

- Title: Measurement of the Top Quark Pair Production Cross Section in Lepton+Jets and Dilepton+Jets Final States at DØ

Abstract: Measurement of the top quark pair ( $t\bar{t}$ ) production cross section at hadron colliders can be used to test perturbative QCD predictions. We present measurements of the  $t\bar{t}$  production cross section at  $\sqrt{s} = 1.96$  GeV in proton-antiproton collisions using about  $220 \text{ pb}^{-1}$  of data collected by the DØ experiment during Run II of the Fermilab Tevatron collider. We discuss the measurements in lepton+jets and dilepton+jets final states, where the lepton has high transverse momentum and is isolated from jet activity. Within the Standard Model, the top quark almost always decays to a  $W$  boson and a  $b$  quark. The leptons arise when one or both  $W$  bosons subsequently decay to an electron or a muon. The lepton+jets analysis is further subdivided into one based purely on topological event selection, and another requiring the reconstruction of a soft muon within a jet, a sign of a semileptonic  $B$  hadron decay.

Parallel session: QCD hard interactions

Keywords: top quark, cross section, topology

Preference: oral

- Title: Measurement of the Top Quark Pair Production Cross Section with Lifetime  $b$  Tagging at DØ

Abstract: Measurement of the top quark pair ( $t\bar{t}$ ) production cross section at hadron colliders can be used to test perturbative QCD predictions. We present measurements of the  $t\bar{t}$  production cross section at  $\sqrt{s} = 1.96$  GeV in proton-antiproton collisions using about  $220 \text{ pb}^{-1}$  of data collected by the DØ experiment during Run II of the Fermilab Tevatron collider. Within the Standard Model (SM), the top quark almost always decays to a  $W$  boson and a  $b$  quark, thus leading to the presence of two  $b$  jets in the event. By using its new silicon tracker, the DØ experiment is capable of identifying  $b$  jets based on lifetime tagging. The analyses presented here use the expected  $b$  jet content of  $t\bar{t}$  events to discriminate between the top signal and the SM backgrounds. We report on the application of this technique to lepton+jets, dilepton+jets and all-jets final states.

Parallel session: QCD hard interactions

Keywords: top quark, cross section, heavy flavor tagging

Preference: oral

- Title: Search for Single Top Quark Production at DØ

Abstract: We present a search for the electroweak production of single top quarks at the DØ experiment of the Fermilab Tevatron proton-antiproton collider at  $\sqrt{s} = 1.96$  GeV using Run II data. The search is performed in the electron+jets and muon+jets decay channels. We improve the signal:background ratio by applying three algorithms to indicate the presence of a jet originating from a  $b$  quark. Single top quarks are often produced together with a high transverse momentum central  $b$  quark, and the top quark decay also includes a  $b$  quark, whereas most background sources do not contain such  $b$  quarks. The  $b$  identification algorithms are reconstructing a muon in a jet from a semileptonic  $B$  hadron decay, and two methods that rely on the long lifetime of the  $B$  hadrons: a secondary-vertex tagger and a jet-lifetime-probability tagger. We set

upper limits on the cross sections for the two production modes,  $s$ - and  $t$ -channel, separately and combined.

Parallel session: Electroweak physics

Keywords: top quark, single top, cross section

Preference: oral

- Title: Measurement of the Top Quark Mass in the Lepton+Jets Channel at DØ

Abstract: The top quark mass is one of the fundamental parameters of the Standard Model (SM). Since its mass is the largest of all known fermions, precise knowledge of it may provide insight into physics beyond the SM. At a hadron collider, top quarks are dominantly produced in pairs ( $t\bar{t}$ ), each of them decaying to a  $W$  boson and a  $b$  quark. We report on a measurement of the mass of the top quark in the lepton+jets channel, using data collected by the DØ experiment at the Fermilab Tevatron collider at  $\sqrt{s} = 1.96$  GeV in proton-antiproton collisions. This final state is characterized by four or more jets, a high transverse momentum isolated electron or muon and high missing transverse energy, resulting from the decay of one  $W$  boson into a charged lepton and a neutrino and the other  $W$  boson into a quark-antiquark pair.

Parallel session: QCD hard interactions

Keywords: top quark, mass, lepton+jets

Preference: oral

- Title: Measurement of the Top Quark Mass in the Dilepton+Jets Channel at DØ

Abstract: The top quark mass is one of the fundamental parameters of the Standard Model (SM). Since its mass is the largest of all known fermions, precise knowledge of it may provide insight into physics beyond the SM. At a hadron collider, top quarks are dominantly produced in pairs ( $t\bar{t}$ ), each of them decaying to a  $W$  boson and a  $b$  quark. We report on a measurement of the mass of the top quark in the dilepton+jets channel, using data collected by the DØ experiment at the Fermilab Tevatron collider at  $\sqrt{s} = 1.96$  GeV in proton-antiproton collisions. This final state is characterized by two or more jets, two high transverse momentum isolated charged leptons, either two electrons, one electron and one muon, or two muons, and high missing transverse energy, resulting from the leptonic decay of both  $W$  bosons in the event.

Parallel session: QCD hard interactions

Keywords: top quark, mass, dilepton

Preference: oral

- Title: Measurement of the  $W$  Boson Helicity in Top Quark Decays at DØ

Abstract: Within the Standard Model, the helicity of the  $W$  boson in the top quark decay is given by the V–A coupling. As the top quark is by far the heaviest of all fermions, some models predict an additional V+A coupling between the top quark and the  $W$  boson. At a hadron collider, top quarks are dominantly produced in pairs ( $t\bar{t}$ ), each of them decaying to a  $W$  boson and a  $b$  quark. We report on a measurement of the  $W$  helicity in top quark decays using data collected by the DØ experiment at the Fermilab Tevatron collider at  $\sqrt{s} = 1.96$  GeV in proton-antiproton collisions. Events are selected in the lepton+jets channel, with one  $W$  boson decaying into a charged lepton

(electron or muon) and a neutrino and the other  $W$  boson into a quark antiquark pair. This analysis makes use of events with and without a yagged  $b$  jet. The fraction of V+A contribution is determined from the angular distribution of the charged lepton with respect to the  $b$  quark direction in the  $W$  boson rest frame.

Parallel session: Electroweak physics

Keywords: top quark, W helicity, coupling

Preference: oral

- Title: Measurement of  $B(t \rightarrow Wb)/B(t \rightarrow Wq)$  at  $D\bar{O}$

Abstract: At a hadron collider, top quarks are dominantly produced in pairs. Within the Standard Model (SM), assuming three generations of fermions and unitarity of the CKM matrix, the top quark decays to a  $W$  boson and a  $b$  quark almost 100% of the times. A deviation from this prediction will indicate the presence of new physics beyond the SM. We report on the direct measurement of the ratio  $B(t \rightarrow Wb)/B(t \rightarrow Wq)$ , with  $q$  being any quark, using data collected by the  $D\bar{O}$  experiment at the Fermilab Tevatron collider at  $\sqrt{s} = 1.96$  GeV in proton-antiproton collisions. Events in the lepton+jets channel, with one  $W$  boson decaying into a charged lepton (electron or muon) and a neutrino and the other  $W$  boson into a quark-antiquark pair, are selected. Identification of  $b$  quarks is done using lifetime-tagging algorithms.

Parallel session: Electroweak physics

Keywords: top quark, branching ratio, coupling

Preference: oral