

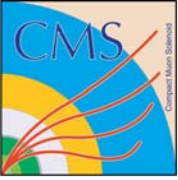
Di-lepton Group Report

JTERM-III

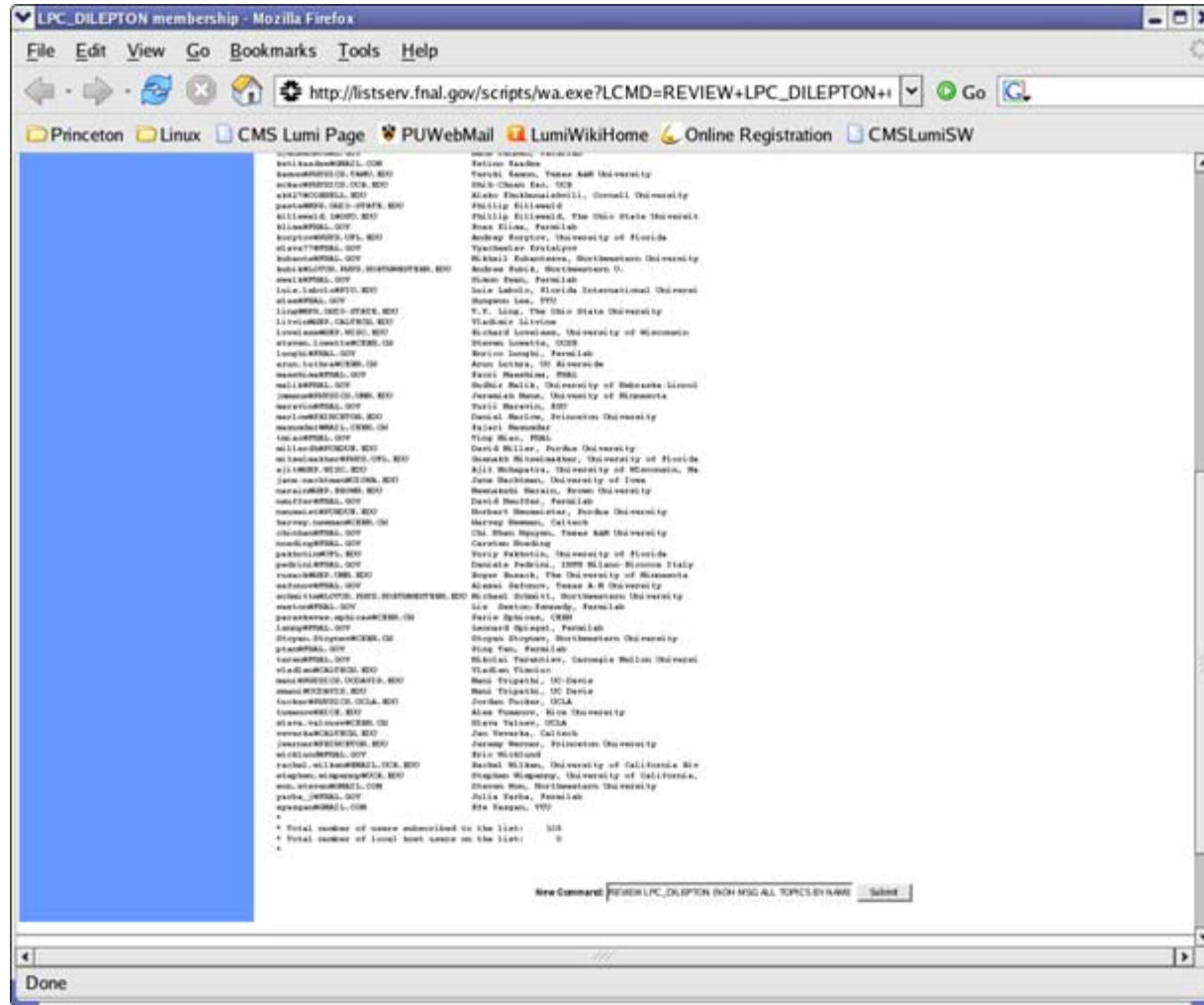
V. Halyo, Yurii Maravin

Jan 14, 2009

- Goals
- Ongoing Activities
- Tools/Meetings
- Join Us /Contact us !!!



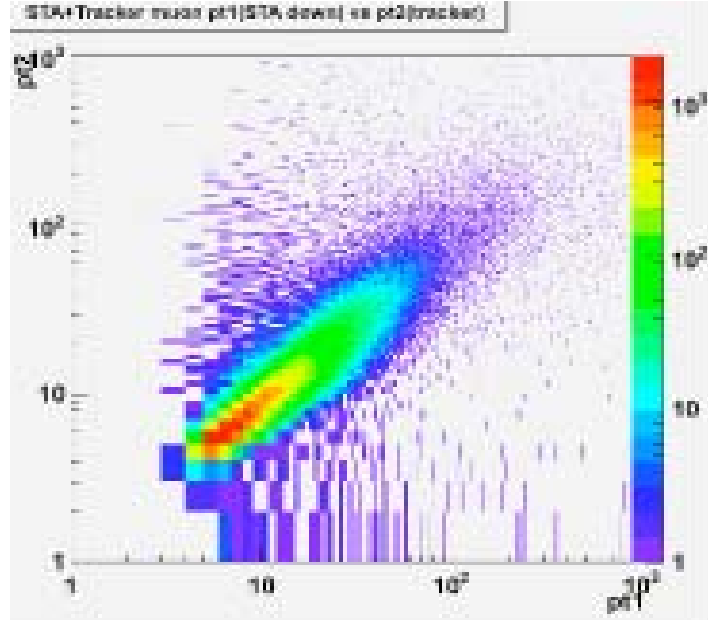
Di-lepton Members



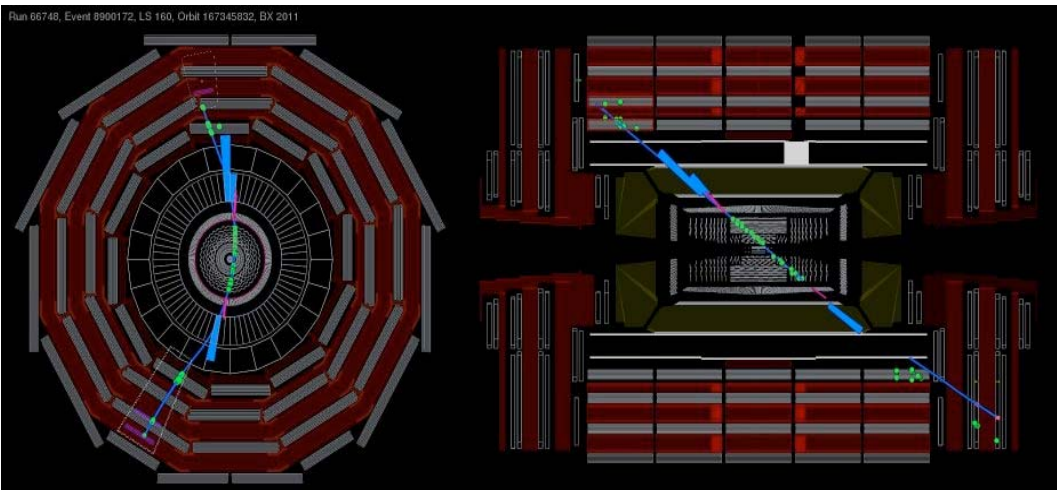
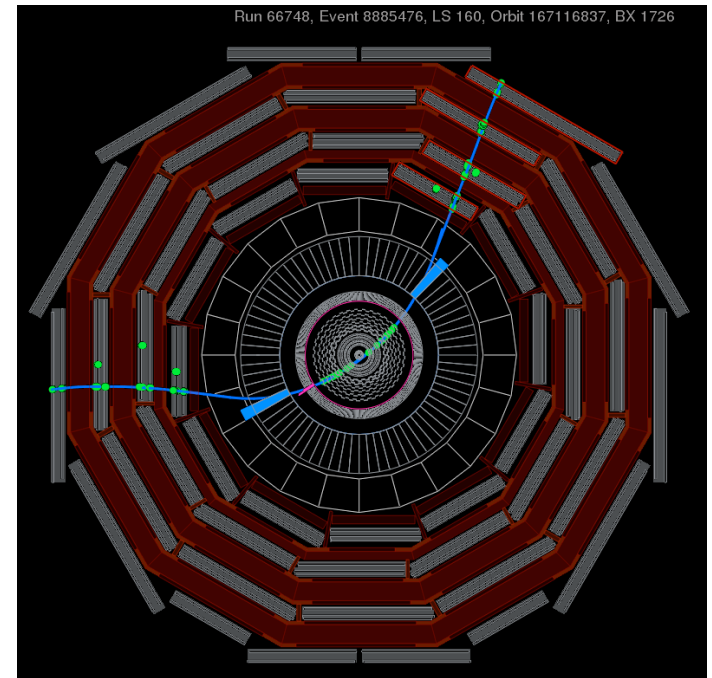
Up to now 117 members have signed up to the Di-Lepton Group

Cosmic Muons

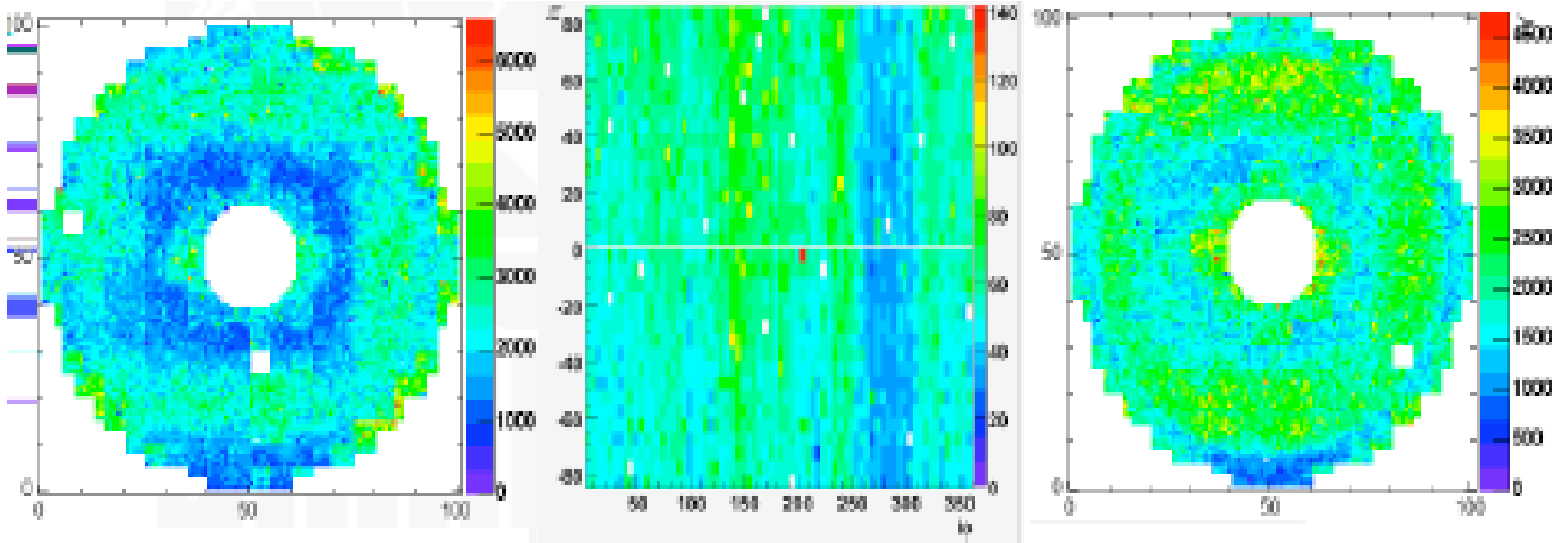
SA



track



Continuous stable running at 4T allowed various studies and measurement and careful tuning of data/MC



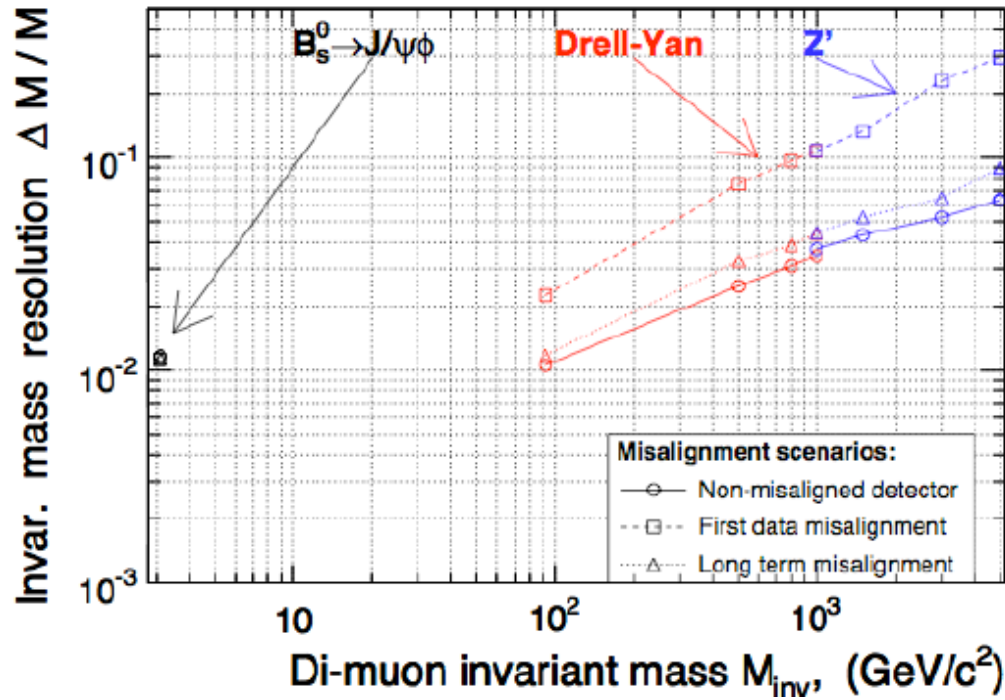
EE-

EB

EE+

Expected ECAL uniformity $\sim 4\%$ at startup
 Lepton energy calibrated to $\sim 2\%$
 Alignment 20-200 μm

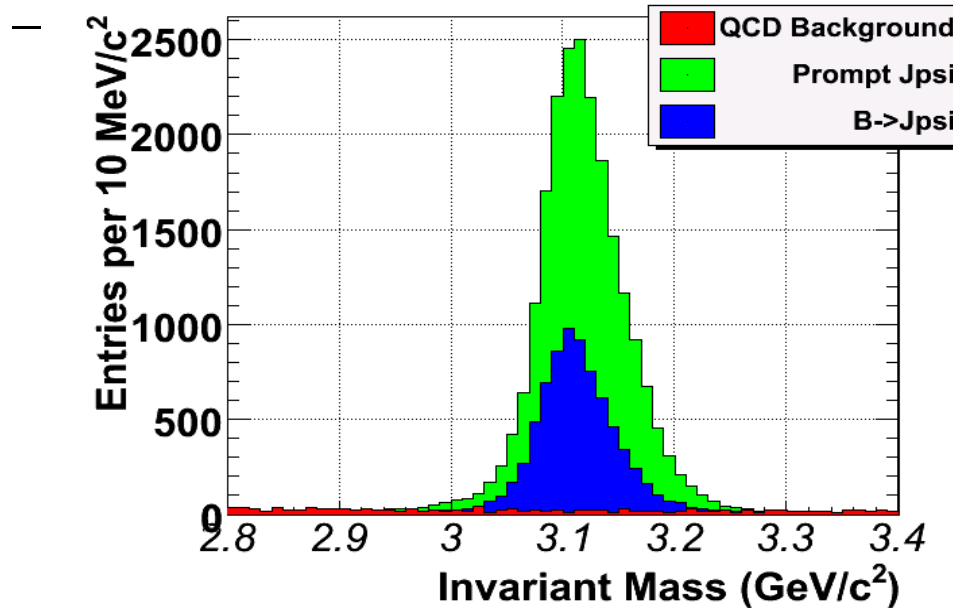
- Excellent mass resolution



Guido Tonelli

1pb-1

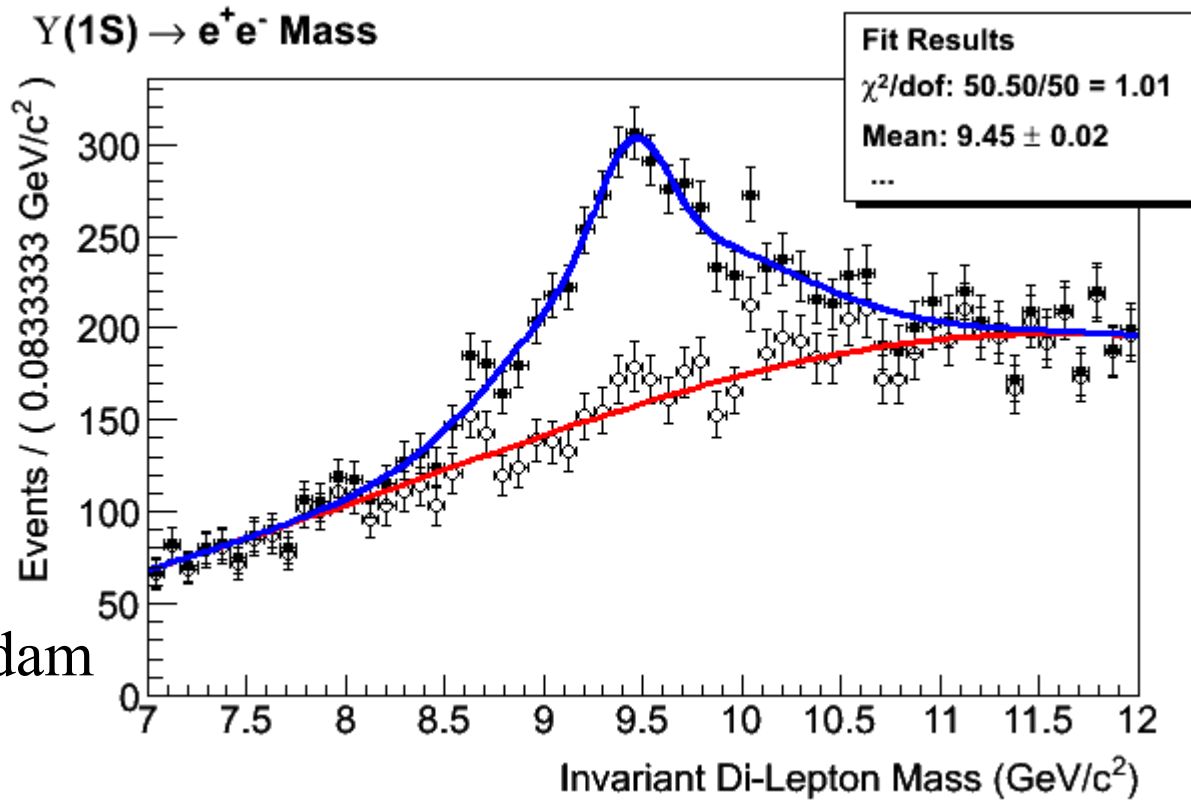
- Rediscovery of the Upsilon, K0, pi0..
 - Improving our calibration/alignments
 - Reconstruction of the Muons electrons photons objects



#(prompt Jpsi)=13K /pb⁻¹

Yu Zheng, Ian Shipsey

Upsilon to ee



Nadia Adam

$\sim 1\text{K events/pb-1}$

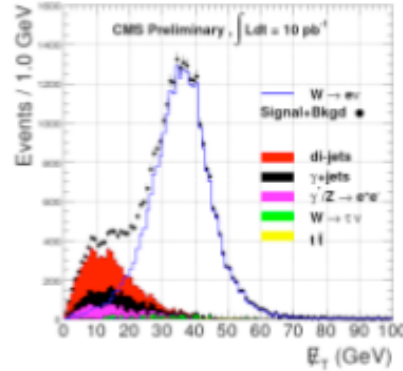
Bunches	Beta	Lumi	Pileup	# Z/week
1x1	18	10^{27}	Low	Low
43x43	18	3.8×10^{29}	0.05	137
43x43	4	1.7×10^{30}	0.21	616
156x156	2	6.1×10^{30}	0.76	2213
156x156	4	1.1×10^{31}	0.38	3390
156x156	4	5.6×10^{31}	1.9	20k
156x156	2	1.1×10^{32}	3.9	39.9k

Expected Num of Zs following this physics run is 66k

- Ultimate goal:
 - Determine all your efficiencies from data
 - Determine background fraction in your selection from data
 - If possible have different methods available to cross-check

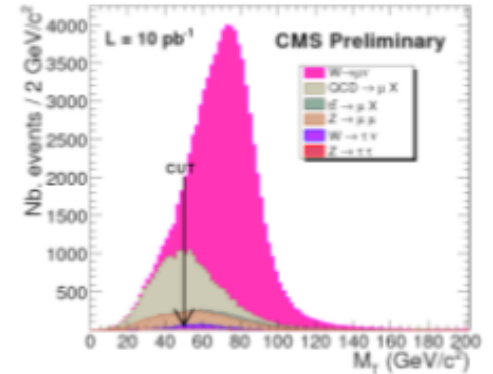
~10⁵ W events

$e^\pm \nu$ or $e^+ e^-$

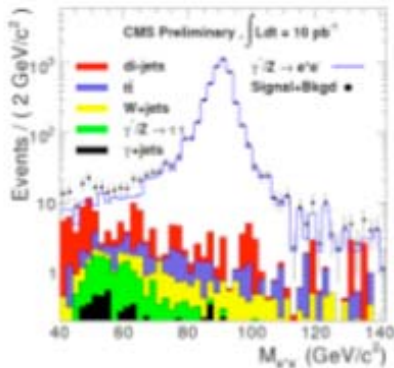


missing transverse energy

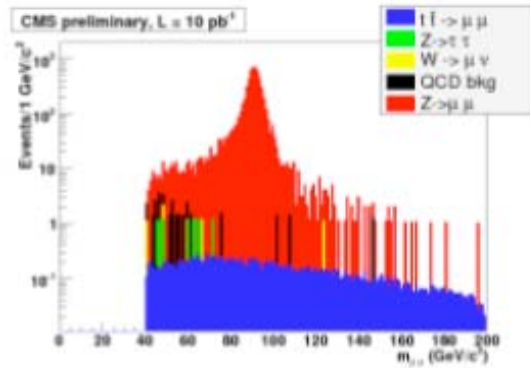
$\mu^\pm \nu$ or $\mu^+ \mu^-$



transverse mass



$e^+ e^-$ mass



$\mu^+ \mu^-$ mass

~10⁴ Z events

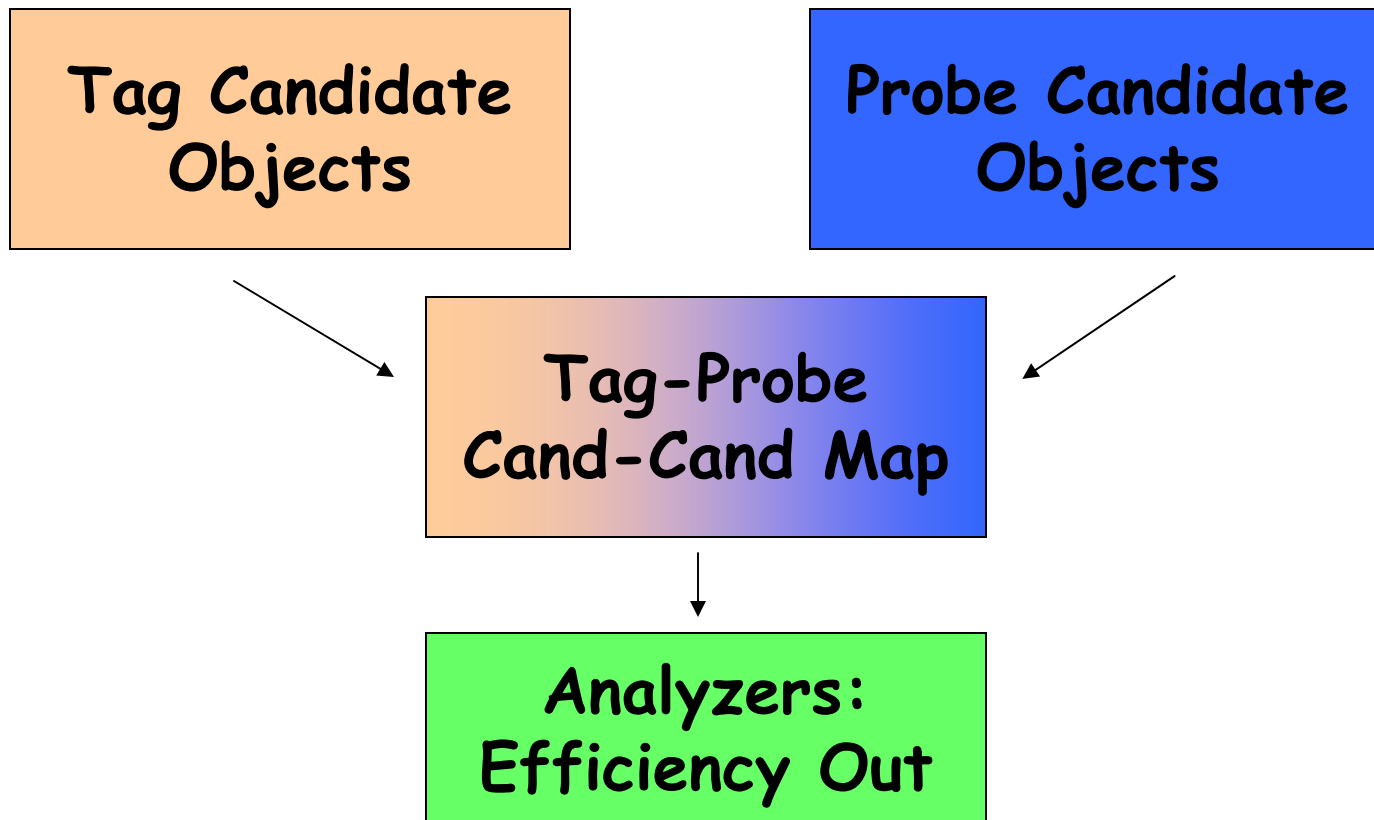
Trigger and offline efficiencies for CMS are about 85% and 77% for electrons and combined about 85% for single muons

- Z Efficiency determination
- Lepton energy scale and resolution
- Theoretical uncertainty $\sim 2\%$ (published JHEP)

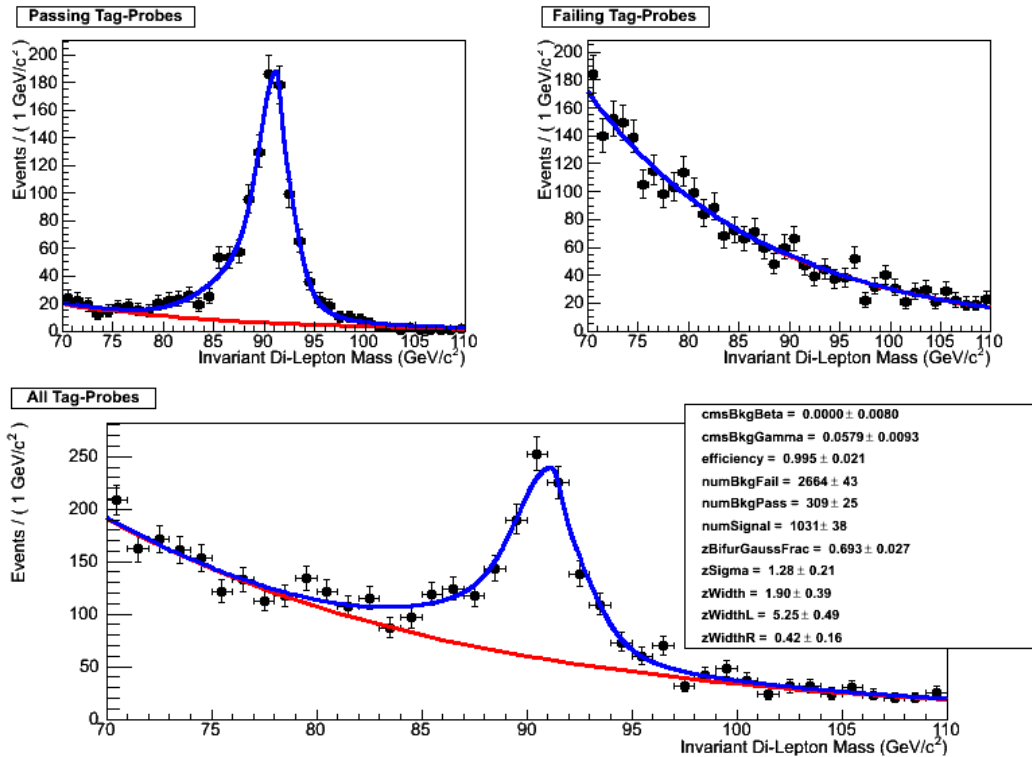
- The lepton efficiencies are evaluated by considering “the tag and prob” method the precision of this method will amount to few percent and account as the dominate systematic

Generic Tag & Probe Tools

Goal: Generic software package developed by Princeton/FNAL that can be used for any tag-probe style measurement.

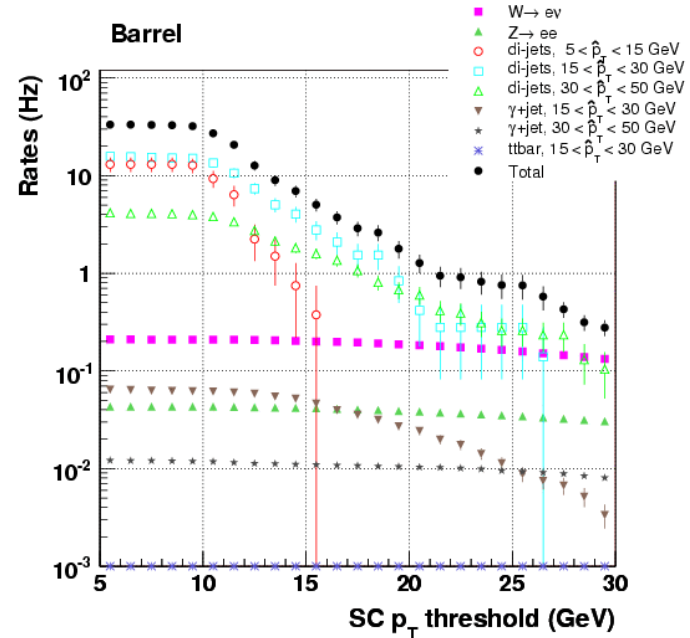
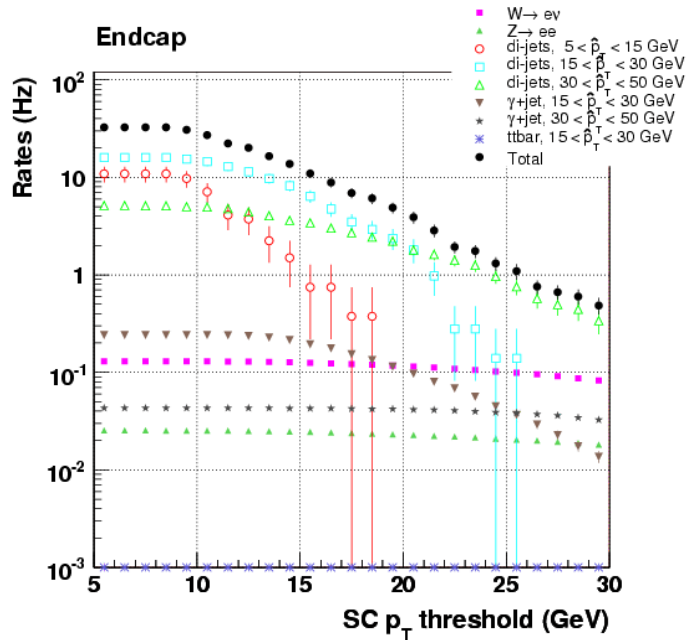


Reconstruction efficiency



Adam Hunt

Trigger Optimization



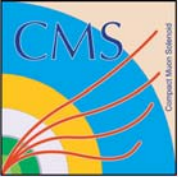
Jeremy Werner
Dmitry Bandurin

Managed to increase the rejection rate while maintaining the signal efficiency

- Look for inclusive dilepton signatures

Such as Z'/W' (KK/RS/Little Higgs/new gauge boson ...)

- Other following up analysis include tri-lepton (Technicolor, chargino+neutrino decay ...)
- Multiple leptons +Jets
- analysis just started and it needs more man power



Join us to di-lepton meeting



JTERMIII - Di-Lepton 5Hours Marathon (14 January 2009) - Mozilla Firefox

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http://indico.cern.ch/conferenceDisplay.py?confId=47008

CMS Sep10

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access (application/pdf Object) JTERMIII - Di-Lepton 5Hours Mar... Dibson fest (23 October 2008) Welcome to the Compact Muon Solenoi... electron_hlt_opt_talk_011209.pdf (app...)

category | view: Indico style | focus on: -- all days -- | manage |

LOCAL: US/Central HALYO, Valerie - logout



JTERMIII - Di-Lepton 5Hours Marathon

Wednesday 14 January 2009
from 10:30 to 18:00
US/Central
at FNAL/LPC (One West)
chaired by: Valerie Halyo, Yurii Maravin (KSU)

[Wednesday 14 January 2009](#) |

Wednesday 14 January 2009

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- 10:30 Overview of Di-lepton group (15) Valerie Halyo (Princeton)
- 10:45 Measurement of Cosmic Muons charge ratio (20) Ivan Furic (Uni. of Florida)
- 11:05 Overview on Muon Reco (20) Adam Evert (Purdue University)
- 11:25 Overview on Electron Reco (20) Matteo Sani (UC San Diego)
- 11:45 Overview on Tau Reco (20) Alexei Safonov (Texas A&M University)
- 12:05 CSC Beam Halo Trigger (20) Joe Gartner (Uni. of Florida)
- 12:25 break (1h00)
- 13:25 Electron HLT Optimization (20) Dmitry Bandurin (Kansas State University) , Jeremy Werner (Princeton)
- 13:45 Tag & Prob update (20) Adam Hunt (Princeton)
- 14:25 Upsilon -> mu mu production Xsec (Trigger Studies) (20) Zoltan Gecse (Purdue University)
- 14:45 Update on Lepton Differential Cross Section and Charge Asymmetry in Inc W(mu nu)+X (20) Ping Tan (FNAL)
- 15:05 Jpsi Production (20) Yu Zheng (Purdue University)
- 15:25 A measurement of Jpsi Polarization in CMS (20) Zhen Hu (Peking University)
- 15:45 Upsilon -> ee Production Xsec (20) Nadia Adam (Princeton) , Valerie Halyo (Princeton)
- 16:05 Overview on DY Analysis (20) Dimitri Bourilkov (Uni. of Florida)

How to get started

What topics are available

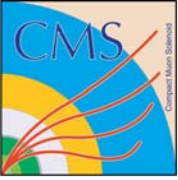
Who else is working on a particular topic

What are the available datasets and where

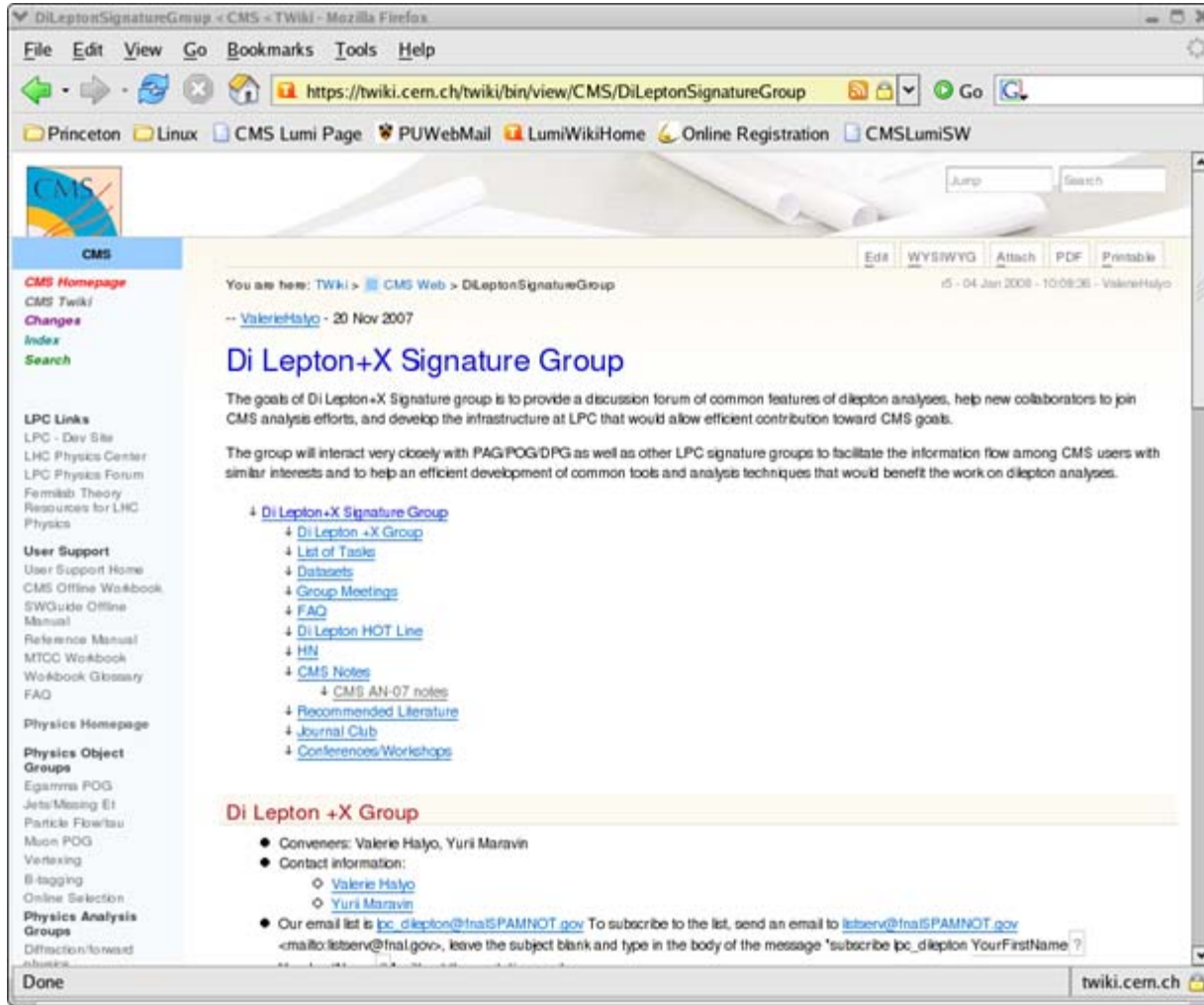
Group area for special skims at the LPC

How often should we meet

Do we have to report at the LPC



Tools



Our Website “DiLeptonSignature”

- POG
- PAG
- User Support (Workbook...)
- Tasks
- Datasets Skims
- Workshop..

<https://twiki.cern.ch/twiki/bin/view/CMS/DiLeptonSignatureGroup>

“Di-Lepton HotLine”

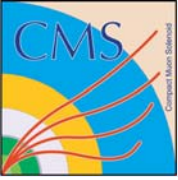
Permanent Forum available for any di-lepton related issue or any other help.

- We have representatives from the ECAL/Muon POG and PAG available
- It was used for spontaneous meetings or quik questions

- The main “Di-Lepton” Twiki page is the “Di-Lepton FAQ” page
- Please feel free to post a question and send the link to the “LPC_DILEPTON@LISTSERV.FNAL.GOV”

- In addition, LPC-HOWTO@LISTSERV.FNAL.GOV
- Disk space at the LPC dedicated for common tools and common skims

- We plan to have next meeting on Jan 29 and you are all invited. We would like hear
 - Your analysis interest
 - Services that you would find useful
 - Feedback of how can we help
- We will have weekly meetings, each week on a different specific topic. We announce the meetings on how Twiki and listserv



Are you interested in starting the work?

- identify the analysis of interest
- identify the task, if you do not know -- ask us!
- contact us and CERN POG/PAG conveners and express your desire to work on a particular task/topic.
- ask as for any help that you need in getting started!

- ATIC detects an abundance of cosmic ray electrons between 300 – 800 GeV, while PAMELA sees an excess of positrons (but not anti-protons) at 10-100 GeV. Together with the CMB haze these observations paint a consistent picture whereby DM annihilates primarily into muons and/or electrons
- Motivated an exciting new proposal] in which a WIMP-like dark matter (DM) particle at 500-800 GeV annihilates primarily into leptons and is charged under a new “dark” force carrier

- "the LHC signals for super unified theory of dark matter" by Nima Arkani-Hamed
- "How to Find a Hidden World at the Large Hadron Collider" Jim Wells