

# Contributions to the LHCC poster session

## 1 ALICE

### 1. Trigger performance of the ALICE Silicon Pixel Detector

Valerio Altini, Bari

### 2. Measurement of the J/psi cross section in the dimuon channel with the ALICE experiment at LHC

Bruno Alexandre Boyer, Orsay

### 3. D0 production in pp collisions at $\sqrt{s} = 7$ TeV and Pb-Pb collisions at $\sqrt{s} = 2.76$ TeV/NN with the ALICE detector

Davide Caffarri, Padova

### 4. Diffractive physics studies at ALICE

Veronica Canoa Roman, Mexico

### 5. $D^+$ and $D_s$ production in pp collisions at $\sqrt{s} = 7$ TeV and Pb-Pb collisions at $\sqrt{s} = 2.76$ TeV/NN in the ALICE experiment

Gian Michele Innocenti, Torino

### 6. Charge fluctuations in Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV

Satyajit Jena, Mumbai

### 7. Measurement of the J/psi production cross section in pp collisions at $\sqrt{s} = 7$ TeV in dielectron channel with ALICE at the LHC and perspectives for Pb-Pb collisions

Frederick Kramer, Frankfurt, Julian Book, Frankfurt

### 8. Measurement of identified hadron spectra with the ALICE experiment at the LHC

Leonardo Milano, Torino

### 9. Mean transverse momentum, multiplicity, and their correlation in pp collisions in string fusion model

Igor Lakomov, St.Petersburg

### 10. Anisotropic flow of decaying strange particles in ALICE

Carlos Eugenio Perez Lara, Amsterdam

11. **Background studies for jet reconstruction in heavy-ion collisions**  
Marta Verweij, Utrecht
12. **Measurement of heavy-flavour production using single muons with ALICE**  
Xiaoming Zhang, Clermont Ferrand and Wuhan
13. **Antimatter production in pp and PbPb collisions with ALICE** Natasha Sharma, CERN

## 2 ATLAS

14.  **$J/\psi$  cross-section production and B-fraction**

Nir Amram, Tel Aviv, CERN

The inclusive  $J/\psi$  production cross-section and fraction of  $J/\psi$  produced in  $B$ -hadron decays are measured in proton-proton collisions at  $\sqrt{s} = 7$  TeV with the ATLAS detector at the LHC, as a function of the transverse momentum and rapidity of the  $J/\psi$ . From the inclusive production cross-section and fraction of  $J/\psi$  produced in  $B$ -hadron decays, the differential production cross-sections of prompt and non-prompt  $J/\psi$  are separately determined and are compared to theory predictions.

15. **Exclusive B-hadron decays in proton-proton collisions**

Ioannis Nomidis, Thessaloniki

B-hadrons are observed in proton-proton collisions at  $\sqrt{s} = 7$  TeV with the ATLAS detector and reconstructed in exclusive decay modes involving a  $J/\psi$ . The  $J/\psi$  is identified by its dimuon decay signature..

16. **Measurements of the top quark pair production cross-section at ATLAS**

Hegoi Gariataonandia, Nihkef

We present a measurement of the top-quark pair-production in proton-proton collisions at  $\sqrt{s} = 7$  TeV with the ATLAS detector at the Large Hadron Collider using the full 2010 data sample. The cross sections are measured in the lepton+jets and dilepton channels.

17. **Measurements of top quark properties at ATLAS**

Stefan Guindon, Göttingen University

We report the results of the first measurement of the top quark mass and other top quark properties in proton-proton collisions at  $\sqrt{s} = 7$  TeV, recorded with the ATLAS detector during 2010. We present results obtained in the lepton + jets and dilepton channels, with emphasis on the current understanding of the systematic uncertainties.

**18. Jet Physics with ATLAS**

Miroslav Vujicic, Carleton University

Jet measurements at the LHC have an unprecedented kinematic reach. Jets can be used to examine the strong interaction in kinematic extremes of high rapidity, high momentum and high multiplicity, to study the structure of the proton, to improve models of soft physics and to stretch the limits of the standard model. A selection of ATLAS results from 2010 running is shown.

**19. Search for the SM and MSSM Higgs boson(s) with ATLAS 2010 data**

Liu Yuan, Beijing

The ATLAS experiment has searched for the the SM Higgs boson in decays to  $ZZ$ ,  $WW$  and gamma gamma final states and the  $H/A$  of the MSSM in tau tau states. No significant evidence for a signal is found in any search, and limits are presented either as a multiple of the standard model expected rate or in the  $m_A - \tan \beta$  plane.

The sensitivity to Standard Model-like Higgs bosons exceeds any preceding experiment for masses above approximately 250GeV and is similar to the best existing in the gamma gamma channel and close in the  $H \rightarrow WW \rightarrow \ell\nu\ell\mu$ . The search for  $A/H \rightarrow \tau\tau$  in the MSSM surpasses existing constraints for a wide range of  $m_A$ .

**20. Searches for Stable Hadronising Squarks and Gluinos with the ATLAS detector**

Christian Ohm, Stockholm

New particles with long lifetimes are a generic feature of many models for physics beyond the Standard Model. We report on searches for long-lived particles with the ATLAS detector, based on data recorded in 2010, corresponding to an integrated luminosity of approximately 35 pb<sup>-1</sup>. No excess is observed above Standard Model expectations. Limits on effective production cross sections are obtained, together with mass limits on new particles in a representative set of models.

**21. Search for squarks and gluinos using final states with jets and missing transverse momentum with the ATLAS detector**

Teng Jian Khoo, teng.jian.khoo@cern.ch

One of the most sensitive channel to Supersymmetry in proton-proton collisions is composed of jets and missing transverse momentum final states, without any lepton (electron, muon). We report on searches with the ATLAS detector, based on data recorded in 2010, corresponding to an integrated luminosity of approximately 35 pb<sup>-1</sup>. As no signal is observed above Standard Model expectations, limits on squarks and gluinos production are set, the most stringent to date.

**22. Searches for physics beyond the Standard Model in photon final states with ATLAS**

Haichen Wang, Wisconsin

Many extensions of the Standard Model predict final states containing high-momentum photons. Several searches for such final states were performed with the ATLAS detector using the 2010 pp collision data. No discrepancy with the Standard Model was observed and limits were set, extending previous searches by other experiments.

**23. Search for heavy gauge bosons decaying to leptons with ATLAS**

Serhan Mete, Iowa

Many extensions of the Standard Model predict the existence of additional, heavy gauge bosons. The ATLAS detector is used to search for such charged ( $W'$ ) and neutral ( $Z'$ ) gauge bosons decaying to leptons. No excess beyond Standard Model expectations is observed in the 40 pb<sup>-1</sup> of data accumulated in 2010.

**24. Observation of asymmetric dijets in  $\sqrt{s_{NN}} = 2.76$  TeV Pb+Pb collisions**

Martin Rybar, Prague

A broad program of measurements using heavy ion collisions is underway in ATLAS, with the aim of studying the properties of QCD matter at high temperatures and densities. With the factor of 14 increase in collision energy compared to RHIC data, significant insights have already been achieved. These include the observation of a centrality-dependent dijet asymmetry, which is suggestive of strong jet quenching in a hot, dense medium.

**25. J/psi suppression and Z production in  $\sqrt{s_{NN}} = 2.76$  TeV Pb+Pb collisions**

Camilla Maiani, Roma

A broad program of measurements using heavy ion collisions is underway in ATLAS, with the aim of studying the properties of QCD matter at high temperatures and densities. Leptons are essential tools for the study of heavy ion collisions since they do not interact strongly and thus pass unaffected through the hot, dense medium. The centrality dependence of J/psi and Z yields, observed through their dimuon channel, are important measurements both for assessing modifications of particle production as well as probing certain regions of the nuclear PDFs.

**26. Electrons reconstruction and identification with ATLAS and the measurement of W/Z cross sections**

Elina Berglund, Geneva

Electron reconstruction and identification with the ATLAS experiment are among the key ingredients for several physics analyses. The measurement of the W/Z inclusive cross section is presented with special emphasis on the performance of the ATLAS detector with electrons. Reconstruction/Identification algorithms are

presented together with the first precision calibration of the electromagnetic liquid argon calorimeter energy scale.

## 27. Measuring the b-tagging Performance with ATLAS Data

Florian Hirsch, TU Dortmund

The identification of jets originating from b-quarks, referred to as b-tagging, is an important part of the LHC physics program. Most b-tagging algorithms exploit the relatively long lifetime of the b-hadron, resulting in a second decay vertex which is significantly displaced from the primary interaction point. In precision measurements in the top quark sector as well as in the search for the Higgs boson and new phenomena, the suppression of background processes containing predominantly light-flavour jets using b-tagging is of great use. It is also critical to eventually understand the flavour structure of any new physics (e.g. supersymmetry) that may be revealed at the LHC. In order for b-tagging to be used in physics analyses the efficiency with which a jet originating from a b-quark is tagged by a b-tagging algorithm needs to be measured. A second important piece of information is the probability to tag a jet originating from a light-flavour (u-, d-, s-quark or gluon) jet, referred to as the mistag rate. Both the b-tag efficiency and the mistag rate have been measured with data from the ATLAS detector using a range of methods. The b-tag efficiency measurements either make use of samples of jets containing muons or a sample of top quark events which inherently contains a large fraction of b-jets, while the mistag rate is measured in a QCD jet sample.

## 28. JET ETMISS

Reina Camacho Toro - Clermont - Ferrand

The accurate measurement of jets at high transverse momentum produced in proton proton collision at a centre of mass energy at  $\sqrt{s}=7$  TeV is important in many physics analysis at LHC. Due to the non-compensating nature of the ATLAS calorimeter, signal losses due to noise thresholds and in dead material the jet energy needs to be calibrated. The ATLAS experiment derives the jet calibration from Monte Carlo simulation using a simple correction that relates the true and the reconstructed jet energy. The jet energy scale and its uncertainty are derived from in-situ measurements and variation in the Monte Carlo simulation. Jet calibration strategies in ATLAS will be discussed, in particular the approaches followed to improve the jet resolution. These calibration are either using hadronic cell calibrations or use the topology of the jet constituents to follow better the hadronic fluctuations. The performances of the various calibration schemes and a comparison between data and simulation will be presented. Moreover, the inputs used in the calibration in data will be compared to the Monte Carlo simulation.

## 29. Tau Reconstruction and Identification Performance

Jana Kraus, University of Bonn

This poster shows the performance of the reconstruction algorithm and identification methods for hadronically decaying tau leptons in ATLAS. The efficiency for tau lepton identification is shown, along with their dependence on various kinematic variables. Furthermore, the fake rates are measured in various samples enriched with jet backgrounds, and the identification efficiency is measured in a sample of  $W\text{-}\tau\nu$  decays. We also show the observation of  $Z\text{-}\tau\tau$  production in both the  $\tau\text{-}e\tau\text{-}had$  and  $\tau\text{-}\mu\tau\text{-}had$  channels.

### 30. Performance of the Muon Identification with the ATLAS Detector in 2010 LHC pp Collision Data

Eve Le Menedeu, Saclay Measurements of the muon reconstruction efficiency and misidentification rate as well as the muon momentum resolution have been carried out with collision data at  $\sqrt{s} = 7$  TeV recorded by the ATLAS experiment in 2010. The muon efficiency is determined with dimuon decays of  $J/\psi$  mesons and  $Z$  bosons. The momentum resolution is extracted from the width of the dimuon mass distribution in  $Z \rightarrow \mu\mu$  decays and the comparison of the independent measurements of muons from  $Z \rightarrow \mu\mu$  and  $W \rightarrow \mu\nu$  decays provided by the ATLAS tracking systems, the inner detector and the muon spectrometer.

### 31. ATLAS Inner Detector alignment

Vicente Lacuesta Miquel, Valencia

The ATLAS Inner Detector tracking system has been aligned for the analysis of the LHC  $\sqrt{s} = 7$  TeV proton-proton collision data taken during 2010. The input data for the alignment consisted of two samples: one of high  $p_T$  and isolated collision tracks, while the second comprises a sample of cosmic-ray tracks collected between LHC proton-proton collisions. The alignment approach used is a track-based algorithm that minimizes a  $\chi^2$  based on track-hit residuals. This poster presents the alignment procedure, its results and performance with the LHC collision data. Results from real data are compared with a Monte Carlo sample simulated with a perfectly aligned detector.

### 32. New ATLAS triggers based on the missing $E_T$ significance

George Lewis, NYU New York

Missing transverse energy signatures are an important component of the ATLAS physics program. However, triggering on missing transverse energy in a high-luminosity hadron collider environment presents unique challenges, particularly due to the effects of pileup. ATLAS has therefore developed a set of triggers based on missing  $E_T$  significance, a function of MET and scalar SumET which measures the amount of missing  $E_T$  in standard deviations of the expected fake rate. We present the physical motivations, implementation from the Level-1 trigger upwards, and the expected performance of these new triggers.

### 33. ATLAS trigger performance in 2010

John Almond, Manchester

The ATLAS trigger has been used very successfully to collect collision data during 2010 LHC running at centre of mass energy of 7 TeV and reaching instantaneous luminosities as high as  $10^{32} \text{cm}^{-2} \text{s}^{-1}$ . This poster presents an overview of the performance of the trigger based on extensive online running in 2010 along with the operational highlights in both the Level-1 and High Level triggers. We describe briefly the setup of the trigger and how the trigger has evolved with increasing LHC luminosity.

**34. 2010 ATLAS Detector Performance: ID and muons**

Devin Harper, CERN and Jonathan Stahlman, CERN.

During the 2010 LHC run the ATLAS detector recorded  $45 \text{ pb}^{-1}$  of proton-proton collision data with 93.6% data taking efficiency and  $9.17 \mu\text{b}^{-1}$  of heavy ion collision data. This poster and the following present the main performance results for each sub-detector which enabled the excellent ATLAS performance during the past year. Here particle identification, alignment, tracking resolution and efficiency results are shown for the Inner Detector and Muon Spectrometer.

**35. 2010 ATLAS Detector Performance: Calorimetry + forward**

Robert Calkins, CERN and Samir Arfaoui, CERN

During the 2010 LHC run the ATLAS detector recorded  $45 \text{ pb}^{-1}$  of proton-proton collision data with 93.6% data taking efficiency and  $9.17 \mu\text{b}^{-1}$  of heavy ion collision data. This poster and the previous one present the main performance results for each sub-detector which enabled the excellent ATLAS performance during the past year. Here we describe results on electromagnetic and jet energy scales for the Liquid Argon and Tile calorimeters, and the LUCID and ZDC luminosity measurements.

**36. ATLAS Detector Improvements during the Winter Shutdown**

Sune Jakobsen and Lucie de Nooij

During the recent LHC shutdown period, ATLAS performed vital maintenance and improvements on the various sub-detectors. Repairs were carried out on Front End Boards of the LAr calorimeter and Tile power supplies were replaced to recover detector coverage that had been lost since the last maintenance period. The ALFA luminosity detector was installed along the beam line and is currently being commissioned. Smaller scale repairs were needed for the Inner Detector. Maintenance on the muon system included repairs on the readout as well as updates and leak checks in the gas systems. Six TGC chambers were also replaced. This poster summarizes the repairs and their expected improvement for physics performance and reliability of ATLAS for the upcoming LHC run.

**37. Measurement of the Luminosity by the ATLAS Experiment**

Stefan Maettig - DESY

The luminosity is measured in ATLAS by several detectors and methods, both online and offline. This poster will present briefly the luminosity detectors in ATLAS and explain in some detail how they were used to extract and publish luminosity during the 2010 data taking. One of the challenges in measuring the luminosity at the LHC comes from the fact that many interactions typically occur in every bunch crossing. Comparisons of the number of interactions as measured by different detectors and methods will be presented. The very successful collaboration with the LHC machine has recently lead to a calibration, via beam separation scans, which is now estimated to have a systematic error of 3.4% . Since the error in the luminosity analysis was the limiting factor in the precision of many cross section measurements in ATLAS during 2010, this error analysis will also be discussed in some detail.

### 38. **Prompt Calibration, Assessment of Data Quality and Data Processing**

Susumu Oda Tokyo ICEPP

All data collected by the ATLAS experiment are processed "promptly" at the CERN Tier0 to provide fast access to high quality data for physics analyses. The high quality of the data is achieved by a so-called "calibration loop" that relies on the detector calibrations to become available on a time scale of 36 hours based on a selected subset of the data designed to allow detailed data investigations. Based on these data new calibrations and updated lists of dead or hot channels are created and those calibrations and/or lists of masked channels are created. These are then used for the so-called "bulk processing" which is the main processing for the physics streams. In 2010 this model was implemented in mid April and was successfully applied throughout the year, and indeed the quality of the data was sufficiently high so that many physics publications were based on this initial Tier0 processing.

### 39. **ATLAS Distributed Computing**

Jaroslava Schovancova - Prague AS

The poster details the different aspects of the ATLAS Distributed Computing experience after the first year of LHC data taking. We describe the performance of the ATLAS distributed computing system and the lessons learned during the 2010 run, pointing out parts of the system which were in a good shape, and also spotting areas which required improvements. Improvements ranged from hardware upgrade on the ATLAS Tier-0 computing pools to improve data distribution rates, tuning of FTS channels between CERN and Tier-1s, and studying data access patterns for Grid analysis to improve the global processing rate. We show recent software development driven by operational needs with emphasis on data management and job execution in the ATLAS production system. Presenter: Jaroslava Schovancova

### 40. **UPGRADE**

Nicolas Bousson - Marseille CPPM

The ATLAS detector has had a very successful start with many results produced already in 2010. The LHC will continue increasing luminosity in a series of runs interspersed with long shut-downs for installation of injector, LHC and experiment upgrades. The higher integrated luminosity made available - the target is 3000 fb-1 - will open access to many new physics goals. This poster summarises these goals and ATLAS upgrade plans from now until the High-Luminosity LHC project around 2020.

### 3 CMS

#### 41. Search for new physics with same-sign di-leptons at LHC

Marc Gabriel Weinberg, Univ. of Wisconsin,

We present results of searches for new physics in events with two same-sign isolated leptons, jets, and missing transverse energy in the final state. The searches use data collected by the CMS experiment at the LHC in pp-collisions at a center of mass energy of 7 TeV. The total integrated luminosity used in this analysis is 35 pb-1, collected in 2010. The data agree with the Standard Model predictions, and we find no evidence for new physics.

#### 42. Measurement of the Lepton Charge Asymmetry in $pp \rightarrow W + X$ production at LHC

Josh Bendavid, MIT

We present the measurement of the W lepton charge asymmetry in pp collisions at  $\sqrt{s} = 7$  TeV using the data collected by the CMS detector in 2010. The measurement is performed using both  $W \rightarrow \mu\nu$  and  $W \rightarrow e\nu$  final states. The charge asymmetry is measured in 6 bins of absolute value of lepton pseudorapidity and is compared to theoretical predictions. This is the first high precision measurement of the W lepton charge asymmetry at the LHC, and provides new insights into parton distribution functions.

#### 43. Mean Charge Multiplicity and Transverse Structure of Hadronic Jets in pp Collisions at 7 TeV

Natalia Lychkovskaya, Inst. for Theoretical and Exp. Phys

We present a study of the jet transverse structure and mean charge multiplicity based on a 78 nb-1 integrated luminosity sample collected by the CMS experiment from pp collisions at 7 TeV. The jet transverse structure is measured using the second moment of the charged hadron transverse jet profile. A comparison with predictions from different Monte Carlo generators is presented.

#### 44. A Level 1 Tracking Trigger for the CMS Experiment at the LHC Phase 2 Luminosity Upgrade

Nicola Pozzobon, Univ. di Padova e Sez. dell'INFN

The second decade of Large Hadron Collider operations, from about 2020 onwards, envisages a remarkable increase in collider instantaneous luminosity, one order of magnitude above the project one. This luminosity presents several challenges to the LHC experiments. The present Tracker of the Compact Muon Solenoid experiment must be replaced with a system providing excellent quality tracking at higher luminosities, as well as Tracking Trigger inputs to the existing “Level 0” CMS Trigger system at the full 40 MHz bunch-crossing rate. The minimal requirements for a Tracking Trigger would be the capability to confirm the presence of high Pt tracks associated with Calorimeter and/or Muon Level 0 Triggers. The ability to provide effective isolation criteria may also be required, and would in any case substantially improve the Trigger performance. The data rates associated with the generation of Tracking Trigger inputs could be maintained within a realistically manageable bandwidth requiring sensor modules to be able to reduce data locally. The main candidates for such a local data rate reduction feature the provision of track direction in the transverse plane, besides its position, from which the transverse momentum of the track can be inferred. These “Pt-modules” would then only transmit to the Level 1 Trigger “stubs” generated by tracks with Pt above 2 GeV/c. The choice of this threshold would result in a data reduction of more than a factor of 10, providing then a manageable data rate. Pt-modules could consist of two closely spaced silicon sensors, featuring a resolution on single hit position measurement such that stubs, from pattern hit correlation across the module, can provide an adequate measurement of the track direction despite a lever arm of about 1 mm. A concept Tracker layout, the so-called “Long Barrel”, consisting in an Outer Tracker completely built out of Pt-modules, has been proposed. The Long Barrel Tracker is particularly flexible in simulation studies of Tracking Trigger as it allows for information from several layers of the Tracker to be combined in a projective geometry. For this reason, it is meant as a testing ground to compare the performance of different designs and configurations. The Long Barrel layout allows also the generation of even more structured Trigger Objects such as “tracklets”, consisting of pairs of stubs in opportunely paired layers, that can be used as seeds to generate “Level 1 tracks”, including even more stubs. The choice of stacked sensors for Pt-modules is strengthened by recent results obtained from data collected with novel prototypes of Monolithic Arrays of Pixel Sensors during a test beam and reported in this thesis. The development of Tracking Trigger simulations is also presented as a major step towards the design of a realistic Tracker upgrade with Trigger capabilities. A particular challenge for the Trigger system is given by tau leptons produced in many rare processes searched at the LHC. The performance of a Tracking Trigger on final states with tau leptons will be crucial at very high luminosities and is presented at the end of this document as the natural step forward in the work on the subject.

#### 45. **Study of $bbZ$ , $Z \rightarrow ll$ production with the CMS detector**

Natalie Heracleous, RWTH, I. Physik. Inst

A study of  $Z$  bosons plus one  $b$ -jet and subsequently  $Z$  decaying into a lepton pair in LHC  $pp$  collisions at  $\sqrt{s} = 7$  TeV is presented. This analysis is performed using the first 35  $pb^{-1}$  of data taken by the CMS detector in 2010. We require at least one  $b$ -tagged jet with a specific lepton and jet selection. The measurement of  $Zb\bar{b}$  can provide an important test for QCD calculations and background predictions to light Standard Model Higgs boson production in association with a  $Z$  boson,  $ZH \rightarrow Zb\bar{b}$ . It is also an irreducible background to the MSSM Higgs boson ( $b\bar{b}h^0/H^0/A^0$ ) discovery channel as both processes are topologically very similar. The main backgrounds considered for  $Zb\bar{b}$  are the  $t\bar{t}$ , the  $Zc\bar{c}$  and  $Zq\bar{q}$  where  $q = u, d, s$ .

#### 46. Higgs and Z to tau tau in CMS

Joshua James Swanson, Univ. of Wisconsin

The production of pairs of oppositely-charged tau leptons at 7 TeV center-of-mass energy is studied with 36/pb of proton-proton collision data collected by the CMS experiment in 2010. Events are selected in a combination of different final states resulting from hadronic and leptonic tau decays. The  $Z \rightarrow \tau\tau$  cross section is measured. The tau pair kinematics is fully reconstructed using a likelihood technique. The mass spectrum observed in data is used to derive upper bounds on the production cross section times branching ratio to tau pairs as a function of the Higgs boson mass in the Minimal Supersymmetric Extension of the Standard Model (MSSM).

#### 47. Tau reconstruction in CMS

Lorenzo Bianchini, LLR, Ecole Polytech., IN2P3-CNRS,

CMS has developed sophisticated tau identification algorithms based on reconstruction of tau decay modes. Some multivariate techniques are used to enhance the performance further. The algorithms are validated using control samples and their efficiencies and background rates are measured. Using  $Z$  decays to tau pairs additional information is obtained. These algorithms enable extended reach for the searches of MSSM higgses,  $Z'$  and other exotic particles.

#### 48. Rates of Jets Produced in Association with W and Z Bosons

Kira Suzanne Grogg, Univ. of Wisconsin

We present a study of jets produced in association with vector bosons production in  $pp$  collisions at center-of-mass energy of 7 TeV using the full CMS 2010 data set, corresponding to 36  $pb^{-1}$ . The transverse energy distribution of the reconstructed leading jets is measured and compared to theoretical expectations. The normalized jet multiplicity distributions are unfolded and corrected. The ratios of multiplicities,  $\sigma(V + n + 1)/\sigma(V + n)$  and  $\sigma(W + n)/\sigma(Z + n)$  where  $n$  stands for  $n$  jets, are also presented. Finally, we present the first test of Berends-Giele scaling at the LHC.

#### 49. Measurement on B-hadron angular correlations with CMS

Lukas Wehrli, ETH Zürich

A measurement of the angular correlations between beauty and anti-beauty hadrons produced in LHC pp collisions at  $\sqrt{s} = 7$  TeV is presented, probing for the first time the small angular separation region. The B hadrons are identified by the presence of secondary vertices from their decays and their kinematics reconstructed combining the decay vertex with the primary interaction vertex. The results are compared with predictions based on perturbative QCD calculations at leading and next-to-leading order.

**50. Data-driven Prediction of Invisible Z Background using Photons for Inclusive Jets plus Missing Momentum New Physics Search**

Piet Verwilligen, Ghent Univ.,

The associated production of a Z boson and jets followed by the decay of the Z boson into neutrinos constitutes an irreducible standard model background to the inclusive jets plus missing momentum search. The correspondence between  $\gamma$  and Z at high boson  $p_T$  is used to predict the  $Z \rightarrow \nu\nu$  background. The missing momentum spectrum is obtained by removing the identified photon and correcting for residual phenomenological and experimental differences between the selected  $\gamma$  sample and the invisible Z events.

**51. Analysis of  $Z \rightarrow l + l -$  Polarization at CMS**

Nhan Viet Tran, Johns Hopkins Univ.

With approximately  $35\text{pb}^{-1}$  of LHC proton-proton collision data collected by CMS we study the Drell-Yan process  $q\bar{q} \rightarrow Z \rightarrow l^+l^-$ . Differential cross sections with respect to the invariant mass, rapidity, and transverse momentum are presented. The forward-backward asymmetry is measured as a function of the di-lepton invariant mass, and an analysis of the fully differential distribution leads to the measurement of the Weinberg weak-mixing angle.

**52. Measurement of the top mass in pp collisions at 7 TeV**

Aram Avetisyan, Brown Univ.,

We present a measurement of the top quark mass in the dilepton decay channel in pp collisions at  $\sqrt{s} = 7$  TeV. The data sample of the measurement corresponds to an integrated luminosity of  $36\text{pb}^{-1}$  collected with the CMS detector at the LHC. Events are selected by requiring two leptons, at least two jets, and missing transverse energy. The mass is reconstructed from the kinematic characteristics of the events with two numerical methods, a full kinematic analysis and a matrix weighting technique. For each method, a set of templates are constructed from simulated samples and a likelihood fit is performed to derive the mass.

**53. Searches for Supersymmetry in hadronic events with the CMS detector**

Raffaele Tito Dagnolo, Univ. di Pisa e Sez. dell'INFN

We present the searches for Supersymmetry performed by the CMS collaboration in the hadronic channels. We focus on multijet final states and signatures with significant missing transverse momentum. These search topologies have a great potential for early discovery and have already allowed to improve the Tevatron and LEP bounds on supersymmetric particles masses. In addition to the current experimental results, the possible role of simplified models in the future developments of these analyses is discussed.

#### 54. **Measurement of the single-top t-channel cross section in pp collisions at 7 TeV**

Alberto Orso Maria Iorio, INFN di Napoli

The Standard Model predicts the production of single top quark through three electroweak mechanisms at LHC. In 7 TeV proton-proton collisions the t-channel mode is by far the most abundant of the three mechanisms and it is the one with the most striking final state topology. The single top production through t-channel has been studied by CMS and its cross section has been measured with the a dataset of 36.1 /pb through two complementary analyses. The final states where t decays to  $lvb$  have been considered, where  $l =$  electron, muon. Using a data driven method, we exploit two angular distributions for separating signal from background processes. In a multivariate analysis approach, we probe the compatibility of the signal event candidates with the expected characteristics from the Standard Model. This measurement allowed the extraction of a limit on  $-\text{Vtb}-$ .

#### 55. **b-tagging in CMS**

Cristina Ferro, IPHC, IN2P3-CNRS - ULP, UHA Mulhouse

The identification of the b-jet is a crucial issue to study and characterize various channels like top quark events and many new physics scenarios. Different b-taggers are defined in CMS which benefit from the long life time, high mass and large momentum fraction of the b-hadron produced in quark jet. Efficient algorithms have been developed based on the measure of b-hadron secondary vertex or on tracks with a large impact parameter. Collision data have been used to estimate both the b-tagging efficiency and the mistag rate from light flavour jets. These results are applied in several measurements, as top quark pair production.

#### 56. **Observation of Jet Quenching in Heavy Ion collisions**

Yetkin Yilmaz, Massachusetts Inst. of Tech.,

The jets that were reconstructed in PbPb collisions at 2.76 TeV per nucleon pair, displayed the long predicted phenomenon of medium-induced energy loss, in a surprisingly clear observation, namely the imbalance between the momenta of the observed jets. The jet reconstruction and tracking capabilities of the CMS detector allow a detailed study of the quenching mechanism of jets in heavy-ion collisions.

57.  **$Z \rightarrow \tau\tau$  production at CMS**

Cesare Calabria, Univ. di Bari e Sez. dell'INFN

The first measurement of the  $Z \rightarrow \tau\tau$  cross-section in the mu-taujet, e-taujet, e-mu and mu-mu final states is presented. The data collected in 2010 with the CMS detector from proton-proton collisions at  $\sqrt{s} = 7$  TeV are used, corresponding to an integrated luminosity of about 36 pb<sup>-1</sup>. The cross section has been measured to be in good agreement with the next-to-next-to-leading order QCD prediction.

58. **Upsilon production cross section in pp collisions at  $\sqrt{s} = 7$  TeV**

Zhen Hu (Purdue Univ.)

The  $\Upsilon$  production cross section in proton-proton collisions at  $\sqrt{s} = 7$  TeV is measured using a data sample collected with the CMS detector at the LHC, corresponding to an integrated luminosity of  $3.1 \pm 0.3$ /pb. Integrated over the rapidity range  $|y| < 2$ , we find the product of the  $\Upsilon(1S)$  production cross section and branching fraction to dimuons to be  $\sigma(pp \rightarrow \Upsilon(1S)) \times B(\Upsilon(1S) \rightarrow \mu^+\mu^-) = 7.37 \pm 0.13(+0.61, -0.42) \pm 0.81$  nb, where the first uncertainty is statistical, the second is systematic, and the third is associated with the estimation of the integrated luminosity of the data sample. This cross section is obtained assuming unpolarized  $\Upsilon(1S)$  production. If the  $\Upsilon(1S)$  production polarization is fully transverse or fully longitudinal the cross section changes by about 20%. We also report the measurement of the  $\Upsilon(1S)$ ,  $\Upsilon(2S)$ ,  $\Upsilon(3S)$  differential cross sections as a function of transverse momentum and rapidity.

59. **Measurement of the inclusive dijet production rate, as a function of the dijet invariant mass, with the CMS detector in proton-proton collisions at  $\sqrt{s} = 7$  TeV**

Bora Isildak, Bogazici Univ., Dept of Physics

Double differential inclusive dijet production cross-section as a function of the dijet invariant mass is measured, in proton-proton collisions at a center of mass energy of 7 TeV in CMS detector with an integrated luminosity of 35/pb. The mass range of the measurement lies between 0.2 TeV/ $c^2$  and 3.5 TeV/ $c^2$  and the predictions of NLO calculations at pQCD are in agreement with the measurement

60. **Measurement of Hadronic Event Shapes with the CMS detector at the LHC**

Matthias Artur Weber, ETH Zürich

Hadronic event shapes have been measured in proton-proton collisions at 7 TeV with the CMS detector at the LHC. The data sample corresponds to an integrated luminosity of 3.2 pb<sup>-1</sup>. It is shown that the normalized event-shape distributions are robust against various sources of systematic uncertainty. We compare event shape distributions, corrected for detector response, with five models of QCD multijet production.

**61. First Observation of  $V$ gamma events at CMS**

Zong-Kai Liu, National Central University, Taiwan

The first measurements of the  $W$ gamma and  $Z$ gamma cross sections at the LHC at centre of mass energy 7 TeV, with the CMS detector is presented. In this analysis we also set the first limits on the trilinear gauge couplings:  $WW$ gamma,  $WWZ$  and  $Z$ gamma gamma. The study is performed with data corresponding 36.1 pb<sup>-1</sup> of integrated luminosity acquired by the CMS detector during 2010.

**62. Measurement of Bose–Einstein Correlations in pp Collisions at  $\sqrt{s}=0.9$  and 7 TeV**

Luca Perrozzi, Univ. di Padova e Sez. dell'INFN

Bose–Einstein correlations between identical particles are measured in samples of proton-proton collisions at 0.9 and 7 TeV centre-of-mass energies, recorded by the CMS experiment at the LHC. The signal is observed in the form of an enhancement of number of pairs of same-sign charged particles with small relative momentum. The dependence of this enhancement on kinematic and topological features of the event is studied. Anticorrelations between same-sign charged particles in the region of relative momenta higher than those in the signal region are observed for the first time in pp collisions.

**63. Measurement of the Drell-Yan Cross Section in pp Collisions at 7 TeV**

Theodore Nicholas Kypreos, Univ. of Florida

The measurement of the Drell-Yan cross section,  $d\sigma/dM$ , for pp collisions at 7 TeV is presented. Data collected by the CMS Collaboration are used, amounting to 36 pb<sup>-1</sup>. The mass spectrum ranges from 15 through 600 GeV and is corrected for contamination, resolution, efficiency and acceptance. The results are compared to theoretical calculations and may serve to constrain the PDFs.

**64. Study of Z boson production in PbPb collisions at  $\sqrt{s}/NN = 2.76$  TeV with CMS detector**

Dong Ho Moon, Korea University, Korea

The  $Z \rightarrow \mu\mu$  production in heavy-ion collisions is measured within  $|y| < 2.0$  by the CMS experiment. The analysis is based on a data sample corresponding to an integrated luminosity  $7.2\mu b^{-1}$  acquired by the CMS detector during 2010. The cross section of Z bosons is found to scale with elementary nucleon-nucleon collisions, reflecting that Z bosons are unaffected by strongly-interacting QCD matter produced in PbPb collisions.

**65. Search for new physics with Diphotons and Large Missing Transverse Energy**

Robert Stringer, UC Riverside

We present a search for new physics in events with two photons and large missing transverse energy. The data were collected by the CMS detector during 2010 at a center of mass energy of 7 TeV. The data matched well to the expected standard model background and no signal for new physics was seen. Limits were calculated in terms of Gauge Mediated SUSY and Universal Extra Dimensions.

**66. Observation of diffraction in minimum bias events at LHC**

Antonio Vilela Pereira, Univ. di Torino e Sez. dell'INFN

The observation of a diffractive signal dominated by the inclusive single diffractive dissociation reaction  $pp \rightarrow pX$  is presented. The analysis is based on a fraction of the data collected by the CMS experiment in 2010 and corresponds to an integrated luminosity of 10, 0.4 and 20  $\text{mub}^{-1}$  at 0.9, 2.36 and 7 TeV, respectively. Detector level distributions are compared to fully simulated and reconstructed Monte Carlo predictions obtained with the PYTHIA6, PHOJET and PYTHIA8 generators.

**67. Forward jets at CMS**

Ilknur Hos, Cukurova Univ., Turkey

We report on a measurement of the cross section of inclusive forward jets in pp collisions at  $\sqrt{s} = 7$  TeV, based on a data sample collected in 2010 and corresponding to an integrated luminosity of 171  $\text{nb}^{-1}$ . Jets are reconstructed with the anti-kT ( $R = 0.5$ ) algorithm in the Hadronic Forward (HF) calorimeter at pseudorapidities  $3.2 < |\eta| < 4.7$ , in the transverse momentum range  $p_T = 35\text{-}140$  GeV/c. The single differential cross section as function of the jet transverse momentum is presented and compared to next-to-leading order perturbative QCD calculations, PYTHIA and HERWIG parton shower event generators, as well as to the CASCADE Monte Carlo.

**68. First measurement of polarization of high transverse momentum W bosons in W +jets events at a pp collider**

Alex Sparrow, Imperial College, Univ. of London

The first measurement of the polarization of W bosons produced with large transverse momentum at a proton-proton collider is presented based on 36  $\text{pb}^{-1}$  of data recorded by the CMS detector for pp collisions at 7 TeV. W bosons with high transverse momentum exhibit predominantly left-handed helicity states for both charges of the W boson which can be observed through a very distinct and charge dependent decay kinematics. The measurement is performed using both electron and muon final states.

**69. Missing Transverse Energy Significance**

Aleko Khukhunaishvili, Cornell University

The significance of the missing transverse energy (MET) assessed, on an event by event basis, the likelihood that an observed MET is consistent with a fluctuation

from zero because of detector-related limitations like finite measurement resolution. We present the formal definition of the significance and show performance studies of the particle flow MET significance in di-jet and  $W \rightarrow e\nu$  data samples collected with the CMS detector.

**70. The Drift Tube detectors at CMS: timing the track segments**

Marco Meneghelli, Univ. di Bologna e Sez. dell'INFN

The Drift Tube chambers of CMS are gas detectors of the muon system, located in the barrel region. Their aim is to measure the trajectory and the momentum of muons produced by LHC collisions, and to contribute to the Trigger. Starting from elementary hits, track segments are fitted: it is presented how these are reconstructed not only in space but also in a time frame, giving four dimensional segments. It is shown how the times of segments have been used to optimize the performances of the Drift Tube Local Trigger, and to calibrate parameters for the offline reconstruction. Time measurement has also application to physical analysis: it can be used to evaluate the Time of Flight of particles from the interaction point to the muon system. This has direct application in the exotica search, where super-massive, slowly moving, muon-like particles are expected, in some SUSY and Extra Dimensions scenarios.

**71. Search for Heavy Stable Charged Particles in pp collisions at  $\sqrt{s} = 7$  TeV**

Claude Patrick Nuttens, Univ. Catholique de Louvain

The result of a search at the LHC for heavy stable charged particles produced in pp collisions at  $\sqrt{s} = 7$  TeV is described. The data sample was collected with the CMS detector and corresponds to an integrated luminosity of 3.1 inverse picobarns. Momentum and ionization-energy-loss measurements in the inner tracker detector are used to identify tracks compatible with heavy slow-moving particles. Additionally, tracks passing muon identification requirements are also analyzed for the same signature. In each case, no candidate passes the selection, with an expected background of less than 0.1 events. A lower limit at the 95% confidence level on the mass of a stable gluino is set at  $398\text{GeV}/c^2$ , using a conventional model of nuclear interactions that allows charged hadrons containing this particle to reach the muon detectors. A lower limit of  $311\text{GeV}/c^2$  is also set for a stable gluino in a conservative scenario of complete charge suppression, where any hadron containing this particle becomes neutral before reaching the muon detectors.

**72. Measurement of the TTbar cross-section at CMS with  $36\text{pb}^{-1}$  of data in the electron+jets channel with b-tagging**

William Patrick Martin, Brunel Univ.,

Using early data at 7 TeV, the TTbar cross-section is measured at CMS using the semileptonic topology. Events are selected that contain one electron and jets

with one or more b-tag from the simple secondary vertex tagger, and a counting experiment is performed to measure the cross-section. The main backgrounds of W/Z boson+jets and Quantum Chromodynamics fakes are estimated using data-driven techniques. Smaller background contributions are taken from simulation.

**73. Measurement of the Isolated Prompt Photon Production Cross Section in pp Collisions at  $\sqrt{s} = 7$  TeV**

Sudha Ahuja, Univ. of Delhi

The differential cross section for the inclusive production of isolated prompt photons has been measured as a function of the photon transverse energy  $E_T$  in pp collisions at  $\sqrt{s} = 7$  TeV using data recorded by the CMS detector at the LHC. The data sample corresponds to an integrated luminosity of 2.9 pb<sup>-1</sup>. Photons are required to have a pseudorapidity  $|\eta| < 1.45$  and  $E_T > 21$  GeV, covering the kinematic region  $0.006 < x_T < 0.086$ . The measured cross section is found to be in agreement with next-to-leading-order perturbative QCD calculations.

## 4 LHCb

**74.  $J/\psi$  production studies at LHCb**

Yhanxi Zhang, Tsinghua University, Beijing

The measurement of the  $J/\psi$  production cross-section with the LHCb detector is presented. The cross-section is measured as a function of the  $J/\psi$  transverse momentum and rapidity, in the forward region. Contributions from prompt  $J/\psi$  and  $J/\psi$  from  $b$  are measured separately. Prospects for measurements of the  $J/\psi$  polarisation with a full angular analysis are also shown.

**75.  $\Upsilon$  production and double  $J/\psi$  production studies at LHCb**

Maddalena Frosini, INFN Florence, University of Florence, CERN

The preliminary measurement of the  $\Upsilon(1S)$  production cross-section with the LHCb detector is presented, as a function of the  $\Upsilon(1S)$  transverse momentum and rapidity. First observation of double  $J/\psi$  production is also reported together with a first measurement of the cross-section. Prospects for measurements of the  $\chi_c$  and  $\psi(2S)$  cross-sections are also shown.

**76. Lifetime measurements and angular analysis of  $B_s \rightarrow J/\psi\phi$**

Ailsa Sparkes, University of Edinburgh

Extracting the CP violating phase  $\phi_s$  from the channel  $B_s \rightarrow J/\psi\phi$  is an important measurement for LHCb. This decay is a pseudoscalar to vector-vector transition and has three decay amplitudes which can be extracted by an angular analysis. Studies of untagged  $B_s \rightarrow J/\psi\phi$  decays using LHCb data recorded in 2010 allow us to measure the lifetime difference in  $B_s$  mesons and verifies the method for extracting

the weak CP violating phase  $\phi_s$ . Preliminary lifetime measurements for  $B^+$ ,  $B^0$ ,  $B_s$  and  $\Lambda_b$  will also be presented.

#### 77. Measurement of the polarization amplitudes of the decay $B^0 \rightarrow J/\psi K^*$ at LHCb

Christian Linn, University of Heidelberg

Using the data sample recorded with the LHCb detector in 2010 we perform a combined angular and lifetime analysis of the decay  $B^0 \rightarrow J/\psi K^*$ . The data correspond to an integrated luminosity of about  $36 \text{ pb}^{-1}$  and was taken at the LHC at a centre-of-mass energy of  $\sqrt{s} = 7 \text{ TeV}$ . A total of 3909  $B^0 \rightarrow J/\psi K^*$  candidates are found and are used to extract preliminary values for the polarisation amplitudes and the corresponding strong phases for the decays  $B_d \rightarrow J/\psi K^*$ .

#### 78. Measurement of $B_s$ mixing frequency $\Delta m_s$ at LHCb

Sebastian Wandernoth, University of Heidelberg

An analysis of the  $B_s \bar{B}_s$  mixing frequency  $\Delta m_s$  was performed on a dataset of  $\sim 35 \text{ pb}^{-1}$  obtained from the LHCb physics run in 2010. After reconstruction about 1350  $B_s$  signal candidates are found in the decay  $B_s \rightarrow D_s(3)\pi$  with an average proper time resolution of 36-44 fs. Opposite side flavour taggers with a tagging performance of  $\varepsilon_{eff} = 3.8 \pm 2.1 \%$  were used. The preliminary result for the mixing frequency is  $\Delta m_s = 17.63 \pm 0.11(\text{stat.}) \pm 0.04(\text{syst.}) \text{ ps}^{-1}$ .

#### 79. Optimization and calibration of the LHCb tagging performances

Emilie Maurice, CPPM Marseille

We describe the flavour tagging algorithm of LHCb, its optimization and calibration using the decays  $B^0 \rightarrow D^{*-}\mu^+\nu$ ,  $B^+ \rightarrow J/\psi K^+$  and  $B^0 \rightarrow J/\psi K^*$  with  $35 \text{ pb}^{-1}$  of data from the 2010 LHCb physics run. After a presentation of the flavour tagging principles, we describe the algorithm and its data-driven optimization and calibration. We measure an effective tagging efficiency for the opposite side taggers and same side pion combination of  $2.87 \pm 0.32 \%$  in the  $B^0 \rightarrow D^{*-}\mu^+\nu$  channel,  $2.38 \pm 0.33 \%$  in the  $B^+ \rightarrow J/\psi K^+$  channel and  $2.52 \pm 0.82 \%$  in the  $B^0 \rightarrow J/\psi K^*$  channel. The per event mistag is calibrated using the  $B^+ \rightarrow J/\psi K^+$  channel and verified in  $B^0 \rightarrow J/\psi K^*$ . The precision on the calibration parameters is limited by statistics: it amounts to  $\pm 0.012$  on the mean value and  $\pm 0.12$  on the scale.

#### 80. Charmless two-body B hadron decays at LHCb with 2010 data

Stefano Perazzini, INFN Bologna

The LHCb experiment is designed to perform flavour physics measurements at the Large Hadron Collider. Using data collected during the 2010 run, we reconstructed a sample of  $H_b \rightarrow h^+ h'^-$  decays, where  $H_b$  can be either a  $B^0$  meson, a  $B_s^0$  meson or a  $\Lambda_b$  baryon, while  $h$  and  $h'$  stand for  $\pi$ ,  $K$  or  $p$ . Such decays are sensitive probes of the Cabibbo-Kobayashi-Maskawa matrix and have the potential to reveal

the presence of New Physics. We present preliminary measurements of the direct CP asymmetries in the  $B^0 \rightarrow K^+\pi^-$  and  $B_s^0 \rightarrow \pi^+K^-$  decays.

**81. Measurement of B-meson production fractions from hadronic decays with the LHCb experiment**

Piotr Morawski, Henryk Niewodniczanski Institute of Nuclear Physics Polish Academy of Sciences, Cracow

A fit to the invariant mass distributions is used to determine the relative abundances of the four decay modes  $B_{d,s} \rightarrow D_{(s)}^\pm \pi^\mp$  and  $B_{d,s} \rightarrow D_{(s)}^\pm K^\mp$  for  $B_{d,s}$  mesons produced in 7 TeV pp collisions at the LHC. From these results preliminary values are determined for the relative branching fractions of the kaon modes with respect to the pion modes, and the  $B_d$  to  $B_s$  fragmentation ratio  $f_d/f_s$ .

**82. First observation of the decay  $\bar{B}_s \rightarrow D^0 K^{*0}$  & measurement of the ratio of branching fractions  $BR(\bar{B}_s \rightarrow D^0 K^{*0})/BR(\bar{B}^0 \rightarrow D^0 \rho^0)$  with LHCb**

Aurelien Martens, LAL Orsay

In  $36 \text{ pb}^{-1}$  of  $pp$  collisions at a centre-of-mass energy  $\sqrt{s} = 7 \text{ TeV}$  we observe for the first time the decay  $\bar{B}_s \rightarrow D^0 K^{*0}$ . The  $\bar{B}_s \rightarrow D^0 K^{*0}$  decay mode is a potentially dangerous background for the Cabibbo suppressed decay  $B^0 \rightarrow \bar{D}^0 K^{*0}$  used in the measurement of the CKM angle  $\gamma$ . With the preliminary analysis a clear signal of  $34.5 \pm 6.9$  events is obtained with a statistical significance over 9 standard deviations and we measure its branching ratio relative to the  $\bar{B}^0 \rightarrow D^0 \rho^0$  branching ratio.

**83. Search for the very rare decays  $B_s^0 \rightarrow \mu^+\mu^-$  and  $B^0 \rightarrow \mu^+\mu^-$  at LHCb**

Cosme Adrover, CPPM Marseille

A review of the search for the very rare decays  $B_s^0 \rightarrow \mu^+\mu^-$  and  $B^0 \rightarrow \mu^+\mu^-$  with the LHCb experiment is presented. These decays are suppressed within the Standard Model as they can only occur via helicity suppressed loop diagrams. However, their amplitudes can be significantly different in many New Physics scenarios, especially in those with an extended Higgs sector. Therefore, these decays are a sensitive probe of physics beyond the Standard Model.

The study is performed using  $\sim 37 \text{ pb}^{-1}$  of pp collisions at  $\sqrt{s} = 7 \text{ TeV}$  collected by the experiment at the Large Hadron Collider at CERN. For these dimuon decays the LHCb has reached sensitivities similar to the best existing limits. The resulting upper limits are  $\mathcal{B}(B_s^0 \rightarrow \mu^+\mu^-) < 56 \times 10^{-9}$  and  $\mathcal{B}(B^0 \rightarrow \mu^+\mu^-) < 15 \times 10^{-9}$  at 95% confidence level. With the number of pp collisions expected in 2011 the LHCb will be able to explore the region of branching ratios  $\sim 10^{-8}$ .

**84. W and Z production at LHCb**

Will Barter, University of Cambridge

Preliminary results are presented for the production cross-sections of  $Z^0$  and  $W^\pm$  production at the LHCb experiment. Also shown is the  $W$  charge asymmetry as

a function of lepton pseudo-rapidity. These measurements have particular interest because of the forward acceptance of the LHCb experiment, which covers pseudo-rapidities between approximately 2 and 5. The results may be interpreted as tests of the Standard Model, or can be used to constrain better the parton density functions. Prospects are given for improving these measurements in the forthcoming run, and for making complementary studies of Drell-Yan production of lower mass dilepton final states.

## **5 LHCf**

### **85. Comparison of the beam position analysis by LHCf with the LHC BPM data**

Koji Noda, INFN, Catania

## **6 TOTEM**

### **86. TOTEM trigger and read-out system**

Virginia Greco, Pisa University

### **87. Preliminary studies with the TOTEM T2 Detector**

Mirko Berretti