

**New Perspectives 2011**

**Report of Contributions**

Contribution ID: 29

Type: **not specified**

## Introduction

*Tuesday, 31 May 2011 07:55 (5 minutes)*

**Presenter:** ISVAN, Zeynep (GSA)

**Session Classification:** Session 1

Contribution ID: 30

Type: **not specified**

## Ten Years of the CDF Silicon Vertex Detector: Performance and Status

*Tuesday, 31 May 2011 08:00 (20 minutes)*

The CDF Silicon Vertex Detector plays a critical role in most analyses at CDF, including searches for the Higgs boson, new physics signatures, measurements of Bs-mixing, top quark and W boson masses. Originally designed to withstand up to 3 1/fb, its life has spanned over 11 1/fb of integrated delivered luminosity with surprisingly good performance. In this talk we will present details of detector's components, radiation environment, effects of continuous exposure and general performance.

**Presenter:** MIGUEL MONDRAGON

**Session Classification:** Session 1

**Track Classification:** Energy Frontier

Contribution ID: 31

Type: **not specified**

## Matrix Element Measurement of the Top Quark Mass in Hadronic Tau + Jets Events

*Tuesday, 31 May 2011 08:20 (20 minutes)*

We use an unbinned likelihood fit, as used in previous precision top quark mass measurements, with events from lepton + jet top quark decays where the lepton has been identified as a hadronically decaying tau. We use ppbar collisions at 1.96 TeV at CDF. Events require a single lepton identified as a hadronic tau, missing  $E_t$ , and 4 jets of which at least one must be tagged as a b jet. The likelihood fit is based on per-event probabilities calculated from leading-order signal ( $t\bar{t}$ ) and background ( $W$ +jets) matrix elements. Our goal is to directly identify this final state and provide a top quark mass measurement in this decay channel.

**Presenter:** DARYL HARE**Session Classification:** Session 1**Track Classification:** Energy Frontier

Contribution ID: 32

Type: **not specified**

## Measuring Spin Correlations in Top Quark Pairs at D0

*Tuesday, 31 May 2011 08:40 (20 minutes)*

Recently two measurements of the correlation between the spin of the top quark and antiquark have been performed at D0. In the  $\{t\bar{t} \rightarrow W^+bW^-b\bar{b} \rightarrow l^+\nu_l l^-\bar{\nu}_l\}$  final states we select about 300  $t\bar{t}$  pairs, corresponding to an integrated luminosity of  $5.4 \text{ fb}^{-1}$ . In the first analysis the correlation is extracted from the angles of the two leptons in the  $t$  and  $\bar{t}$  rest frames, yielding a correlation strength  $C = 0.10^{+0.45}_{-0.45}$ , in agreement with the NLO QCD prediction within two standard deviations. Using a matrix element based approach we significantly improve the sensitivity in the second measurement. This allows us to exclude the no correlation hypothesis at the 97.7% C.L.

**Presenter:** TIM HEAD**Session Classification:** Session 1**Track Classification:** Energy Frontier

Contribution ID: 33

Type: **not specified**

## Measurement of t-channel Single Top quark production cross-section at D0

*Tuesday, 31 May 2011 09:00 (20 minutes)*

We present a model-independent measurement of t-channel electroweak production of single top quarks in ppbar collisions at center of mass energy of 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  $\sigma(\text{pp}^- \rightarrow \text{tqb} + \text{X}) = 2.90 \pm 0.59$  (stat + syst) pb for a top quark mass of 172.5 GeV. The probability of the background to fluctuate and produce a signal as large as the one observed is  $1.6 \times 10^{-8}$ , corresponding to a significance of 5.5 standard deviations.

**Presenter:** JYOTI JOSHI**Session Classification:** Session 1**Track Classification:** Energy Frontier

Contribution ID: 34

Type: **not specified**

## Measurement of the b-tagging efficiency using events with jets containing muons

*Tuesday, 31 May 2011 09:20 (20 minutes)*

We present a measurement of the b-tagging efficiency using 32pb-1 of data collected in 2010 with the CMS detector operating at the proton-proton LHC with  $\sqrt{s}=7$  TeV. The measurement is based on data samples that have a least two reconstructed jets and a non-isolated muon close to one of the jets. The measurements are made as a function of the jet  $p_T$  and  $\eta$ . Results are presented for different b-tagging algorithms that identify b-jets based on the track's impact parameters or by fully reconstructing the secondary decay vertex.

**Presenter:** SAMVEL KHALATYAN**Session Classification:** Session 1**Track Classification:** Energy Frontier

Contribution ID: 35

Type: **not specified**

## Search for the Standard Model Higgs Boson produced in Association With a W boson

*Tuesday, 31 May 2011 09:40 (15 minutes)*

We present a search for the Standard Model Higgs boson produced in association with a W boson in proton-antiproton collisions at a center-of-mass energy of 1.96 TeV. We search a dataset corresponding to an integrated luminosity of 5.7 fb<sup>-1</sup>. The analysis uses the channel where the Higgs boson decays to a bottom-antibottom quark pair and the W boson decays leptonically. Therefore, we select events consistent with the signature of one high transverse-momentum electron or muon candidate, large missing transverse energy and two jets. We increased the purity of our sample by using advanced techniques to identify several categories of jets that originate from bottom quarks. We further improved our discrimination of Higgs signal from background processes through the use of an artificial neural network. We combined our searches in separate tag and charged lepton categories and set a 95% confidence level upper limit on the production cross section times branching ratio of the Standard Model Higgs boson.

**Presenter:** ADRIAN BUZATU (Higgs mini-session)

**Session Classification:** Session 1

**Track Classification:** Energy Frontier: Higgs Physics



Contribution ID: 36

Type: **not specified**

## Search for Standard Model Higgs Boson in $H \rightarrow WW \rightarrow l\nu jj$ Channel at CDF

*Tuesday, 31 May 2011 09:55 (15 minutes)*

We present a search for Standard Model Higgs boson ( $h$ ) production in  $pp$ -bar collisions at a center-of-mass energy of 1.96 TeV. For this analysis, we use the data collected with the CDF II detector. We consider  $h$  decays into two  $W$  bosons of which one decays into a lepton plus a neutrino and another decays into two jets. This is the dominant decay mode for  $h$  mass larger than 135 GeV. This decay mode has an important kinematic feature that  $W$  bosons have a spin correlation because the spin of  $h$  is zero. We employ a likelihood method with variables such as an angle between a lepton and an up-type jet to separate signals from backgrounds.

**Presenter:** YUJI SUDO**Session Classification:** Session 1**Track Classification:** Energy Frontier: Higgs Physics

Contribution ID: 37

Type: **not specified**

## New tools for the Higgs search in tau tau channel at CDF experiment

*Tuesday, 31 May 2011 10:10 (15 minutes)*

An overview of a search for the Higgs boson in the  $H \rightarrow \tau\tau$  decay channel in data collected with CDF detector at the Tevatron collider is presented. To fully explore the discovery potential of this channel sophisticated methods are required for identification and energy measurements of tau leptons decaying hadronically as well as the for accurate reconstruction of the mass of  $\tau\tau$  system, which is particularly challenging due to presence of multiple neutrinos from tau decays. Two new methods are presented to address both problems. The first method employs a particle flow algorithm complemented with a likelihood-based method for separating contributions of overlapping energy depositions of spatially close particles. In addition to superior tau energy resolution provided by the method, the estimate of the probability of the observed detector response for a given particle hypothesis allows improved rejection against quark or gluon jets background. The second method was developed for full mass reconstruction of  $\tau\tau$  system and it relies on a requirement that mutual orientations of the neutrinos and other decay products are consistent with the mass and decay kinematics of a tau lepton. This is achieved by minimizing a likelihood function defined in the kinematically allowed phase space region. The method provides significant improvements over existing methods for mass reconstruction of  $\tau\tau$  resonances. The performance of both methods is tested on a sample of data  $Z\gamma^* \rightarrow \tau\tau$  events.

**Presenter:** ANDEY ELAGIN**Session Classification:** Session 1**Track Classification:** Energy Frontier: Higgs Physics

Contribution ID: 38

Type: **not specified**

## Search for the Standard Model Higgs Boson in the ZH- $\rightarrow$ llbb Channel at CDF

*Tuesday, 31 May 2011 10:25 (15 minutes)*

We present a search for the Standard Model Higgs boson produced in association with a  $Z$  boson in the  $\ell^+\ell^-b\bar{b}$  ( $\ell = e, \mu$ ) final state using the CDF detector. The latest iteration of this analysis has benefited from several improvements, including multivariate lepton identification, the inclusion of additional triggers based on missing transverse energy, and the addition of expert discriminants to better separate signal and background. These improvements have led to significant increases in signal acceptance. We present the latest limits on the Higgs production cross section, and detail the new techniques used in this analysis.

**Presenter:** JUSTIN PILOT**Session Classification:** Session 1**Track Classification:** Energy Frontier: Higgs Physics

Contribution ID: 39

Type: **not specified**

## Search for the Vh Production Using Like-Sign Dilepton Events at CDF

*Tuesday, 31 May 2011 11:00 (20 minutes)*

We are searching the Higgs boson associated with a vector boson by using like-sign dilepton events. In these events, the most dominant backgrounds are fake events. As collecting the data, we found that the nominal W veto causes some bias in the fake ratios. Also, pT only background predictions are not sufficient because fakes depend on other variables and result in poor predictions. In this conference, we mainly report our new fake estimations, five-dimensional fake rate with MC-based subtraction.

**Presenter:** DAISUKE YAMATO**Session Classification:** Session 2**Track Classification:** Energy Frontier

Contribution ID: 40

Type: **not specified**

## Electroweak Results from CMS

*Tuesday, 31 May 2011 11:20 (20 minutes)*

A summary of electroweak results from the CMS Collaboration is given. The inclusive cross sections have been measured to better than 2% with a 4% luminosity uncertainty. The rate of jet production in association with W and Z bosons has been extensively studied and includes a test of Berends-Giele scaling. The W polarization in unpolarized pp collisions has been observed. Measurements of the W charge asymmetry, Drell-Yan cross section, Z differential cross sections ( $d\sigma/dY$  and  $d\sigma/dq_T$ ) all constrain the parton distribution functions. A new technique for measuring  $\sin^2\theta_W$  is presented. Finally, relatively rare processes such as di-boson production and Z + heavy flavor have been observed

**Presenter:** MICHELE DE GRUTTOLA**Session Classification:** Session 2**Track Classification:** Energy Frontier

Contribution ID: 41

Type: **not specified**

## Search for Anomalous Production of Events with a W or Z Boson and Additional Leptons

*Tuesday, 31 May 2011 11:40 (20 minutes)*

We present a search for anomalous production of events containing a W or Z boson and additional leptons. The search uses data corresponding to  $5.1 \text{ fb}^{-1}$  of integrated luminosity from  $p\bar{p}$  collisions at a center-of-mass energy of  $\sqrt{s} = 1.96 \text{ TeV}$ . We find no indications of non-standard-model phenomena. Limits are set for a dark-matter inspired model of supersymmetric dark sector Higgs production.

**Presenter:** SCOTT WILBUR**Session Classification:** Session 2**Track Classification:** Energy Frontier

Contribution ID: 42

Type: **not specified**

## Search for Fourth Generation Top-like quarks at CDF

*Tuesday, 31 May 2011 12:00 (20 minutes)*

We present searches for a massive quark ( $t'$ ) decaying to  $Wq$  and separately  $Wb$ , thus mimicking the top quark decay signature in data collected by the CDF II detector corresponding to  $5.6 \text{ fb}^{-1}$ . We use the reconstructed mass of the  $t'$  quark and the scalar sum of the transverse energies in the event to discriminate possible new physics from Standard Model processes, and set limits on a standard 4th generation  $t'$  quark.

**Presenter:** DAVID COX**Session Classification:** Session 2**Track Classification:** Energy Frontier

Contribution ID: 43

Type: **not specified**

## Precision measurement of Bs lifetime in the channel Bs- $\rightarrow$ $\mu$ Ds X with the D0 dete

*Tuesday, 31 May 2011 12:20 (20 minutes)*

The Heavy Quark Expansion theory predicts that the ratio among the  $B^0$  and  $B_s$  lifetime to be very close to 1. The  $B^0$  lifetime has been measured with a precision around 1%, so having a precision measurement of  $B_s$  lifetime can be a test of this framework. I will describe a method to measure the  $B_s$  lifetime using the semileptonic channel  $B_s^0 \rightarrow D_s^+ \mu X$  with data collected by the D0 collaboration.

**Presenter:** JORGE MARTINEZ ORTEGA

**Session Classification:** Session 2

**Track Classification:** Energy Frontier



Contribution ID: 44

Type: **not specified**

## **A Research Study on the Impact of Relocation**

*Tuesday, 31 May 2011 13:40 (10 minutes)*

International Services is researching the process by which people adapt to living and working at Fermilab, with focus on psychological processes known as Culture Shock and “transition shock”. The goal is to develop systems and resources to emphasize enjoyable aspects and minimize stressful aspects.

International Services is confirming anecdotal data about adapting to Fermilab, and exploring possible new systems or resources, by conducting interviews of users and employees. The interviews are 20 - 30 minutes long and focus on the expectations prior to arrival, the issues that arose during transition, and the successful coping mechanisms, resources or systems that facilitated transition. Please volunteer to be interviewed to share your experiences, ideas or opinions!

**Presenter:** HALEY PSCHIRRER

**Session Classification:** Session 3

Contribution ID: 45

Type: **not specified**

## Clusters and Lenses: Analyzing Ten Gravitational Lensing Systems

*Tuesday, 31 May 2011 13:50 (20 minutes)*

In this presentation, we describe a study of ten strong gravitational lenses. A gravitational lens is a mass distribution which causes the deflection of light from a more distant astronomical source, sometimes forming a ring or an arc visible in space. In this case, all of the lenses are clusters of galaxies. These lensing systems were discovered in the Sloan Digital Sky Survey by the Sloan Bright Arcs Survey at Fermilab. We took data on these systems with much better resolution and reduced and calibrated the data. We then studied the properties of the galaxy clusters of which the lenses are a part and the properties of the strong lenses themselves. We present results for the number of galaxies in each cluster and for the masses and the velocity dispersions of the clusters. We also present results for the Einstein radii (the sizes of the visible arcs of light), masses and velocity dispersions of the strong lenses. Finally, we find a relation between the Einstein radii and the cluster masses and we compare this relation to the findings of other groups.

**Presenter:** MATTHEW WIESNER

**Session Classification:** Session 3

**Track Classification:** Cosmic Frontier

Contribution ID: 46

Type: **not specified**

## DM-Ice: A dark matter detector at the South Pole

*Tuesday, 31 May 2011 14:10 (20 minutes)*

DM-Ice is a new direct detection dark matter experiment planned for deployment deep in the South Pole ice underneath the IceCube Neutrino Telescope. This detector will consist of approximately 250-kg of NaI(Tl) scintillating crystals and will have sensitivity to testing the expected annual modulation in the dark matter signal. Following the results of DAMA/LIBRA and preliminary findings of CoGeNT with respect to this modulation, an experiment in the southern hemisphere will be able to test the hypothesis while eliminating or reversing seasonal environmental and cosmic ray effects.

In December 2010, two prototype units of 17-kg combined crystal mass were deployed at a depth of ~2200 m.w.e.; these units are now taking data. We will report on the current status of the prototype and discuss the full-scale experiment.

**Presenter:** WALTER PETTUS

**Session Classification:** Session 3

**Track Classification:** Cosmic Frontier

Contribution ID: 47

Type: **not specified**

## The Primordial Lithium Problem : Can We Avoid New Physics ?

*Tuesday, 31 May 2011 14:30 (20 minutes)*

The primordial abundances of light elements form an important evidence of the Big Bang Model of the universe. With precise measurements of the baryon-to-photon ratio,  $\eta$  from WMAP, these final abundances, which are functions of  $\eta$  alone in general, are fixed and must be consistent. As a result, any discrepancy between the theoretical and observational abundances of these elements, as exists for lithium, may be due to inadequacies in the Big Bang Nucleosynthesis Model which is based on the Standard Model of particle physics and cosmology. This could potentially point to new physics beyond the Standard Model such as decaying dark matter, or incompleteness of the nuclear reaction network. The theoretical  ${}^7\text{Li}$  abundance is 3-4 times more than the observational values at  $\eta_{\text{WMAP}}$ . In order that the former matches the latter,  ${}^7\text{Li}$  destruction needs to be enhanced as the production channels are more constrained. This could be achieved within the Standard Model

via missed resonant nuclear reactions, which is the possibility we explore. We find some potential candidate resonances which can solve the lithium problem if the radii of the resonant channels are large ( $> 10$  fm). These resonance properties need experimental verification. If experiment rules them out, then we may be compelled to invoke new physics to solve the lithium problem and potentially constrain dark matter models.

**Presenter:** NACHIKETA CHAKRABORTY**Session Classification:** Session 3**Track Classification:** Cosmic Frontier

Contribution ID: 48

Type: **not specified**

## The ArgoNeuT Experiment

*Tuesday, 31 May 2011 14:50 (20 minutes)*

ArgoNeuT, a 170 liter Liquid Argon Time Projection Chamber (LArTPC) neutrino detector, recently collected thousands of neutrino events in the NuMI beam line at Fermilab. After a brief introduction to the experiment, progress on the reconstruction and analysis will be discussed. Candidate neutrino events and future LArTPC experiments will also be presented.

**Presenter:** ELLEN KLEIN

**Session Classification:** Session 3

**Track Classification:** Intensity Frontier

Contribution ID: 49

Type: **not specified**

## **R&D Effort for Plastic Scintillator Based Cosmic Ray Veto System for Mu2e**

*Tuesday, 31 May 2011 15:10 (20 minutes)*

The proposed Mu2e experiment aims to search for neutrino-less muon to electron conversion with sensitivity improved by three orders of magnitude relative to previous experiments. To achieve this goal, Mu2e needs to obtain a cosmic ray veto efficiency of better than 99.9%. We report the preliminary results of recent R&D efforts for three-layer plastic scintillator veto system. The results are obtained from the studies of a PMT based prototype module and single scintillator counter read out by SiPMs

**Presenter:** YURI OKSUZIAN

**Session Classification:** Session 3

**Track Classification:** Intensity Frontier

Contribution ID: 50

Type: **not specified**

## Studies of variation of rates for nuclear decays

*Tuesday, 31 May 2011 15:30 (15 minutes)*

Neu-Rad is an experiment to investigate the recently observed variations in isotope decay rates correlated with the earth-sun distance and solar flares. Isotope decay rates will be observed near high flux neutrino sources with energies similar to what is observed from the sun such as the nuclear reactor facility in Rio De Janeiro, Brasil. Isotope decay rates will also be measured at the underground neutrino beamline at Fermilab. The isotope decay rates are recorded using a Ge detector and are integrated every 12 hours. The decay rates in the laboratory, at the Fermilab neutrino source, and at the nuclear reactor facility will be compared. Initial measurements using a Sr-90 source in the laboratory will be shown.

**Presenter:** Ms CANCELO, Martina (Batavia High School)

**Session Classification:** Session 3

**Track Classification:** Cosmic Frontier

Contribution ID: 52

Type: **not specified**

## Light Detection in Liquid Argon Time Projection Chambers

*Tuesday, 31 May 2011 16:00 (20 minutes)*

Liquid Argon Time Projection Chambers (LArTPC) are being developed to study the neutrino sector because of their sensitivity and scalability. In a LArTPC, light detection information is used in conjunction with a wire chamber to reconstruct charged particle paths. MicroBooNE is a LArTPC being built at Fermilab to measure neutrino cross-sections in liquid argon and investigate the low-energy excess measured by MiniBooNE. I will explain the basics of LArTPCs, the physics MicroBooNE will investigate, how MicroBooNE will make its measurements, and the work we are doing at MIT to improve light detection coverage in MicroBooNE and future LArTPCs.

**Presenter:** TESS SMIDT

**Session Classification:** Session 4

**Track Classification:** Intensity Frontier



Contribution ID: 53

Type: **not specified**

## A Study of the Neutrino Mass Hierarchy with MINOS Far Detector Atmospheric Neutrinos

*Tuesday, 31 May 2011 16:20 (20 minutes)*

MINOS is a long-baseline neutrino oscillation experiment utilizing the NuMI neutrino beam from Fermilab. Although not designed for atmospheric neutrino analyses, the uniqueness of the MINOS magnetized detector enables neutrino induced muon charge discrimination and the measurement of the charge asymmetry due to matter effects as a function of zenith angle and neutrino energy. The oscillation probabilities are significantly modified by matter effects due to a coherent charged-current forward scattering of electron-type neutrinos with electrons as the neutrinos propagate through the Earth. The matter effects have an opposite sign for neutrinos versus antineutrinos and for the normal versus inverted neutrino mass hierarchy. We present in this talk an analysis of using the MINOS far detector atmospheric neutrinos for the potential neutrino mass hierarchy determination. A realistic analysis for atmospheric neutrinos is performed with simulated data.

**Presenter:** XINJIE QIU

**Session Classification:** Session 4

**Track Classification:** Intensity Frontier

Contribution ID: 54

Type: **not specified**

## Anti-Neutrino Quasi-Elastic Scattering in MINERvA

*Tuesday, 31 May 2011 16:40 (15 minutes)*

We present recent anti-neutrino Quasi-Elastic scattering results in the few GeV region. Data was taken with the MINERvA detector in the NuMI beam at Fermilab. We discuss sample selection and show data and simulation comparisons.

**Presenter:** JESSE CHVOJKA

**Session Classification:** Session 4

**Track Classification:** Intensity Frontier: MINERvA

Contribution ID: 55

Type: **not specified**

## **ART (Algebraic Reconstruction Technique) for Electron Shower**

*Tuesday, 31 May 2011 16:55 (15 minutes)*

I will talk about new reconstruction algorithm that is based on a medical CT scan image reconstruction to reconstruct electron shower event in MINERvA detector.

**Presenter:** JAEWON PARK

**Session Classification:** Session 4

**Track Classification:** Intensity Frontier: MINERvA

Contribution ID: 56

Type: **not specified**

## First steps to RES-CCPi0

*Tuesday, 31 May 2011 17:10 (15 minutes)*

Ideas how to reconstruct charge current Pi zero production in the Minerva Experiment.

**Presenter:** JOSE PALOMINO GALLO

**Session Classification:** Session 4

**Track Classification:** Intensity Frontier: MINERvA

Contribution ID: 57

Type: **not specified**

## Tagging Michel electrons in Minerva

*Tuesday, 31 May 2011 17:25 (15 minutes)*

Tagging michel electrons in Minerva

**Presenter:** DUN ZHANG

**Session Classification:** Session 4

**Track Classification:** Intensity Frontier: MINERvA

Contribution ID: 58

Type: **not specified**

## Candidate Event Formation and Readout Dead Time Accounting in MINERvA

*Tuesday, 31 May 2011 17:40 (15 minutes)*

MINERvA experiment is running since the last year and the first analysis are taking place. In this presentation I show the candidate event formation from our data and the tools that manage the readout dead time. Both of them are very important in the reconstruction stage.

**Presenter:** LEONIDAS ALIAGA SOPLIN

**Session Classification:** Session 4

**Track Classification:** Intensity Frontier: MINERvA