

**DØ's Top Quark Physics Abstracts
submitted to the
American Physical Society April Meeting,
St Louis, Missouri, April 11-15, 2008**

Session B2: Tevatron Physics, Saturday 12th, 10:45 am

0. Top and Electroweak Physics at the Tevatron (invited talk)

Graham Wilson, University of Kansas

Results on top and electroweak physics from the Tevatron Collider experiments, CDF and DØ are reviewed. These will include measurements of the top quark mass, top quark pair production cross-section, top properties and single top production. Electroweak measurements will include W mass, W and Z production properties and di-boson production. Latest results on precision measurements of the W mass and the top mass will be reviewed and placed in the context of indirect sensitivity to the Higgs mass.

Session J12: Top I, Sunday 13th, 10:45 am

1. Measurement of the Top Quark Mass at DØ Using the Matrix-Element Method in the Dilepton Channel

Alexander Grohsjean, LMU Munich

We report on the measurement of the top quark mass using candidates in the dilepton final state. For each event, a probability based on the differential cross section for production is calculated as a function of the top mass. The top mass is extracted by maximizing a likelihood constructed as the product of the single event probabilities. The measurement is based on 1 fb^{-1} of data.

2. Measurement of the $t\bar{t}$ Cross Section in the Dilepton Channel with the DØ Detector

Marion Arthaud, DAPNIA/SPP, Saclay

We present the $t\bar{t}$ production cross measurement using dilepton events. This analysis is based on data taken with the DØ detector at the Fermilab Tevatron collider at a center-of-mass energy of 1.96 TeV. The data corresponding to an integrated luminosity of about 1.1 fb^{-1} were recorded in the years 2002 to 2006.

3. Study of Differential Distributions of Top Quarks

Jiri Kvita, Charles University, Prague

The study of kinematics of top quark pairs produced at Fermilab Tevatron Collider can test Standard Model production and decay of the system or look for new physics. Differential distributions can validate current 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 present measurements of differential distributions of top quarks produced in pairs in $p\bar{p}$ collisions recorded by the DØ experiment. Events containing a high- p_T lepton, large missing transverse energy, and four or more jets were chosen from the 0.9 fb^{-1} Run IIa data sample. At least one of the jets was required to be identified as a b jet. A constrained kinematic fit associated these decay products with the individual top quarks. The measured spectra, binned in several observables, are compared to those obtained from the Monte Carlo simulation. We focus on the transverse momentum of the top quark and the top pair system as well as the system invariant mass and the azimuthal decorrelation between top quarks.

4. Simultaneous Measurement of the Ratio $B(t \rightarrow Wb)/B(t \rightarrow Wq)$ and the Top Quark Pair Cross Section with the DØ Detector at $\sqrt{s} = 1.96 \text{ TeV}$

Suharyo Sumowidagdo, Florida State University

We present the first simultaneous measurement of the ratio of branching fractions, $R = B(t \rightarrow Wb)/B(t \rightarrow Wq)$, with q being a d , s , or b quark, and the top quark pair production cross section $\bar{t}t$ in the lepton plus jets channel using 0.9 fb^{-1} of $p\bar{p}$ collision data at $\sqrt{s} = 1.96 \text{ TeV}$ collected with the DØ detector. We extract R and $\bar{t}t$ by analyzing samples of events with 0, 1 and 2 identified b jets.

5. Measurement of the $\bar{t}t$ Cross Section in the Lepton+Track Channel with the DØ Detector

Robert Wagner, Princeton University

The production cross-section for top-antitop quark pairs from proton-antiproton collisions at $\sqrt{s} = 1.96 \text{ TeV}$ was measured in the dilepton channel. The top quark decays almost exclusively to a Wb final state, and in the dilepton channel both of the W bosons from the top-antitop pair decay into either an electron or muon, possibly through an intermediary tau. The measurement was made using a lepton+track selection method, which selects events where only one lepton was fully identified by the detector and the second lepton is identified by an isolated track in the tracking system. The lepton+track selection is added to the fully identified channels to increase the sensitivity of the combined dilepton channel measurement. This work was performed at the DØ detector at the Tevatron collider, using about 1 fb^{-1} of integrated luminosity.

6. Measurement of the $t\bar{t}$ Production Cross Section at DØ Using Lepton + Hadronic Tau Events

Florent Lacroix, LPC, Clermont Ferrand

We present the measurement of top quark-antiquark pair production in the lepton+hadronic tau channel using approximately 0.9 fb^{-1} of DØ data. We select events with one isolated high p_T electron or muon, one isolated hadronic tau, high missing transverse energy, and two high p_T jets. One or more of the jets are required to have originated from a b quark by applying a neural network tagging algorithm. We discuss the results both within the context of the Standard Model and a semi model-independent approach of a non-SM production mechanism of a tau lepton in top quark decay.

7. Measurement of the $t\bar{t}$ Production Cross Section at DØ Using Tau+Jets Events

Mikhail Arov, Louisiana Tech University

We report on the measurement of the $t\bar{t}$ production cross section with candidate events in which the W boson from one of the top quarks decays into a tau lepton and the associated neutrino while the other W boson decays to a quark-antiquark pair. We select events in which the tau lepton subsequently decays to one or three charged hadrons plus neutral hadrons and a neutrino. The measurement is based on 1 fb^{-1} of data. The signal was discriminated from background using kinematic information and by requiring an identified b jet.

Session M11: Higgs II, Sunday 13th, 3:30 pm

8. Search for a Charged Higgs Boson with Decay to a Top Quark and a Bottom Quark at DØ

Christopher Potter, McGill University

The large mass of the top quark, close to the electroweak symmetry-breaking scale, makes it a good candidate for probing physics beyond the Standard Model. Single top quarks may be produced in the decay of a charged Higgs boson predicted by several extensions of the Standard Model. We present limits on the production cross section of such a particle using a 0.9 fb^{-1} dataset.

Session M12: Top III, Sunday 13th, 3:30 pm

9. Measurement of the $t\bar{t}$ Production Cross Section at DØ Using Lepton+Jets Events

Sehwook Lee, Iowa State University

We report on the measurement of the $t\bar{t}$ production cross section using candidate events in the lepton+jets final state. We separate the signal from background processes using kinematic information or a neural network algorithm that uses lifetime information to identify the b -quark jets.

10. Measurement of the Top Quark Mass at DØ Using the Matrix-Element Method in the Lepton+Jets Channel

Zhenyu Ye, Fermilab

We report on the measurement of the top quark mass using candidates in the lepton+jets final state. For each event, a probability based on the differential cross section for production is calculated as a function of the top mass and the overall jet energy scale. The top mass and jet energy scale are extracted by maximizing a likelihood constructed as the product of the single event probabilities. The overall jet energy scale is constrained by the two jets from the hadronic W boson decay.

11. Measurement of the Top Quark Mass at DØ Using the Ideogram Method in the Lepton+Jets Channel

Pieter Houben, NIKHEF, Netherlands

We report on the measurement of the top quark mass based on a 1 fb^{-1} sample of $t\bar{t}$ events in the lepton+jets final state. For each event, a probability based on the kinematic reconstruction of the event is calculated as a function of the top mass and the overall jet energy scale. The top mass and jet energy scale are extracted by maximizing a likelihood constructed as the product of the single event probabilities. The overall jet energy scale is constrained by the two jets from the hadronic W boson decay.

12. Measurement of the Top Quark Mass at DØ Using All-Hadronic Events

David Lam, University of Notre Dame

We report on the measurement of the top quark mass using candidates in the all-hadronic decay channel. The signal was discriminated from background using kinematic information and by requiring two identified b jets. The mass was extracted by comparing templates of signal and multijet background to the selected candidates.

Session X11: Top II, Tuesday 15th, 1:30 pm

13. Indirect Charged Higgs Boson Search in Leptonic Final States of Top Decay

Andre Sopczak, Lancaster University

The discovery of a charged Higgs boson would be an unambiguous signal for physics beyond the Standard Model. The existence of a charged Higgs boson would alter the Standard Model top decay branching fractions if light enough and thereby could lead to an indication of the existence of a charged Higgs boson. The present study is based on the final states containing either $e\mu$, $e+e^-$ or $\mu+\mu^-$. No significant disagreement of the data with the SM expectations is found, and from this, limits on the charged Higgs boson branching fraction are derived.

14. Single Top Quark Production at DØ Using Matrix Elements

Monica Pangilinan, Brown University

Protons and antiprotons are collided at the Fermilab Tevatron at a center of mass energy of 1.96 TeV. We have performed a search for single top quark production in these collisions using a dataset of 2.2 fb^{-1} collected with the DØ detector in the electron+jets and muon+jets channels. This analysis utilizes secondary-vertex tagging to identify jets originating from b quarks. It probes the electron+jets and muon+jets decay modes, where the W boson from the top quark decays into an electron or muon, and a neutrino. We present results from the application of matrix elements to separate the expected signals from backgrounds.

Session F1: Welcome Reception and Posters, Saturday 12th, 5:30 pm

15. Measurement of the W Boson Helicity in Top Quark Decay at DØ

Amitabha Das, University of Arizona

We report on a model-independent measurement of the helicity of W bosons produced in top quark decays based on a 1 fb^{-1} sample of $t\bar{t}$ events in the dilepton and lepton+jets channels. In the standard model, the fraction of longitudinal (right-handed) W bosons is predicted to be 0.7 (0). The deviation from these values would be a clear sign of new physics. The measurement is based upon the angle between the momenta of the down-type fermion and the top quark in the W boson rest frame.

16. Single Top Quark Production at DØ in the Muon Decay Channel Using Boosted Decision Trees

Jorge Benitez, Michigan State University

Protons and antiprotons are collided at the Fermilab Tevatron at a center of mass energy of 1.96 TeV. We have performed a search for single top quark production in these collisions using a dataset of 2.2 fb^{-1} collected with the DØ detector in the muon+jets channel. This analysis utilizes secondary-vertex tagging to identify jets originating from b quarks. It probes the muon+jets decay mode, where the W boson from the top quark decays into a muon and a neutrino. We present results from the application of boosted decision trees to separate the expected signals from backgrounds.

17. Measurement of the Top Quark Mass at DØ Using the Matrix weighting Method on Dilepton Events

Daniel Boline, Boston University

We present a measurement of the top quark mass in the dilepton channel based on approximately 1 fb^{-1} of data collected by the DØ experiment during Run II of the Fermilab Tevatron collider. The kinematics of these events are not sufficiently constrained by the observed final state to reconstruct the top quark mass. We therefore compute a likelihood for the observed events to occur for a range of assumed top quark masses. For each event we choose the hypothesized top quark mass at which this likelihood is maximized as the estimator for the top quark mass. We compare the distribution of this estimator for all events to Monte Carlo predictions for different input top quark masses in a maximum likelihood fit to extract the top quark mass.

18. Measurement of the Charge Asymmetry in Top production in proton-Antiproton Collisions at DØ

Amnon Harel, University of Rochester

We report on the first measurement of the forward-backward asymmetry in top quark production in proton-antiproton collisions based on 0.9 fb^{-1} of data. If the component of the top quark momentum along the proton direction is larger than that of antitop the asymmetry is defined as positive and negative otherwise. Top and antitop momenta are reconstructed in lepton+jets sample using b -tagging information and kinematic constraints.