

## Abstracts : Session POSTER LHC-France Annecy Vendredi 5 avril 2013

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### LHCb

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#### Mesure de l'angle gamma du triangle d'unitarité, avec la désintégration $B^0 \rightarrow D(K_S\pi\pi) K^{*0}$ dans l'expérience LHCb. *Présenté par Alexis VALLIER, LAL (vallier@lal.in2p3.fr)*

La matrice CKM décrit le mélange entre les saveurs des quarks par interaction faible chargée. Ce mélange de saveurs est l'unique source de violation CP dans le Modèle standard. La matrice CKM devant être unitaire, on peut représenter cette condition dans un plan complexe par un triangle : le triangle d'unitarité. L'angle le moins bien mesuré à ce jour de ce triangle, est l'angle gamma. Il intervient dans les transitions de type  $b \rightarrow u$ .

C'est pourquoi la désintégration  $B^0 \rightarrow D(K_S\pi\pi) K^{*0}$  est un laboratoire privilégié pour la mesure de ce paramètre du modèle standard. Ce canal ne fait pas intervenir de diagramme en boucles. Il est donc très peu sensible à des effets de nouvelle physique, et permet de réaliser une mesure de référence. De plus, la désintégration en trois corps du méson D permet d'effectuer une analyse en amplitude de type Dalitz. Cette méthode est la plus sensible pour réaliser une mesure de gamma.

Ce poster résume le travail préliminaire effectué sur l'analyse du canal  $B^0 \rightarrow D(K_S\pi\pi) K^{*0}$  dans l'expérience LHCb, avec  $1 \text{ fb}^{-1}$  de données à  $\sqrt{s} = 7 \text{ TeV}$  et  $2 \text{ fb}^{-1}$  à  $\sqrt{s} = 8 \text{ TeV}$ .

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#### Rare charm decays at LHCb. *Présenté par Olga KOCHEBINA, LAL (olga.kochebina@cern.ch)*

The last results of the searches of the  $D(S) \rightarrow \pi \mu \mu$  decay at LHCb will be presented as well as current work on  $D^0 \rightarrow K K/\pi \mu \mu$ . Such decays are very rare in the Standard model due to a very effective GIM suppression. Consequently, they are good tools to search for new physics. It could be seen by enhancement of BF or occurrence of asymmetries (CP, FB).

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#### Mesure de la polarisation du $\Lambda_b$ avec le détecteur LHCb et recherche de la violation de la symétrie de renversement du temps (T). *Présenté par Mostafa HOBALLAH, LPC (mostafa.hoballah@cern.ch)*

Radiative  $b \rightarrow s \gamma$  decays are an example of effective flavor-changing neutral current interactions, which arise from the Standard Model through loop processes such as penguin or box diagrams dominated by a virtual intermediate top quark coupling to a W boson. Such processes allow to probe physics at high energies through the virtual particles circulating in the loop. This feature makes them a good testing ground in searches for physics beyond the Standard Model, which may introduce new heavy flavor-changing particles to which radiative decays could be sensitive to. Theoretical predictions for exclusive radiative decays—more accessible experimentally than inclusive ones—are more difficult to calculate; quark-level processes cannot be accessed directly in the experiment, and thus predictions have to be made at the hadronic level, where there are sizeable non-perturbative and thus hard-to-calculate contributions. Predictions are based on QCD factorization theorems derived from effective field theories, but suffer from large uncertainties due to non-perturbative QCD contributions. Some observables, such as CP or isospin asymmetries, benefit from cancellations of some of these uncertainties, making them better targets for experimental study. The radiative B decay to the vector

mesons  $\phi$  and  $K^*$ ,  $B_s \rightarrow \phi\gamma$  and  $B_d \rightarrow K^*\gamma$ , have been re-observed at LHCb. The latter has the current world best measurement of the branching fraction of  $B_s \rightarrow \phi\gamma$  and the CP symmetry of  $B_d \rightarrow K^*\gamma$ . The process  $B_s \rightarrow \phi\gamma$  is particularly interesting as the final state mixes the left- and right-handed amplitudes of the photon allowing us to determine the polarization of the photon, which is mostly left- (right-) handed for  $B$  ( $B_{\bar{d}}$ ) in the SM while various new physics models predict additional right- (left-) handed components. As the  $3 \text{ fb}^{-1}$  collected by the LHCb detector in 2011 and 2012 are hardly sufficient to measure the photon polarization in the  $B_s \rightarrow \phi\gamma$  channel, it is possible to measure the effective lifetime of the  $B_s$  meson and have an indirect access to the left to right-handed photon polarization amplitude. I present the current status of the radiative analysis at LHCb.

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**Mesure de la polarisation du  $\Lambda_b$  avec le détecteur LHCb et recherche de la violation de la symétrie de renversement du temps (T). Présenté par Ibrahim EL RIFAL, LPC (avec Ziad AJALTOUNI) (elrifai@clermont.in2p3.fr)**

La symétrie de Renversement du Temps, T, représente la contrepartie de la symétrie CP dans le cadre du théorème CPT. Une observation directe de la violation de T pourrait être mise en évidence dans les désintégrations  $\Lambda_b \rightarrow \Lambda J/\psi \rightarrow p\pi^- \mu^+ \mu^-$ , notamment grâce à l'étude des distributions angulaires des résonances intermédiaires ( $\Lambda$  et  $J/\psi$ ) ainsi que celle de leurs produits de désintégrations ; ce qui permettrait de déterminer la polarisation de ces résonances (longitudinale, normale et transversale). Dans cette étude on examine, dans des repères appropriés, la transformation des composantes du vecteur-polarisation de chaque résonance par rapport à l'opération de Renversement du Temps. Une composante du type "T -odd" (changement de signe par T) serait une manifestation de la violation de la symétrie T. L'analyse avec les données enregistrées par le détecteur LHCb est en cours.

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**Analysis of the rare decay  $B \rightarrow K^* e^+ e^-$  at LHCb. Présenté par Claire PROUVE, Aachen/LAL (avec Marie-Hélène SCHUNE) (Claire.Prouve@rwth-aachen.de)**

The  $b \rightarrow s\gamma$  transition proceeds through flavour changing neutral currents, and thus is particularly sensitive to the effects of new physics. While the branching ratio of  $b \rightarrow s\gamma$  has been measured to be consistent with Standard Model predictions, physics beyond the Standard Model could still be present in details of the decay process such as the photon polarisation. Information about the photon polarisation can be obtained by performing an angular analysis of  $b \rightarrow sl^+ l^-$  decays, such as the  $B \rightarrow K^* e^+ e^-$  decay. Although this decay has been observed by BaBar and Belle the statistics were not sufficient to measure the photon polarisation.

An overview of the method to measure the photon polarisation at the LHCb experiment via an angular analysis of  $B \rightarrow K^* e^+ e^-$  at low  $q^2$  is presented. The status of the  $B \rightarrow K^* e^+ e^-$  analysis with  $1\text{fb}^{-1}$  of pp collisions at  $\sqrt{s} = 7 \text{ TeV}$  at LHCb is given.

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**The measurement of the CP-violating phase,  $\phi_s$ , and the penguin contributions in  $B^0_s \rightarrow J/\psi \phi$  at LHCb. Présenté par Walaa KANSO, CPPM (kanso@cppm.in2p3.fr)**

The CP-violating phase,  $\phi_s$ , in  $B^0_s \rightarrow J/\psi \phi$ , is an excellent probe for the discovery of physics beyond the

Standard Model. LHCb has obtained the world's most precise value of the phase  $\phi_s$ , which is consistent with the Standard Model, but does not exclude the presence of New Physics in  $\phi_s$ . To detect it, the determination of the sub-dominant penguin contributions from the Standard Model becomes crucial now. We present the latest LHCb results on  $\phi_s$  and we outline the method to measure the impact of penguin diagrams in  $\phi_s$ .

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**Charmonium production measurements via  $c\bar{c} \rightarrow p\bar{p}$  decay mode.** *Présenté par Maksym TEKLISHYN, LAL (avec Sergey BARSUK, Jibo HE, Emi KOU) (teklishy@lal.in2p3.fr)*

The production of  $c\bar{c}$  mesons via decay to the proton-antiproton final state at  $\sqrt{s} = 7$  TeV is studied with the LHCb detector. Both prompt production and inclusive yield from b-hadron decays are addressed. Reference  $J/\psi \rightarrow p\bar{p}$  prompt and secondary samples are used. We use two data samples of 2011 and 2012 with the total luminosity about  $Ldt = 3 \text{ fb}^{-1}$ . Relative prompt  $\eta_c$  meson production was estimated, as well as its relative inclusive yield from b-decays. Other charmonium states are also studied.

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**ATLAS**

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**Probing  $Z/\gamma^*$  boson transverse momentum with angular correlations in Drell-Yan lepton pairs in ATLAS.** *Présenté par Houry KEOSHKERIAN, LAPP (houry.keoshkerian@lapp.in2p3.fr)*

A measurement of angular correlations in Drell-Yan lepton pairs via the  $\phi^*$  observable is presented. This variable probes the same physics as the  $Z/\gamma^*$  boson transverse momentum with a better experimental resolution. The  $Z/\gamma^* \rightarrow e^+e^-$  and  $Z/\gamma^* \rightarrow \mu^+\mu^-$  decays produced in proton-proton collisions at a centre-of-mass energy of  $\sqrt{s} = 7$  TeV are used. The data were collected with the ATLAS detector at the LHC and correspond to an integrated luminosity of  $4.6 \text{ fb}^{-1}$ . Normalised differential cross sections as a function of  $\phi^*$  are measured separately for electron and muon decay channels. These channels are then combined for improved accuracy. The cross section is also measured double differentially as a function of  $\phi^*$  for three independent bins of the  $Z$  boson rapidity. The results are compared to QCD calculations and to predictions from different Monte Carlo event generators. The data are reasonably well described, in all measured  $Z$  boson rapidity regions, by resummed QCD predictions combined with fixed-order perturbative QCD calculations. Some of the Monte Carlo event generators are also able to describe the data. The measurement precision is typically better by one order of magnitude than present theoretical uncertainties.

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**Reducible background estimation for the standard model Higgs boson search analysis in the decay channel  $H \rightarrow ZZ \ (*) \rightarrow 4l$  with the ATLAS experiment.** *Présenté par Elodie TIOUCHICHINE, CPPM (tiouchi@cppm.in2p3.fr)*

In the ATLAS collaboration, one of the main channels involved in the newly observed Higgs-like particle is the  $H \rightarrow ZZ \ (*) \rightarrow 4l$ . This golden channel has a good sensitivity and a clean signature.

However this channel suffers from low statistics, it is then important to well estimate the background. This is composed of the irreducible background coming from the standard model ZZ (\*) and the reducible one mainly composed of the Z + jets, Z + bb(bar) and tt(bar) processes. One of the Z + ee reducible background estimation methods ultimately developed, called fake factors method, is a data-driven method using control regions by inverting selections and extrapolating to the signal region. The poster will give a global vision of the H $\rightarrow$ ZZ (\*) $\rightarrow$ 4l latest results and more particularly about the Z + ee background estimation using the fake factors method.

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**Recherche de résonances ttbar dans le canal semi-leptonique avec le détecteur ATLAS. Présenté par Loïc VALERY, LPC ([loic.valery@cern.ch](mailto:loic.valery@cern.ch))**

Le poster proposé résume la recherche de résonances Z' se désintégrant en une paire top-antitop dans le canal semi-leptonique en utilisant les données enregistrées par le détecteur ATLAS en 2011 à une énergie de 7 TeV dans le centre de masse pour des collisions proton-proton, représentant une luminosité intégrée de 4,66 fb-1. Cette analyse permet notamment de poser une limite inférieure sur la masse d'un boson Z' leptophobique prédit dans les modèles *topcolor* de 1.7 TeV, et pour les gluons de Kaluza-Klein jusqu'à 1,9 TeV, toutes deux étant établies à 95 % de degré de crédibilité.

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**Photon energy scale intercalibration in ATLAS using 2012 data. Présenté par Zuzana BARNOVSKA, LAPP ([barnov@lapp.in2p3.fr](mailto:barnov@lapp.in2p3.fr))**

The precise calibration of the photon energy scale is crucial to obtain the most precise measurement of the mass of the newly discovered X (126) boson in its diphoton decay. The photon energy scale calibration procedure in ATLAS is described, as well as an original study of the photon intercalibration in  $\phi$  using the data collected by ATLAS in proton-proton collisions at  $\sqrt{s} = 8$  TeV in 2012.

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**Electron track and cluster combination (ATLAS). Présenté par Alessandro CALANDRI, CEA Saclay (IRFU/SPP) ([alessandro.calandri@cern.ch](mailto:alessandro.calandri@cern.ch))**

This analysis explores the possibility to improve the invariant mass resolution in the Higgs to 4 leptons decay channel with electrons in the final state (4e, and 2e2 $\mu$  or 2 $\mu$ 2e) using electron track and cluster transverse momentum combination. The analysis is performed on Monte Carlo simulations. First of all, the transverse momentum,  $p_T$ , measured in the inner detector and the energy calculated through the cluster deposits at the calorimeter level (the latter one used in the standard analysis) are both compared with their Monte Carlo true values. This study is pursued in different  $p_T$  (low, medium and high) and pseudorapidity (central, medium and forward) regions. A combined  $p_T$  is computed through a maximum-likelihood fit of track and cluster information, electron by electron. As a second step, the quality of the combined algorithm is tested on a single-electron sample and then the impact of the combination is estimated on the invariant mass distribution of the Higgs boson decaying into a pair of Z bosons (H $\rightarrow$ ZZ (\*) $\rightarrow$ 4e, 2e2 $\mu$ , 2 $\mu$ 2e).

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**Stave Rating and Quality Assurance of Pixel IBL- Staves.** *Présenté par Ahmed BASSALAT,  
CERN/LAL (ahmed.bassalat@cern.ch)*

During the current LHC shutdown, one of the major upgrade programs for the ATLAS experiment to the inner detector. A fourth layer of pixels, the Insertable B-Layer,(IBL) will be inserted by mid-2014 between the existing pixel system and the new-reduced beam pipe. The staves production has already begun. Fourteen staves will be chosen based on their results of the quality assurance.

Quality assurance measurements under clean room conditions, including temperature and humidity control will be performed during the various production steps of the IBL, namely as electrical and functional tests, connectivity and bad pixel identification tests which will be the main player for the stave rating and choosing the best 14 staves out of the total produced staves.

Some results of measurements of the first produced stave, the method of bad pixel identification and the different classes that were found and then the stave rating will be presented.

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**Recherche de nouvelle physique dans des évènements à 2 quarks top de même signe auprès du détecteur Atlas.** *Présenté par Emmanuelle DUBREUIL, LPC  
(emmanuelle.dubreuil@clermont.in2p3.fr)*

Le Modèle Standard décrit le comportement des particules élémentaires. L'une de ces particules, le quark top, tient un rôle privilégié du fait de sa grande masse. Il permet de tester le Modèle Standard de la physique des particules, via des mesures de précision, ou bien de chercher des processus nouveaux impliquant des quarks top.

Un état final a 2 quarks top de même signe est une signature claire pour la recherche de Nouvelle Physique. La production de ce processus est très supprimée dans le Modèle Standard. De nombreuses théories prédisent des états finaux a 2 quarks top de même signe, comme des théories prédisant des leptoquarks ou de nouveaux bosons.

Une étude a été mené avec les données enregistrées lors des collisions pp a  $\sqrt{s}=7\text{TeV}$  auprès du détecteur ATLAS. Dans le modèle effectif choisi, les quarks top sont produits par interaction de contact. Ils se désintègrent de manière leptonique, ce qui donne un état final composé de 2 leptons de même signe, 2 neutrinos et 2 quarks b. Avec un échantillon de données de  $4.7\text{fb}^{-1}$ , aucun excès n'a été observé. Une limite supérieure sur la section efficace de production de paires de quarks top de même signe a été calculé a 95% CL, comprise entre 0.27 pb et 0.37 pb en fonction des différentes configurations de chiralité des quarks top.

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**Search for single-top production in the s-channel at  $\sqrt{s}=7\text{ TeV}$  with the ATLAS detector.** *Présenté par Caterina MONINI, LPSC (monini@lpsc.in2p3.fr)*

We present the result of a search for single-top production in the s-channel using 7 TeV

pp collisions with the ATLAS detector for an integrated luminosity of  $4.7 \text{ fb}^{-1}$ . Events are selected requiring one isolated lepton, missing transverse energy and two b-tagged hadronic jets. The resulting sample is mostly composed of top pairs and W+jets events with a small single top contribution. A Boosted Decision Tree approach has been followed in order to optimize the discrimination against the background. An observed (expected) upper limit at 95% CL on the s-channel cross section of  $\sigma s < 16.94 \text{ pb}$  ( $\sigma s < 8.19 \text{ pb}$ ) has been obtained.

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**Search for direct slepton and chargino production in final states with two leptons and missing transverse momentum in pp collisions at  $\sqrt{s} = 8 \text{ TeV}$  with the ATLAS detector. Présenté par Thomas SERRE, CPPM ([serre@simap.in2p3.fr](mailto:serre@simap.in2p3.fr))**

Searches for the electroweak production of slepton pairs and chargino pairs decaying into final states with two leptons and missing transverse momentum are performed using  $20.7 \text{ fb}^{-1}$  of proton-proton collision data at  $\sqrt{s} = 8 \text{ TeV}$  recorded with the ATLAS experiment at the Large Hadron Collider. No significant excesses are observed with respect to the prediction from Standard Model processes. Limits are set on the masses of the lightest chargino for different lightest neutralino mass hypotheses within the framework of the phenomenological minimal supersymmetric Standard Model and of the simplified models.

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**SUSY search with two same-sign leptons and jets with the ATLAS detector using  $21 \text{ fb}^{-1}$  of pp collisions at  $8\text{TeV}$ . Présenté par Otilia Anamaria DUCU, CPPM ([oducu@cern.ch](mailto:oducu@cern.ch))**

Search for the production of supersymmetric particles decaying into final states with two same electric charge isolated leptons, e or  $\mu$ , jets, b-jets and missing transverse momentum is presented. The analysis uses a data sample collected during 2012, which corresponds to a total integrated luminosity of  $20.7 \text{ fb}^{-1}$  of  $\sqrt{s} = 8 \text{ TeV}$  proton–proton collisions recorded with the ATLAS detector at the Large Hadron Collider. No deviation from the Standard Model expectation is observed. Exclusion limits are derived for an mSUGRA/CMSSM model, which is compatible with a mass of around  $126 \text{ GeV}$  for the lightest Higgs boson, and for a wide variety of simplified models of supersymmetry. The result significantly extends previous exclusion limits of ATLAS from the same-sign lepton analysis.

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**Qualité des données du point de vue du calorimètre à Argon liquide d'ATLAS. Présenté par Jonathan BROWN, LPSC ([brown@lpsc.in2p3.fr](mailto:brown@lpsc.in2p3.fr))**

Un des enjeux instrumentaux majeurs au sein de l'expérience ATLAS porte sur la qualité des données collectées par le calorimètre électromagnétique à Argon liquide. Cette partie du détecteur, cruciale entre autres pour la découverte du boson de Higgs, est sujet à une attention particulière: différents effets instrumentaux peuvent potentiellement détériorer la mesure ou induire une inefficacité de collecte des données due au mode de fonctionnement inhérent de l'instrument. Ces différents aspects seront présentés ici, ainsi que les causes et solutions mises en œuvre afin de réduire au mieux les effets indésirables pouvant se manifester.

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**Search for squarks and gluinos using final states with jets and missing transverse momentum with the ATLAS experiment in 20.3 fb $^{-1}$  of data.** *Présenté par Marija MARJANOVIC, LAL (marjanov@lal.in2p3.fr)*

Results are presented of a search for the production of squarks and gluinos in  $\sqrt{s} = 8$  TeV LHC collisions at the ATLAS experiment using 20.3 fb $^{-1}$  of data from 2012. Using the jets + Emiss + 0-leptons signature no evidence for an excess beyond SM expectations is observed. Limits are set on the parameters of mSUGRA/CMSSM models, simplified and ‘compressed spectrum’ SUSY models which extend substantially beyond those set by ATLAS and other experiments previously.

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**Evidence for the Higgs boson in the  $H \rightarrow WW \rightarrow l+l-$  ( $l = e, \mu$ ) channel with the ATLAS detector at the LHC.** *Présenté par Yichen LI, LAL (liyichen.hep@gmail.com)*

The latest results from the ATLAS experiment on the Higgs boson in the  $H \rightarrow WW^* \rightarrow l l l l$  channel is reported as well as the author’s main contribution to the top background estimation in the dominant zero-jet category.

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## CMS

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**Tau lepton reconstruction in the CMS experiment.** *Présenté par Ivo Nicolas Naranjo FONG, LLR (ivo@llr.in2p3.fr)*

The tau lepton is the heaviest elementary particle in the leptonic sector. Due to its high mass, it appears in many decay chains of heavier particles and it is involved in several physics analyses performed in the CMS collaboration like the Higgs boson searches, top physics, supersymmetry, etc.

Tau reconstruction is based in the so called particle flow algorithm, using all the information collected by the CMS sub-detectors. The reconstruction is not perfect and suffers from fake rates coming from muons, jets and electrons that can be misidentified as taus, so the tau identification requires isolation criteria and discriminators against muons and electrons.

The poster will give a description of the tau reconstruction using the CMS detector and an overview of the tau ID performance and new developments.

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**Observation of new Higgs-like boson in the 4 leptons decay channel with CMS detector.** . *Présenté par Mykhailo DALCHENKO, LLR (avec Marko KOVAC) (mykhailo.dalchenko@cern.ch)*

Measurements of the new Higgs-like boson at a mass near 126 GeV in the CMS experiment are reported. The results are obtained from a comprehensive search for the standard model Higgs boson in the  $H \rightarrow ZZ$  decay channel, where both Z decay to electron or muon pairs. The analysis uses pp collision data recorded by the CMS detector at the LHC, corresponding to integrated luminosities of

$5.1 \text{ fb}^{-1}$  at  $\sqrt{s} = 7 \text{ TeV}$  and  $19.6 \text{ fb}^{-1}$  at  $\sqrt{s} = 8 \text{ TeV}$ . The new boson is observed with local significance above the expected background of 6.7 standard deviations and measurement of its mass gives  $125.8 + 0.5(\text{stat}) + - 0.2(\text{syst}) \text{ GeV}$ .

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**L'extraction de l'échelle d'énergie des photons avec les événements  $Z \rightarrow \mu\mu\gamma$ . Présenté par Louis SGANDURRA, IPNL ([sgandurr@ipnl.in2p3.fr](mailto:sgandurr@ipnl.in2p3.fr))**

Les événements  $Z \rightarrow \mu\mu\gamma$  où un boson Z se désintègre en deux muons et où l'un des muons émet un photon par bremsstrahlung sont des sources extrêmement pures de vrais photons. Ils sont très utiles, notamment pour la calibration en énergie du calorimètre électromagnétique de CMS. Ce poster présente les résultats de l'extraction de l'échelle d'énergie des photons pour des données de collision proton-proton récoltées à  $7 \text{ TeV}$  ( $5.1 \text{ fb}^{-1}$ ).

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**Standard Higgs boson search in the  $H \rightarrow WW \rightarrow 2l2v$  decay channel with the CMS detector. Présenté par Hugues BRUN, Oviedo/IPNL ([hugues.louis.brun@cern.ch](mailto:hugues.louis.brun@cern.ch))**

The search for the standard model Higgs boson in the  $H \rightarrow WW \rightarrow 2l2v$  channel with the CMS detector is described. This analysis is performed in categories, depending on the number of jets and the lepton flavour, in order to enhance the Higgs signal with respect to the expected irreducible backgrounds. The largest backgrounds are estimated with data-driven methods. In some categories a fit with a 2D template, using kinematical variables, is performed to improve the sensitivity and to be sensitive to the Higgs boson spin and parity. The result with the  $5.1 \text{ fb}^{-1}$  of data recorded in 2011 with  $7 \text{ TeV}$  in the center-of-mass and with the  $19.5 \text{ fb}^{-1}$  recorded at  $8 \text{ TeV}$  in 2012 is presented.

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**Mesure du boson à 125 GeV dans le canal diphoton dans l'expérience CMS. Présenté par Olivier BONDU, CERN/IPNL ([olivier.bondu@cern.ch](mailto:olivier.bondu@cern.ch))**

Dans le cadre des recherches du boson de Higgs du Modèle Standard dans le canal de désintégration en deux photons, un nouveau boson avec une masse de 125 GeV a été mis en évidence en juillet 2012. Ce poster présente une mise à jour de la mesure de cet excès, notamment avec l'intégralité des données de collision proton-proton récoltées à  $7 \text{ TeV}$  ( $5.1 \text{ fb}^{-1}$ ) et  $8 \text{ TeV}$  ( $\sim 20 \text{ fb}^{-1}$ ).

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**Search for ttbar resonances in semileptonic final state. Présenté par Sébastien BROCHET, IPNL (avec Stéphane PERRIES, Viola SORDINI et Silvano TOSI) ([s.brochet@ipnl.in2p3.fr](mailto:s.brochet@ipnl.in2p3.fr))**

We present a search for the production of heavy resonances decaying into top-antitop quark pairs at the Compact Muon Solenoid (CMS) Experiment at the Large Hadron Collider (LHC). The data correspond to an integrated luminosity of  $4.4 - 5 \text{ fb}^{-1}$  collected in pp collisions at  $\sqrt{s} = 8 \text{ TeV}$ .

We consider all events containing one muon or electron and at least two jets in the final state. We

present results from the combination of two dedicated searches, the first optimized for ttbar production at the kinematic production threshold ("threshold analysis"), and the other optimized for ttbar production produced with high Lorentz boosts ("boosted analysis"). We do not observe any excess of events above the expected yield from the standard model (SM) processes.

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## ALICE

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### **Neutral meson production in pp and Pb-Pb collisions at the LHC measured with ALICE.** *Présenté par Gustavo CONESA BALBASTRE, LPSC (gustavo.conesa.balbastre@cern.ch)*

Identified hadron spectra are considered to be sensitive to transport properties of strongly interacting matter produced in high-energy nucleus-nucleus collisions.

We present measurements of  $\pi^0$  and  $\eta$  mesons at mid-rapidity in a wide transverse momentum range in pp and Pb-Pb collisions at LHC energies measured with the ALICE detector. The mesons are reconstructed via their two-photon decays by two complementary methods, using the electromagnetic calorimeters and the central tracking system for photons converted to electron-positron pairs on the material of the inner ALICE barrel tracking detectors.

The spectrum and the nuclear modification factor  $R_{AA}$  of the  $\pi^0$  production measured in Pb-Pb collisions at different collision centralities shows a clear pattern of strong suppression with respect to pp collisions. Comparison of the ALICE results on neutral mesons with those of lower-energy experiments is discussed.

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### **J/ $\psi$ studies in pPb collisions at the ALICE experiment at LHC.** *Présenté par Igor LAKOMOV, IPNO (lakomov@gmail.com)*

ALICE (A Large Ion Collider Experiment) is one of the four main experiments on the Large Hadron Collider (LHC) ring. It is designed to study the physics of strongly interacting matter at extreme energy densities, where a phase of matter called quark-gluon plasma (QGP) is formed. One of the signatures of its formation is the so-called J/ $\psi$  "melting", i.e. J/ $\psi$  suppression (via Debye color screening) in heavy-ion (A-A) collisions compared to pp. To measure QGP effects in Pb-Pb in ALICE one usually uses the nuclear modification factor RPb-Pb. It represents the ratio of the J/ $\psi$  yield in Pb-Pb to its yield in pp multiplied by the number of the binary nucleon-nucleon collisions (assumed in Pb-Pb). If RPb-Pb is not unity then we observe nuclear matter effects. But RPb-Pb includes both hot (with QGP formation) and cold (without QGP formation) nuclear matter effects (CNM). Since nucleus (Pb) in heavy ion collisions is not a basic superposition of individual protons we need an intermediate step between Pb-Pb and elementary pp collisions. A high statistics pPb data obtained in January-February 2013 at the LHC at energy 5 TeV would help us to measure CNM effects and could be then used as a reference for Pb-Pb to disentangle hot nuclear matter effects and CNM. First results on the inclusive J/ $\psi$  analysis in pPb collisions are presented.

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**Study of the production mechanisms for K0 S, Λ and Λ in Pb-Pb collisions at  $\sqrt{s_{NN}} = 2.76$  TeV with ALICE.** *Présenté par Xitzel SANCHEZ CASTRO, IPHC (xsanchez@iphc.cnrs.fr)*

The aim of this study is to understand better the hadron production mechanisms in ultra-relativistic heavy-ion collisions and, ideally, to separate the hard production of the strange hadrons (K0 S, Λ and Λ) from their production in the thermalized bulk. The analysis is focused on the intermediate pT-range where it has been previously observed that the baryons are produced more abundantly than mesons while increasing the centrality of the collision.

The presented results are obtained by studying the angular correlations of strange baryons and mesons in the range  $2 < pT < 5$  GeV/c with charged primary hadrons of higher pT ( $5 < pT < 10$  GeV/c), in Pb-Pb collisions recorded by ALICE in 2010.

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**Next-Generation Muon Physics in ALICE: The Muon Forward Tracker Upgrade Project.** *Présenté par Antonio URAS, IPNL (antonio.uras@cern.ch)*

The ALICE experiment is dedicated to the study of the quark gluon plasma in heavy-ion collisions at the CERN LHC. The Muon Forward Tracker (MFT) is under consideration by the ALICE Experiment to be part of its program of detectors upgrade to be installed during the LHC shutdown planned for 2018. The MFT is a silicon pixel detector added in the Muon Spectrometer acceptance ( $2.5 < \eta < 4$ ) upstream of the hadron absorber. The MFT will allow a dramatic improvement of the measurements that are presently done with the Muon Spectrometer and, in addition, will give access to new measurements that are not possible with the present Muon Spectrometer set-up. The enhanced pointing accuracy gained by the muon tracks will significantly improve the mass resolution for the low mass resonances  $\omega$  and  $\phi$ , as well as --to a lesser extent--for the  $J/\psi$  and  $\psi'$ . The measurement of these resonances down to low pT in heavy-ion collisions represents a unique feature at the LHC. The precise measurement of the offset for the muon tracks will also permit a model-independent identification of open charm ( $c\tau \sim 150$  μm) and beauty ( $c\tau \sim 500$  μm) production, including displaced vertices related to  $J/\psi$  production from b. In addition, the MFT will help to reject a large fraction of muons coming from pion and kaon decays, improving the signal over background ratio for all the observables. In order to establish the physics performances achievable at the luminosities expected after 2018, realistic simulations of the MFT setup are being performed within the AliRoot framework. Detailed results will be shown on the physics performances, including background treatment and rejection, for the measurement of low mass neutral mesons, the  $J/\psi$  and  $\psi'$  resonances and the open charm and open beauty processes in central Pb-Pb collisions at  $\sqrt{s_{NN}} = 5.5$  TeV. An overview of the main technological issues related to the MFT project will also be given.



