Top Physics Summary for PRC

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Top quark physics at DESY

Activities in 2009 / 2010: preparation for physics analysis

- Total ttbar cross section measurement in dimuon decay channel
  - Robust event selection for first 50 pb-1 at 7 TeV
  - Development of data-driven methods to describe and subtract QCD and fake muon bg: "wrong charge method"
- ttbar cross section measurement in mu+jets channel
  - Event selection for L = 100 pb-1
  - Investigation of methods for cross-section determination: simple counting, fit to S+B 3-jet invariant mass distribution
- Online/offline Data Quality Monitoring for top-like dilepton events
  - **Prompt data validation**: monitoring of dilepton reconstruction and efficiencies (RECO & HLT) for simple physics feedback (i.e, dilepton mass spectrum) → **Running within Offline DQM sequence since October 2009**
  - **Plans for prompt trigger monitoring**: Online/offline monitoring and checks of lepton trigger efficiencies at HLT level (*'tag&probe'* approach) → **Tested**
  - CMS AN-2010/062

Top quark physics at DESY

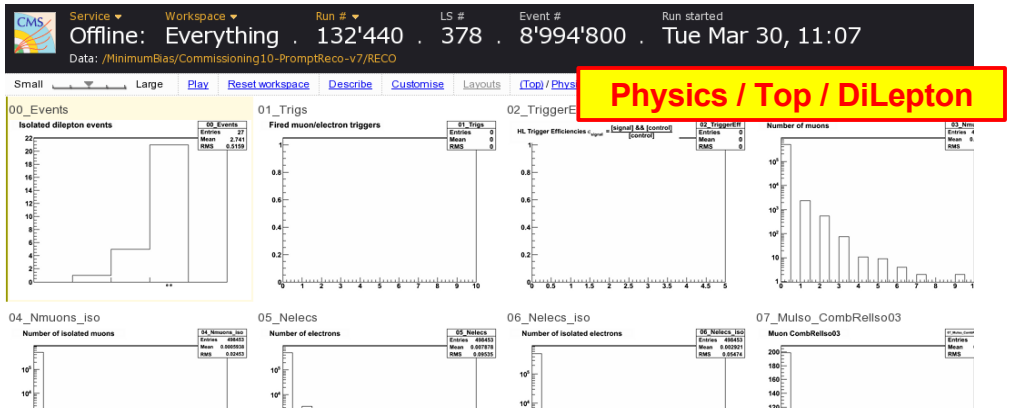
Ongoing activities and plans for 2010:

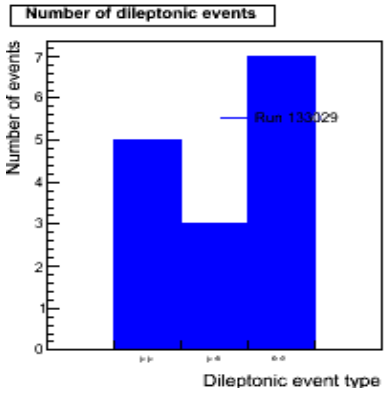
- Development of calibration tools for b-tagging using ttbar events
- Simulation studies to evaluate the b-tagging performance of the pixel detector upgrade for top quark analyses
- Feasibility studies for measuring the top mass in the dilepton channel using the "Lxy method"
- Analysis of first LHC data (900 GeV, 2.36 TeV, 7 TeV):
  - Participation in SV validation within joint tracking and b-tagging POG effort
  - First look into muon distributions
  - First performance plots of the top analysis framework

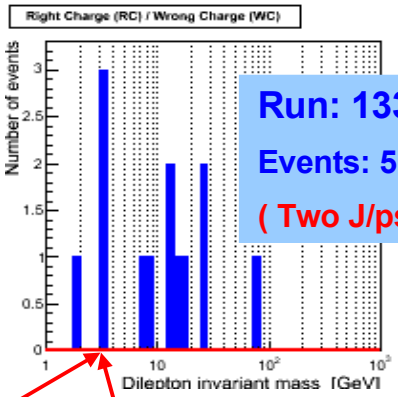
Goals for 2010:
top re-discovery and cross section measurement in dilepton and mu+jets channels

First look at 7 TeV data !

- **TopDiLeptonDQM**





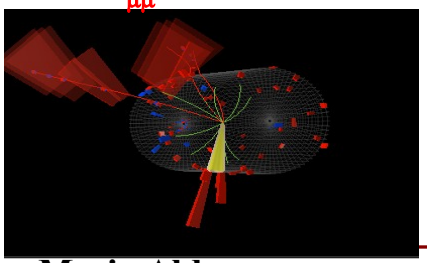


Run: 133029

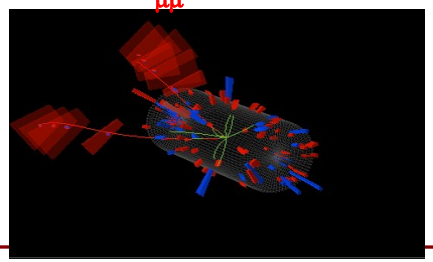
Events: 5033612, 7409195

(Two J/psi candidate events)

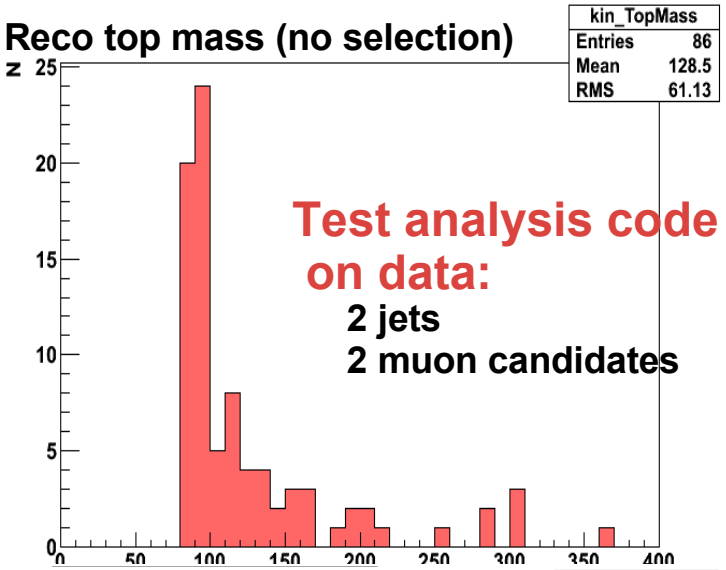
$M_{\mu\mu}$ = 3.16 GeV



$M_{\mu\mu}$ = 3.06 GeV



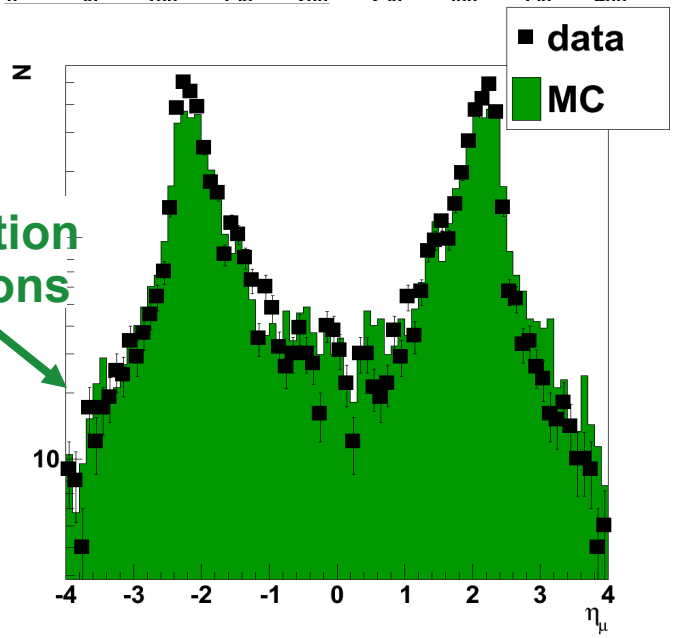
- **Top dimuon analysis**



Test analysis code on data:

2 jets

2 muon candidates



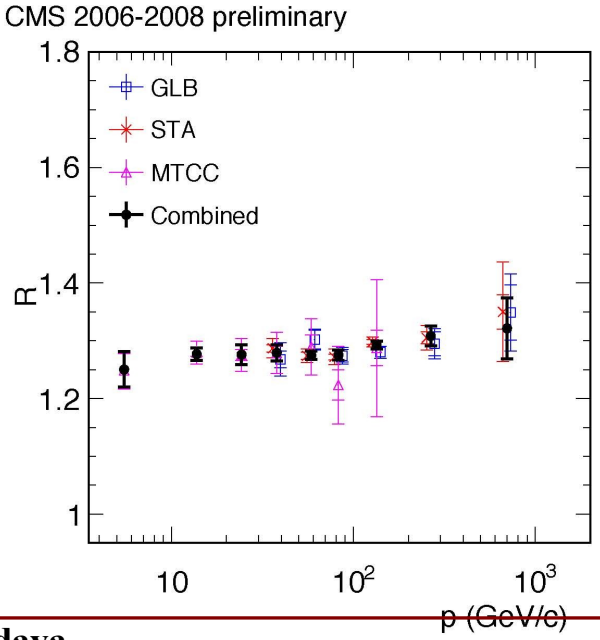
Eta distribution for STA muons

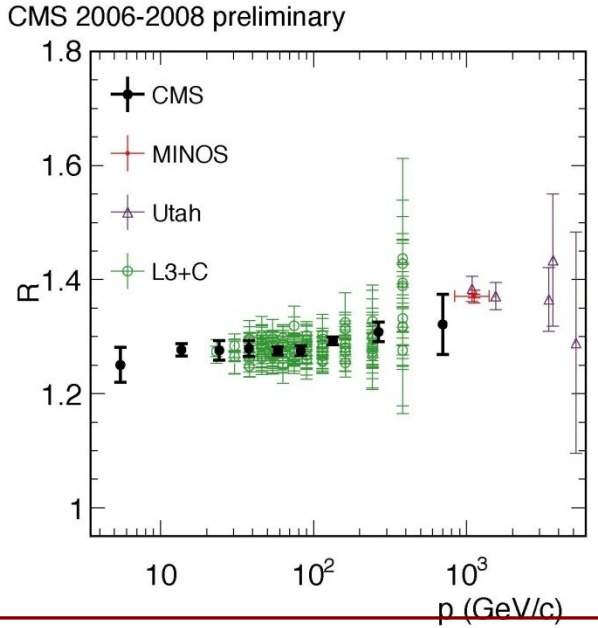
Contribution to physics papers

"Measurement of the charge asymmetry of atmospheric muons with the CMS detector"
(**CMS PAS MUO-10-001**, approved on 07.04.10)

- The cosmic muon charge ratio has been measured, as a function of the muon momentum, using CRAFT08 and MTCC (2006) data
- Combination of three analyses:
  - ✓ MTCC: standalone- muon analysis (surface, using a reduced fraction of CMS)
  - ✓ CRAFT08: global-, standalone- muon analyses (underground, using full CMS)

R = 1.2766 ±0.0032 (stat) ±0.0032 (syst), p < 100 GeV, good agreement with previous measurements, significant improvement in precision





First muon physics measurement with the complete CMS detector !