in  $p\bar{p}$  collisions at a center of mass energy  $\sqrt{s} = 1.96$  TeV, using data collected with the D0 detector at the Fermilab Tevatron collider. The correlation is extracted using a double differential angular distribution and a novel technique using matrix element integration is used to increase the sensitivity of the result, Measurements are performed in both the dilepton and lepton+jets final states.

**Search for a fourth generation  $t'$  quark in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 222 - Beyond the Standard Model session**

**EPS: abstract 443 - Higgs and New Physics session**

**SUSY: abstract 43 - Alternatives to SUSY: experiment session**

We present a search for pair production of a fourth generation  $t'$  quark and its antiparticle, followed by their decays to a  $W$  boson and a jet, based on an integrated luminosity of  $5.3 \text{ fb}^{-1}$  of proton-antiproton collisions at  $\sqrt{s} = 1.96$  TeV collected by the D0 Collaboration at the Fermilab Tevatron Collider. We set upper limits on the  $t'\bar{t}'$  production cross section that exclude at the 95% C.L. a  $t'$

quark that decays exclusively to  $W$ +jet with a mass below 285 GeV. We observe a small excess in the  $\mu$ +jets channel which reduces the mass range excluded compared to the expected limit of 320 GeV in the absence of a signal.

**Determination of the pole and  $\overline{MS}$  masses of the top quark from the  $t\bar{t}$  cross section**

**DPF: abstract 223 - Top quark physics session**

**EPS: abstract 444 - Top and Electroweak physics session**

We use higher-order quantum chromodynamics calculations to extract the mass of the top quark from the  $t\bar{t}$  cross section measured in the lepton+jets channel in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV using  $5.3 \text{ fb}^{-1}$  of integrated luminosity collected by the D0 experiment at the Fermilab Tevatron Collider. The extracted top quark pole mass and  $\overline{MS}$  mass are compared to the current Tevatron average top quark mass obtained from direct measurements.

**Search for flavor changing neutral currents in decays of top quarks**

**DPF: abstract 224 - Top quark physics session**

**EPS: abstract 445 - Top and Electroweak physics session**

**SUSY: abstract 42 - Intensity frontier: experiment session**

We present a search for flavor changing neutral currents in decays of top quarks. The analysis is based on a search for  $t\bar{t} \rightarrow \ell'\nu\ell\bar{\ell}$ +jets ( $\ell, \ell' = e, \mu$ ) final states using  $4.1 \text{ fb}^{-1}$  of integrated luminosity of  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV. We extract limits on the branching ratio  $B(t \rightarrow Zq)$  ( $q = u, c$  quarks), assuming anomalous  $tuZ$  or  $tcZ$  couplings. We do not observe any sign of such anomalous coupling and set a limit of  $B < 3.2\%$  at 95% C.L.

**Measurement of the top quark pair production cross section in the lepton+jets channel in proton-antiproton collisions at  $\sqrt{s}=1.96$  TeV**

**DPF: abstract 225 - Top quark physics session**

**EPS: abstract 446 - Top and Electroweak physics session**

We present a measurement of the inclusive top quark pair production cross section in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV utilizing data corresponding to an integrated luminosity of  $5.3 \text{ fb}^{-1}$  collected with the D0 detector at the Fermilab Tevatron Collider. We consider final states containing one high- $p_T$  isolated electron or muon and at least two jets, and we perform three analyses: one exploiting specific kinematic features of  $t\bar{t}$  events, the second using  $b$ -jet identification, and the third using both techniques to separate  $t\bar{t}$  signal from background. In the third case, we determine simultaneously the  $t\bar{t}$  cross section and the ratio of the production rates of  $W$ +heavy flavor jets and  $W$ +light flavor jets, which reduces the impact of the systematic uncertainties related to the background estimation. Assuming a top quark mass of 172.5 GeV, we obtain  $\sigma_{t\bar{t}} = 7.78^{+0.77}_{-0.64}$  pb. This result agrees with predictions of the standard model.

**Measurement of color flow in  $t\bar{t}$  events from  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 226 - Top quark physics session**

**EPS: abstract 448 - Top and Electroweak physics session**

We present the first measurement of the color representation of the hadronically decaying  $W$  boson in  $t\bar{t}$  events, from  $5.3 \text{ fb}^{-1}$  of integrated luminosity collected with the D0 experiment. A novel calorimeter-based vectorial variable, “jet pull,” is used, sensitive to the color-flow structure of the final state. We find that the fraction of uncolored  $W$  bosons is  $0.56 \pm 0.42(\text{stat}+\text{syst})$ , in agreement with the standard model.

**Search for  $W' \rightarrow tb$  resonances with left- and right-handed couplings to fermions**

**DPF: abstract 227 - Beyond the Standard Model session**

**EPS: abstract 449 - Higgs and New Physics session**

**SUSY: abstract 41 - Alternatives to SUSY: experiment session**

We present a search for the production of a heavy gauge boson,  $W'$ , that decays to third-generation quarks, by the D0 Collaboration in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$ . We set 95% confidence level upper limits on the production cross section times branching fraction. For the first time, we set limits for arbitrary combinations of left- and right-handed couplings of the  $W'$  boson to fermions. For couplings with the same strength as the standard model  $W$  boson, we set the following limits for  $M(W') > m(\nu_R)$ :  $M(W') > 863 \text{ GeV}$  for purely left-handed couplings,  $M(W') > 885 \text{ GeV}$  for purely right-handed couplings, and  $M(W') > 916 \text{ GeV}$  if both left- and right-handed couplings are present. The limit for right-handed couplings improves for  $M(W') < m(\nu_R)$  to  $M(W') > 890 \text{ GeV}$ .

**Measurement of the  $W$  boson helicity in top quark decays using  $5.4 \text{ fb}^{-1}$  of  $p\bar{p}$  collision data**

**DPF: abstract 228 - Top quark physics session**

**EPS: abstract 450 - Top and Electroweak physics session**

We present a measurement of the helicity of the  $W$  boson produced in top quark decays using  $t\bar{t}$  decays in the  $\ell$ +jets and dilepton final states selected from a sample of  $5.4 \text{ fb}^{-1}$  of collisions recorded using the D0 detector at the Fermilab Tevatron  $p\bar{p}$  collider. We measure the fractions of longitudinal and right-handed  $W$  bosons to be  $f_0 = 0.669 \pm 0.102 [\pm 0.078 (\text{stat.}) \pm 0.065 (\text{syst.})]$  and  $f_+ = 0.023 \pm 0.053 [\pm 0.041 (\text{stat.}) \pm 0.034 (\text{syst.})]$ , respectively. This result is consistent at the 98% level with the standard model. A measurement with  $f_0$  fixed to the value from the standard model yields  $f_+ = 0.010 \pm 0.037 [\pm 0.022 (\text{stat.}) \pm 0.030 (\text{syst.})]$ .

**Determination of the width of the top quark**

**DPF: abstract 229 - Top quark physics session**

**EPS: abstract 451 - Top and Electroweak physics session**

We extract the total width of the top quark,  $\Gamma_t$ , from the partial decay width  $\Gamma(t \rightarrow Wb)$  measured using the  $t$ -channel cross section for single top quark production and from the branching fraction  $\mathcal{B}(t \rightarrow Wb)$  measured in  $t\bar{t}$  events using up to  $2.3 \text{ fb}^{-1}$  of integrated luminosity collected by the D0 Collaboration at the Tevatron  $p\bar{p}$  Collider. The result is  $\Gamma_t = 1.99_{-0.55}^{+0.69} \text{ GeV}$ , which translates to a top-quark lifetime of  $\tau_t = (3.3_{-0.9}^{+1.3}) \times 10^{-25} \text{ s}$ . Assuming a high mass fourth generation  $b'$  quark and unitarity of the four-generation quark-mixing matrix, we set the first upper limit on  $|V_{tb'}| < 0.63$  at 95% C.L.

**Measurement of  $t\bar{t}$  production in the  $\tau$  + jets topology using  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV****DPF: abstract 230 - Top quark physics session****EPS: abstract 453 - Top and Electroweak physics session**

We present a measurement of the  $t\bar{t}$  production cross section multiplied by the branching ratio to tau lepton decaying semihadronically ( $\tau_h$ ) plus jets,  $\sigma(p\bar{p} \rightarrow t\bar{t} + X) \cdot \text{BR}(t\bar{t} \rightarrow \tau_h + \text{jets})$ , at a center of mass energy  $\sqrt{s} = 1.96$  TeV using  $1 \text{ fb}^{-1}$  of integrated luminosity collected with the D0 detector. Assuming a top quark mass of 170 GeV, we measure  $\sigma_{t\bar{t}} \cdot \text{BF}_{\tau_h+j} = 0.60^{+0.23}_{-0.22} (\text{stat})^{+0.15}_{-0.14} (\text{syst}) \pm 0.04$  (lumi) pb. In addition, we extract the  $t\bar{t}$  production cross section using the  $t\bar{t} \rightarrow \tau_h + \text{jets}$  topology, with the result  $\sigma_{t\bar{t}} = 6.9^{+1.2}_{-1.2} (\text{stat})^{+0.8}_{-0.7} (\text{syst}) \pm 0.4$  (lumi) pb. These findings are in good agreement with standard model predictions and measurements performed using other top quark decay channels.

**Model-independent measurement of  $t$ -channel single top quark production in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV****DPF: abstract 231 - Top quark physics session****EPS: abstract 454 - Top and Electroweak physics session**

We present a model-independent measurement of  $t$ -channel electroweak production of single top quarks in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV. Using  $5.4 \text{ fb}^{-1}$  of integrated luminosity collected by the D0 detector at the Fermilab Tevatron Collider, and selecting events containing an isolated electron or muon, missing transverse energy and one or two jets originating from the fragmentation of  $b$  quarks, we measure a cross section  $\sigma(p\bar{p} \rightarrow tbq + X) = 2.90 \pm 0.59 (\text{stat} + \text{syst})$  pb for a top quark mass of 172.5 GeV. We estimate the probability of the background to fluctuate and produce a signal as large as the one observed to be  $1.6 \times 10^{-8}$ , corresponding to a significance of 5.5 standard deviations.

**Precise measurement of the top-quark mass from lepton+jets events at D0****DPF: abstract 232 - Top quark physics session****EPS: abstract 455 - Top and Electroweak physics session**

We report a measurement of the mass of the top quark in lepton+jets final states of  $p\bar{p} \rightarrow t\bar{t}$  data corresponding to  $2.6 \text{ fb}^{-1}$  of integrated luminosity collected by the D0 experiment at the Fermilab Tevatron Collider. Using a matrix element method, we combine an in situ jet energy calibration with a constraint imposed from the standard jet energy scale derived in studies of  $\gamma$ +jet and dijet events and we measure a top-quark mass of  $m_t = 176.01 \pm 1.64$  GeV. Combining this result with that from a previous analysis yields a total data sample corresponding to  $3.6 \text{ fb}^{-1}$  of integrated luminosity and a top-quark mass of  $m_t = 174.94 \pm 1.49$  GeV.

**Direct measurement of the mass difference between top and antitop quarks****DPF: abstract 233 - Top quark physics session****EPS: abstract 456 - Top and Electroweak physics session**

We present a direct measurement of the mass difference between top and antitop quarks ( $\Delta m$ ) in lepton+jets  $t\bar{t}$  final states using the matrix element method. The purity of the lepton+jets sample is enhanced for  $t\bar{t}$  events by applying a neural-network-based  $b$ -jet identification technique. The

analyzed data correspond to  $3.6 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$  acquired by D0 in Run II of the Fermilab Tevatron Collider. The combination of the  $e$ +jets and  $\mu$ +jets channels yields  $\Delta m = 0.8 \pm 1.8(\text{stat}) \pm 0.5(\text{syst}) \text{ GeV}$ , which is in agreement with the standard model prediction of no mass difference.

**Measurement of the  $t\bar{t}$  production cross section using dilepton events in  $p\bar{p}$  collisions**

**DPF: abstract 234 - Top quark physics session**

**EPS: abstract 457 - Top and Electroweak physics session**

We present a measurement of the  $t\bar{t}$  production cross section in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$  using  $5.4 \text{ fb}^{-1}$  of data collected with the D0 detector. We consider final states with at least two jets and two leptons ( $ee, e\mu, \mu\mu$ ), and events with one jet for the  $e\mu$  final state as well. The measured cross section is  $7.4_{-0.8}^{+0.9}(\text{stat} + \text{syst}) \text{ pb}$ . This result combined with the cross section measurement in the lepton + jets final state yields a cross section of  $7.6 \pm 0.6(\text{stat} + \text{syst}) \text{ pb}$  which agrees with the standard model expectation and represents a relative precision of 8% reaching an uncertainty comparable to the latest theoretical calculations.

**Combination of the D0 top quark mass measurements**

**DPF: abstract 235 - Top quark physics session**

**EPS: abstract 458 - Top and Electroweak physics session**

We present a combination of the top quark mass measurements performed by the D0 experiment in lepton plus jets ( $\ell$ +jets) and dilepton ( $\ell\ell$ ) channels. The combined result yields  $m_{top} = 175.08 \pm 1.47(\text{stat+syst}) \text{ GeV}$ .

**Measurement of the ratio  $B(t \rightarrow Wb)/B(t \rightarrow Wq)$  in the lepton+jets and dilepton  $t\bar{t}$  final states at D0**

**DPF: abstract 236 - Top quark physics session**

**EPS: abstract 459 - Top and Electroweak physics session**

We present a measurement of the ratio of top quark branching fractions  $R = B(t \rightarrow Wb)/B(t \rightarrow Wq)$ , where  $q$  can be a  $d, s$  or  $b$  quark, in the lepton+jets and dilepton final states. The measurement uses a data sample of  $5.4 \text{ fb}^{-1}$  of  $p\bar{p}$  collisions collected with the D0 detector. We find a value of  $R$  compatible with the Standard Model expectation and set a limit on the CKM matrix element  $|V_{tb}|$  assuming the CKM matrix unitarity.

**Measurement of the forward-backward charge asymmetry in top quark production in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96 \text{ TeV}$**

**DPF: abstract 237 - Top quark physics session**

**EPS: abstract 461 - Top and Electroweak physics session**

**SUSY: abstract 40 - Intensity frontier: experiment session**

We present measurements of the integrated forward-backward charge asymmetry in  $t\bar{t}$  production in  $p\bar{p}$  collisions using data collected with the D0 detector at the Fermilab Tevatron collider, using both the lepton+jets and dilepton final states. We present the raw measurement as well as results

obtained after correcting for acceptance and detector effects and present also measurements as a function of invariant mass of the  $t\bar{t}$  pair. We also investigate the dependence of the asymmetry on the total transverse momentum of the  $t\bar{t}$  pair.

**Search for  $CP$  violation in single top production**

**DPF: abstract 238 - Top quark physics session**

**EPS: abstract 463 - Top and Electroweak physics session**

**SUSY: abstract 39 - Intensity frontier: experiment session**

We present a search for  $CP$  violation in single top quark production at the D0 experiment at the Fermilab Tevatron.  $CP$  violation in the top electroweak interaction results in different single top quark production cross sections for top and antitop quarks. We consider the asymmetry in the total number of leptons ( $\ell^+$  and  $\ell^-$ ) in the final state. We perform the search separately in the electron+jets and muon+jets final states using  $5.4 \text{ fb}^{-1}$  of data collected with the D0 detector.

**Search for anomalous top quark couplings in single top events at D0**

**DPF: abstract 239 - Top quark physics session**

**EPS: abstract 464 - Top and Electroweak physics session**

**SUSY: abstract 38 - Intensity frontier: experiment session**

Anomalous  $Wtb$  couplings can change the single top quark production cross section. We present limits on anomalous top quark couplings by searching for anomalous production in the single top quark final state. We set limits on right-handed vector couplings as well as left-handed and right-handed tensor couplings based on data collected by the D0 experiment.

**Search for charged Higgs Boson decaying into top and bottom quarks**

**DPF: abstract 240 - Higgs physics session**

**EPS: abstract 465 - Higgs and New Physics session**

**SUSY: abstract 36 - Higgs: experiment session**

We present an improved search for quark fusion production  $q\bar{q}' \rightarrow H^+$  of the charged Higgs boson reconstructed in the  $t\bar{b}$  final state using  $5.4 \text{ fb}^{-1}$  of data collected by the D0 detector. We find no evidence for charged Higgs production and set limits on the production cross-section for a variety of theoretical models.

**Search for the Standard Model higgs boson in the  $t\bar{t}H \rightarrow t\bar{t}b\bar{b}$  channel at D0**

**DPF: abstract 241 - Higgs physics session**

**EPS: abstract 467 - Higgs and New Physics session**

**SUSY: abstract 37 - Higgs: experiment session**

We present a search for the Standard Model Higgs boson produced in association with top anti-top quark pairs. This analysis considers samples of lepton+jets events with one, two or three b-tagged jets and four, five or more jets in total collected with the D0 detector, corresponding to an integrated luminosity of  $5.4 \text{ fb}^{-1}$ . Kinematical differences between  $t\bar{t}$  and  $t\bar{t}H$  events are exploited and limits are set on the  $t\bar{t}H \rightarrow t\bar{t}b\bar{b}$  production cross section.

**Measurements of differential distributions of top quarks with the D0 detector**

**DPF: abstract 242 - Top quark physics session**

**EPS: abstract 468 - Top and Electroweak physics session**

We present measurements of differential distributions for top quarks produced in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV using  $7 \text{ fb}^{-1}$  of data collected with the D0 detector at the Fermilab Tevatron collider. These differential distributions can be used to validate current Monte Carlo generators and their level of description of the top quark pairs and provide a detailed window on QCD dynamics of a unique heavy diquark system at large scales. We use a sample consisting of events containing a high  $p_T$  lepto, large missing transverse energy, and four or more jets of which one is required to be identified as a  $b$  jet. of the jets was required to be identified as a b jet. The measured spectra, binned in several observables, are compared to those obtained from the Monte Carlo simulation.

**Measurements of the single top quark production cross section and  $|V_{tb}|$  in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV**

**DPF: abstract 335 - Top quark physics session**

**EPS: abstract 469 - Top and Electroweak physics session**

We present new measurements of the single top quark production cross section in  $p\bar{p}$  collisions at  $\sqrt{s} = 1.96$  TeV using data corresponding to  $5.4 \text{ fb}^{-1}$  of integrated luminosity collected by the D0 detector at the Fermilab Tevatron Collider. The events are selected with an isolated electron or muon missing transverse energy, two, three or four jets, with one or two of them identified as originating from the fragmentation of  $b$  quarks. From the cross section measurement we obtain new bounds on the Kobayashi-Maskawa  $|V_{tb}|$  matrix element.