# CDF Japan Group Contribution
# (2) Physics Analyses

## Top Quark Mass

**Tsukuba group has worked on the top quark mass and kinematics analysis since Run0, and reported the results in 27 CDF notes before the top quark discovery. Dynamical Likelihood Method (DLM) was invented by K. Kondo.**


CDF/ANAL/TOP/CDFR/2047
Version 1.0

Reconstruction of b-tagged Events in the Lepton +Jets Channel as $t\bar{t}$ Production

S.Kim and K. Kondo

Abstract

A method of parton level reconstruction of lepton+jets events as $t\bar{t}$ production is described. The method is applied for reconstruction of HERWIG/QFL Monte Carlo $t\bar{t}$ events, with $M_{top}$=120,140,160,180 and 200 GeV, and VECBOS/HERWIG/QFL W+jets events. Reconstructed mass spectra of these samples are shown. With this Monte Carlo study, we evaluate errors in reconstructed masses, and we also check the CDF standard jet energy scale. The method is then applied to $t\bar{t}$ candidate events in the CDF Run 1a data, in which

CDF/TOP/PHYS/2401
December 23, 1993
Version 1.0

Comparison of fitting methods on top candidate events

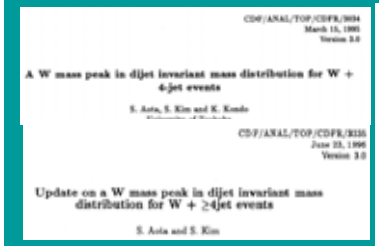
J.Lys, M.Binkley, L.Galtieri, B.Harral, S.Kim, K.Kondo, K.Sliwa, D.Wu

**Tsukuba group reported the top quark masses from $t\bar{t}$ candidates $W$ + jets events with one b-tag in Run1a.**

**Top quark masses in Run1a reconstructed by Tsukuba group and 4 other groups were compared between each other (end of 1993) .**

## Hadronic $W$ decay in $t\bar{t}$ events

**Hadronic $W$ decay in $t\bar{t}$ events was first observed in W + 4jet pre-tagged events after $H_T$ > 330GeV cut.**


CDF/ANAL/TOP/CDFR/3034
March 15, 1995
Version 3.0

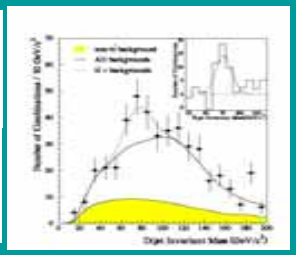
A W mass peak in dijet invariant mass distribution for W + 4-jet events

S. Aota, S. Kim and K. Kondo

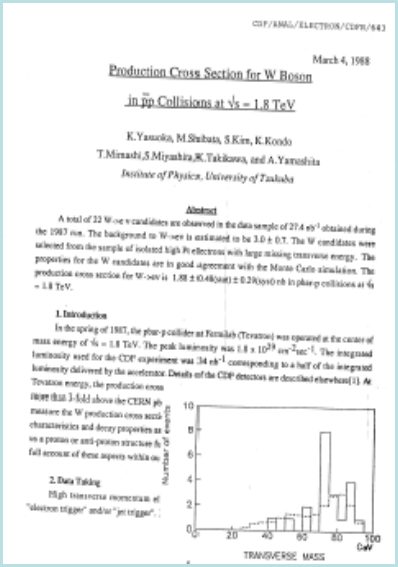
CDF/ANAL/TOP/CDFR/3135
June 23, 1996
Version 3.0

Update on a W mass peak in dijet invariant mass distribution for W + ≥4jet events

S. Aota and S. Kim



## $W \to e\nu$ Cross Section Measurement In 1987 Engineering Run


CDF/RMAL/ELECTRON/CDFR/643

March 4, 1988

Production Cross Section for W Boson in $p\bar{p}$ Collisions at $\sqrt{s}$ = 1.8 TeV

K.Yasuoka, M.Shibata, S.Kim, K.Kondo
T.Minashi, S.Miyashita, K.Takikawa, and A.Yamashita
*Institute of Physics, University of Tsukuba*

Abstract

A total of 22 W→eν candidates are observed in the data sample of 27.4 $nb^{-1}$ obtained during the 1987 run. The background to W→eν is estimated to be 3.0 ± 0.7. The W candidates were selected from the sample of isolated high $P_t$ electrons with large missing transverse energy. The properties for the W candidates are in good agreement with the Monte Carlo simulation. The production cross section for W→eν is $1.88 \pm 0.48(stat) \pm 0.23(sys)$ nb in $p\bar{p}$ collisions at $\sqrt{s}$ = 1.8 TeV.

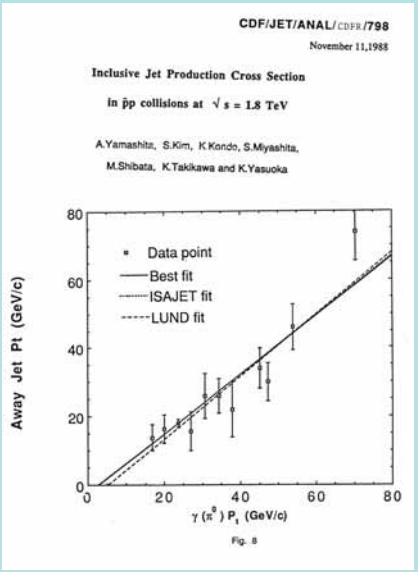
1. Introduction

In the spring of 1987, the $p\bar{p}$ collider at Fermilab (Tevatron) was operated at the center of mass energy of $\sqrt{s}$ = 1.8 TeV. The peak luminosity was $1.8 \times 10^{29}$ $cm^{-2}sec^{-1}$. The integrated luminosity used for the CDF experiment was 34 $nb^{-1}$ corresponding to a half of the integrated luminosity delivered by the accelerator. Details of the CDF detectors are described elsewhere[1]. At Tevatron energy, the production cross

2. Data Taking

TRANSVERSE MASS GeV

## $E_T$ balancing between γ and jet in γ + jet jet events in 1987 Engineering Run


CDF/JET/ANAL/CDFR/798

November 11,1988

Inclusive Jet Production Cross Section in $p\bar{p}$ collisions at $\sqrt{s}$ = 1.8 TeV

A.Yamashita, S.Kim, K.Kondo, S.Miyashita, M.Shibata, K.Takikawa and K.Yasuoka

Data point
Best fit
ISAJET fit
LUND fit

Away Jet Pt (GeV/c)

γ ($\pi^0$) $P_t$ (GeV/c)

Fig. 8

## PhD Theses in Japan Group

**Before RUN I ( 15 PhD Theses) + RUN I ( 24 PhD Theses)**

**T. Chikamatsu Top-Quark Search in the Dilepton Channel in 1.8-TeV Proton-Antiproton Collisions(1994.2).**
PRL 73 (1994) 225; citation 473 PR D50 (1994) 2966; citation 545

**S. Aota A Measurement of Top Quark Mass and Kinematics Properties in Fermilab 1.8-TeV Proton-Antiproton Collisions (1997.1)** PRL 80 (1998) 2767; citation 95 PRL 80 (1998) 5720; citation 11

## Newspaper Articles on Evidence for Top Quark Production


トップクオーク確認
日米伊のグループ
素粒子理論の「宿題」解決へ
素粒子物理学者 執念の解析


トップクォークを発見
トップクォークを「発見」
10個の現象確認
つつは発見済み

## 9th Topical Workshop on Proton-Antiproton Collider Physics held in October 1993 at Tsukuba

Excursion for accompanying persons of participants


9th Topical Workshop on Proton-Antiproton Collider Physics
October 18-22,1993 Tsukuba

Shinhong Kim, Kuni Kondo
University of Tsukuba