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Book of Abstracts

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Contributed Talks / 5**The Heavy baryon masses and Spin-Isospin Dependence****Authors:** Ali Akbar Rajabi¹; Zahra Ghalenovi¹¹ *Iran***Corresponding Author:** z_ghalenovi@yahoo.com

Heavy flavour baryons containing one charm (beauty) quark with light flavour combinations are studied using the hypercentral approach. The considered potential is a combination of Coulombic, linear confining and harmonic oscillator terms. An improved form of the hyperfine interaction and isospin dependent quark potential is introduced. The ground state masses (and) of heavy baryons are computed. Also the magnetic moments of heavy baryons with using the effective mass of the confined quarks are computed. The obtained results are very close to the ones obtained in experiments or in the other works.

Contributed Talks / 6**Rare Decay Searches with BABAR**

We present recent BABAR results of searches for rare decays with new physics sensitivity. In particular, we describe recent inclusive and exclusive studies of $b \rightarrow s \gamma$ and $b \rightarrow d \gamma$ radiative processes, $B, D \rightarrow X l^+ l^-$, $D \rightarrow l^+ l^-$ and $B^+, D_s^+ \rightarrow l^+ \nu$.

Contributed Talks / 7**Recent BABAR Charm Physics Results****Author:** Steven Robertson¹¹ *High Energy Physics Group-McGill University-Unknown***Corresponding Author:** steven.robertson@cern.ch

We report recent BABAR charm physics results, including CP violation studies in $D^{*+} \rightarrow K_S^0 \pi^+$ and $D^+ \rightarrow K_S^0 h^+ h^-$, a study of the Dalitz plot of $D_s^{*+} \rightarrow K^+ K^- \pi^+$, measurements of the mass and width of the $D_{s1}(2536)^+$ and measurements of charm semileptonic decays. We also describe a recent study of inclusive $D^{(*)} \pi$ production in $c\bar{c}$ continuum.

Contributed Talks / 9**Searches for Exotic New Physics with BABAR**

We present recent BABAR results on lepton universality, and lepton and baryon number conservation in Upsilon, B, charm and tau decays. We also describe the results of direct searches for light new physics with BABAR. These include light pseudoscalar Higgs bosons, invisibly decaying dark matter candidates and hidden sector gauge and Higgs bosons.

Contributed Talks / 15**Search for New Physics in CP violating measurements at LHCb**

Precise measurements of CP violating effects in B hadron decays, and the search for CP violation in the charm sector, are an important and sensitive way to search for New Physics and constrain its nature. LHCb has a very wide programme of such studies. These include the measurement of mixing induced CP-violation in the B_s system, a precise determination of the unitarity triangle angle γ , the characterisation of CP-violation in loop dominated charmless B-decays, and the search for direct and indirect CP-violation in D^0 decays. First studies on some of these studies, and related topics, will be reported, using the 2010 dataset and the first data of the 2011 run.

Contributed Talks / 16**Search for New Physics in rare heavy flavour decays at LHCb**

FCNC decays of heavy flavour hadrons are highly sensitive to the effects of physics beyond the Standard Model. Important observables include the branching ratio of $B_{(s,d)} \rightarrow \mu^+ \mu^-$ and $D^0 \rightarrow \mu^+ \mu^-$, the angular distributions in the decay $B^0 \rightarrow K^* \mu^+ \mu^-$ and the lifetime distribution of $B_s \rightarrow \phi \gamma$. First results on some of these studies and related topics will be reported, using the 2010 dataset and the first data of the 2011 run.

Contributed Talks / 17**Electroweak and QCD measurements at LHCb**

LHCb is performing a wide range of studies in the electroweak sector, in soft-QCD and in jet physics. In many cases these measurements are unique and complement well those of the other experiments at the LHC. This is because of LHCb's forward geometry, low p_T acceptance and excellent particle identification capabilities. Results and prospects will be presented based on the 2010 dataset and the first data of the 2011 run.

Plenary Talks / 18**The Status and Road Map of Turkish Accelerator Center**

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Turkish Accelerator Center (TAC) Project has started with support of State Planning Organization (SPO) of Turkey under coordination of Ankara University. After completing Feasibility Report (FR,

2000) and Conceptual Design Report (CDR, 2005), third phase of project is started in 2006 as an inter-universities project with support of SPO. Third phase of project has two main scientific goals: to write Technical Design Report (TDR) of TAC and to establish an Infrared Free Electron Laser (IR FEL) facility as a first step. It is planned that the first facility will be completed in 2013 and will be based on 15-40 MeV superconducting electron linac. In this talk, main aims, national and regional importance, main parts and main parameters, status and road map of Turkish Accelerator Center will be presented.

Contributed Talks / 19

Phenomenological Study of Fragmentation Functions in Hadronization Processes

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The hadronization process turns partons produced in hard-scattering reactions into the physical, colorless, non-perturbative hadronic bound states detected in experiments. Within the standard framework, processes with an observed hadron in the final state can be described in terms of perturbative hard-scattering cross sections and certain non-perturbative but universal fragmentation functions, ending the details of the subsequent hadronization process. We determine unpolarized fragmentation functions for the pion in LO and NLO from electron-positron annihilation data and based on a phenomenological model. The resulting sets are in good agreement with the other models and all data.

Contributed Talks / 20

About the quantization of electric charge in gauge theories

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The electric charge quantization and fixing conditions of particles are found using a number of gauge theories, and it is shown that the presence of Higgs fields is a necessary condition for the electric charge quantization in the considered models. The dependence of the electric charge quantization conditions from the hypercharge of the Higgs fields, the identity of electric charge quantization conditions, resulting from Lagrangians generating particle masses and from the P invariance of the electromagnetic interaction and the fact of the fixing of fermionic field hypercharges by the Higgs fields can be interpreted as new properties of Higgs fields.

Contributed Talks / 21

Top Quark at 3TeV e+e- collider as gate to new physics

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The top quark, as heaviest known particle in the Standard Model, is expected to play a major role in the electroweak symmetry breaking mechanism and/or in many new physics scenarios. In the present work, 3TeV s-channel $t\bar{t}$ events are selected among different background sources and are used to investigate an example of new physics scenario by searching for a Z' gauge boson decaying into dark matter particles.

Standard Model data are simulated and reconstructed using the official CLIC CDR production.

Contributed Talks / 24

Mass spectrum and decay constant of Fourth generation quarkonia and

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The heavy fourth generation of quarks that have sufficiently small mixing with the three known SM families form hadrons. we calculate the masses and decay constants of the bound state objects containing two quarks (mesons beyond the SM) either both quarks from the SM4 or one from heavy fourth generation and the other from observed SM quarks, namely heavy charm or bottom quark in the framework of the QCD sum rules approach.

Contributed Talks / 25

The dynamic of diffractive structure functions at high energies

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We describe the most recent H1 and ZEUS diffractive DIS data obtained by various methods with very large uncertainties associated with the treatment of proton dissociation processes and compare them in detail. We consider pomeron as an object with parton distribution function, evolving according to the DGLAP equations. the gluon distributions are found to be quite different for methods of H1 and ZEUS. We perform a global analysis and achieve a very good description of all available measurements. Our results for longitudinal diffractive structure function are in good agreement with recently measured longitudinal structure function data points.

Contributed Talks / 26

The Electromagnetic Calorimeter of the SuperB Detector

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SuperB will run on a very high luminosity asymmetric e⁺e⁻ flavour factory. Being a natural partner of hadron colliders, SuperB will provide a unique information about the details of the physics discoveries in the coming decade.

The SuperB detector is based on the Babar apparatus, with those modifications required to operate at a luminosity of 10³⁶ or above.

In this presentation all the R&D work performed on the new electromagnetic calorimeter will be shown. A 25 LYSO-crystal prototype have been tested with electron and pion beams providing an energy resolution of about 3% for 1 GeV electrons.

A comparison with a full MC simulation will also be discussed.

Plenary Talks / 27

ATLAS detector status and operations, improvements during shutdown, and 2011 data taking

Author: Nectarios Benekos¹

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After the successful 2010 LHC run, where the ATLAS detector recorder 45 fb^{-1} of proton-proton collision data with 93.6% data taking efficiency and during the recent LHC shutdown period, ATLAS performed vital maintenance and improvements on the various sub-detectors. Maintenance on the Muon Spectrometer included repairs on the readout system as well as updates and leak checks in the gas system. Six TGC chambers have been also replaced. For the Calorimeters, repairs were carried out on the front-end electronics and power supplies to recover detector coverage that have been lost since the last maintenance period. Repairs were also performed on the Inner Detector, but at a smaller scale. Finally the ALFA luminosity detector was installed along the beam line and is being commissioned. This talk summarizes the above repairs and their expected improvement for physics performance and reliability of the ATLAS for the 2011 LHC run.

Contributed Talks / 28

The CUORE experiment: a search for neutrinoless double beta decay

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Neutrinoless Double-Beta Decay is a rare transition that violates the lepton number by 2 units and is possible only if the neutrino is a massive Majorana particle: these properties makes the search for this decay a unique tool to probe neutrino properties. In this talk we will present the status of the CUORE experiment on Neutrinoless Double Beta Decay of ¹³⁰Te. The Cryogenic Underground Observatory for Rare Events (CUORE) is a bolometric detector composed of 988 Tellurium dioxide crystals, with the total mass of about 750 kg of natural Tellurium. We will discuss its recent R&D efforts, anticipated sensitivity, and present the most recent result from Cuoricino, the predecessor experiment of CUORE, which was the largest bolometric experiment ever realized until now.

Contributed Talks / 30

PHIN Photo-Injector as the CLIC Drive Beam Source**Author:** Oznur Mete¹**Co-authors:** Anne Dabrowski²; Daniel Egger¹; Eric Chevallay²; Marta Csatari²; Massimo Petrarca²; Steffen Doeber²; Valentine Fedosseev²¹ CERN / EPFL² CERN**Corresponding Author:** oznur.mete@cern.ch

The Compact Linear Collider (CLIC) study proposes a multi-TeV, high luminosity, electron-positron linear collider in order to fulfill the current need for a lepton collider. The study has been started in the late 80s at CERN and currently is a joint effort with a collaboration of 40 institutes. An innovative scheme of high peak RF power production for the high accelerating gradient has been proposed for CLIC. The so called “two-beam scheme” consists of two beams that are running parallel to each other. One of the beams is to be accelerated for the collision experiments and called “the main beam”. The second beam of the CLIC scheme is “the drive beam” and will be employed for the power production. The quality of the main beam acceleration depends on the stability of the power that is generated by the drive beam. Therefore, the optimization of the drive beam production with the proper time structure and within the required beam dynamics tolerances is one of the most important accelerator physics aspects of the project.

Currently in the conceptual level, the baseline design of the drive beam injector consists of a thermionic gun. This electron source has to be combined with a sub-harmonic bunching system in order to provide the required time structure of the drive beam. However, a big disadvantage of this scheme is the parasitic satellite bunches that are produced due to the sub-harmonic bunching system. PHIN photoinjector has been raised as another option in order to replace the existing thermionic gun of CLIC test facility (CTF3) and to form the bases of a source for the CLIC drive beam. The PHIN project is in the framework of the European CARE (Coordinated Accelerator Research in Europe) program.

In this talk the highlights from the design and the commissioning of the PHIN photoinjector will be presented.

Contributed Talks / 31

Decay Constants of Heavy Vector Mesons at Finite Temperature**Author:** ELSEN VELI VELIEV¹**Co-authors:** ARZU TURKAN¹; GULSAH KAYA¹; HAYRIYE SUNDU¹; KAZEM AZIZI²¹ Department of Physics, Kocaeli University, 41380 Izmit, Turkey² Physics Division, Faculty of Arts and Sciences, Doğuş University, Acıbadem-Kadıköy, 34722 Istanbul, Turkey**Corresponding Author:** elsen@kocaeli.edu.tr

We calculate the masses and leptonic decay constants of the heavy vector quarkonia, J/ψ and Υ mesons at finite temperature. In particular, considering the thermal spectral density as well as additional operators coming up at finite temperature, the thermal QCD sum rules are acquired. Our numerical calculations demonstrate that the masses and decay constants are insensitive to the variation of temperature up to $T \cong 100 MeV$, however after this point, they start to fall altering the temperature. At deconfinement temperature, the decay constants attain roughly to 45% of their vacuum values, while the masses are diminished about 12% and 2.5% for J/ψ and Υ states, respectively.

The obtained results at zero temperature are in good consistency with the existing experimental data as well as predictions of the other nonperturbative models. Considerable decreasing in the values of the decay constants can be considered as a sign of the quark gluon plasma phase transition.

Contributed Talks / 32

QCD and Top physics results with the 2010 ATLAS Data

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In 2010, ATLAS collected proton-proton collision data at a centre-of-mass energy of 7 TeV, for an integrated luminosity of ~ 35 pb⁻¹. The high energy gave the possibility to produce a sizeable amount of top quarks, allowing for measurements of top quark properties and searches for BSM-predicted heavy resonances decaying in top-antitop pairs. Moreover, the large phase space at this energy enabled the study of W and Z gauge boson production in association with multijet topologies, which constitute a significant experimental background for Higgs and BSM searches at LHC. This talk will give an overview of the top physics and multijet QCD results of 2010, with an outlook on perspectives for 2011.

Contributed Talks / 33

Collective behavior of partons could be a source of energetic hadrons

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The scaling behavior of the v_2 at ultrarelativistic heavy ion collisions is considered as a signal of collective behavior of the partons in hot and/or dense hadronic matter [1-4]. The early results of CERN EMC [5-6] and JINR on the effect of limiting fragmentation of nuclei [7-9] were might be also explained through the collective behavior of the partons in the medium with extreme density. The phenomenon could lead to formation of the partons / hadrons with extreme high energies due to which all/majority of partons in the group collectively could give their energies to single (or a few) partons/hadrons. In this case the energy of the energetic partons could be limited mainly with the total energy of the collective partonic system. Using the idea given above one can explain the source of the cosmic particles in the energy domain greater than 10^{15} eV. It is surmised that such energetic partons could be formed in the center of the massive stars with density close to the Quantum Chromodynamic critical one, transformed to the energetic hadron and were detected as high energy cosmic particles [10].

1. V. A. Okorokov. Physics of Atomic Nuclei, 2009, Vol. 72, No. 1, pp. 147160.
2. J. Adamset al., Phys.Rev.Lett. 95, 122301 (2005).
3. A. Adareet al., Phys.Rev.Lett. 98, 162301 (2007).
4. K. Aamodt et al. arXiv:1011.3914v1 [nucl-ex] 17 Nov 2010
5. J.J. Aubert et al., Phys. Lett. 123B, 275 (1983)
6. A. V. Efremov, Phys. Lett. 174B, 219-223 (1986)

7. A.M. Baldin et al. Sov.J. Nucl.Phys.18,41 (1973); A.M. Baldin. Journal of PEPAN, v.8 (1977), p.429-477
8. V.S. Stavinski. Journal of PEPAN, v.10 (1979), p.949-995;
9. M.I. Stricman, L.L. Frankfurt PEPAN, v.11, p.571 (1980); A.V. Efremov PEPAN, v.13, p.613 (1982).
10. M. Suleymanov et al. PoS EPS-HEP2009:406,2009.

Contributed Talks / 34

The Study of Short-Lived Resonances with the ALICE Experiment at the LHC

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ALICE is the LHC experiment dedicated to the study of heavy-ion collisions. The main purpose of ALICE is to investigate the properties of a new state of deconfined nuclear matter, the quark-gluon plasma. Resonance production in proton-proton collisions is interesting in itself and important as a baseline for heavy-ion studies.

The study of short lived resonances allows the investigation of the collision dynamics and of the properties of the hot and dense medium created in high energy collisions. Moreover it is interesting to address the topics of the strangeness production by the analysis of strange resonances. First measurements of the $\phi(1020)$, $\Sigma(1385)$, $\Lambda(1520)$, $K(892)$, $\Xi(1530)$ and doubly charged $\Delta(1232)$ resonances in pp collisions at a center of mass energy of 7 TeV will be presented. Thermal model predictions of particle ratios in proton-proton collisions will be shown.

Contributed Talks / 37

Analyses of $B_s^* - B - K$ and $D_s^* - D - K$ vertices

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The strong coupling constants, $g_{B_s^*BK}$, $g_{D_s^*DK}$, where K_1 is pseudoscalar kaon meson, are calculated in the framework of three-point QCD sum rules. In particular, the correlation functions of the considered vertices when both $B(D)$ and K mesons are off-shell are evaluated. A comparison of the obtained result with the existing prediction on $g_{D_s^*DK}$ as the only coupling constant among the considered vertices, previously calculated in the literature, is also made.

Contributed Talks / 39

Search for the decay $\mu \rightarrow e \gamma$ in the MEG experiment

Author: Yasuhiro Nishimura¹

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The MEG experiment is currently searching for the lepton-flavor-changing decay $\mu \rightarrow e\gamma$. Flavor mixing in the neutrino sector, which is implied by neutrino oscillations, leads to too small branching ratio of the $\mu \rightarrow e\gamma$ in the Standard Model to be observed. Many extensions of the Standard Model such as Supersymmetric theories, however, bring the branching ratio of the decay within the reach of the MEG. We started the physics data taking in 2008 with a high precision liquid xenon gamma-ray detector and a positron spectrometer with a gradient magnetic field. A preliminary result from the analysis on the data 2009 will be presented together with the current status and the future prospects of the experiment.

Contributed Talks / 42

Forward-backward asymmetry of top quark in unparticle physics.

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The updated CDF measurement of the forward-backward asymmetry (FBA) in the top quark production $p\bar{p} \rightarrow t\bar{t}$ at Tevatron (with the CMS energy 1.96 TeV) shows a deviation of 2σ from the value predicted by the Standard QCD Model. We present calculation of this quantity in the scenario where colored unparticle physics contributes to the s-channel of the process, and obtain the regions in the plane of the unparticle parameters λ and d_U which give the values of the FBA and of the total $t\bar{t}$ production cross section compatible with the present measurements.

Contributed Talks / 44

TAC-SASE FEL Facility Project

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We study start-to-end simulations of the proposed TAC SASE FEL facility. Astra Code simulates electron gun, including space charge effect while Elegant Code simulates to track particle distribution from the accelerator modules through the entrance of the undulator. Elegant Code includes weak field but does not include space charge effects. Undulator optimization is managed by Genesis 1.3. In this study, tentative electron beam and laser parameters of TAC SASE FEL facility projects are given.

Contributed Talks / 46

Development of Micromegas readout planes for Rare Event Searches

Author: Theopisti Dafni^{None}

Detectors in rare-event searches are required to follow a strict budget on radiopurity, but should also show good energy and space resolution, and stability over long periods of operation.

The Micromegas detectors have attracted a lot of attention since their invention in 1996, for their potential use in this field of particle physics, among others.

One example is the CAST (CERN Axion Solar Telescope) experiment which is searching for axions. The energy range of the expected signal is between 1 and 10 keV and therefore low background detectors are necessary for the experiment's sensitivity. The new microbulk micromegas installed in CAST the last years have registered periods where the background has been reduced even down to a level of $\sim 2 \times 10^{-7} \text{ s}^{-1} \text{ cm}^{-2} \text{ keV}^{-1}$.

Double decay experiments' main requirements are as well very good energy resolution and ultra-low background levels, apart from big masses. NEXT (Neutrino Experiment with a Xenon TPC) will construct a 100 kg high-pressure xenon gas (HPGXe) TPC, looking for the neutrinoless double beta decay in the Canfranc Underground Laboratory (LSC). Micromegas planes have been one of the proposed technologies for the equipment of this detector.

We report on the effort that has been invested in the development of detectors which push the technology in order to meet the characteristics for this type of experiments.

Contributed Talks / 47

Electroweak results with the 2010 ATLAS Data

Author: Lidia Dell'Asta^{None}

The ATLAS Experiment is one of the two multi-purpose detectors at the LHC. During the year 2010 it has collected 45 pb⁻¹ of pp collisions at a center-of-mass energy of 7 TeV. In this talk the ATLAS electroweak results with 2010 data will be described. We present measurements of total inclusive W and Z production cross sections, as well as differential cross sections and the W charge asymmetry. As the production of pairs of bosons is an important process for investigating the electroweak sector of the Standard Model, the measurements of the cross section of such processes will also be presented.

Contributed Talks / 48

Early Higgs searches with the ATLAS data

Author: Taiki Yamamura^{None}

We search for the Higgs boson produced in pp-collisions at $\sqrt{s} = 7 \text{ TeV}$ with the ATLAS detector at the LHC. The searches are performed by using various decay channels such as $H \rightarrow \gamma\gamma$, WW , ZZ , $\tau\tau$ and so on. The analysis of each final state is well performed, where main background contribution is understood in a data-driven technique, but we see no significant hint for the signal events up to now. In this presentation, we summarize the results with 2010 data. By showing the simulated result, we also discuss the future prospects for our search for the Standard Model Higgs boson.

Contributed Talks / 49

Search for new physics at ATLAS

Author: Gokhan Unel¹

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LHC operations at $E_{\text{cm}}=7\text{TeV}$ have been successfully ongoing since March 2010 with ever increasing instantaneous Luminosity. ATLAS is one of the two general purpose experiments recording LHC collision data. This presentation will review the ATLAS public results for the new physics quests focusing mainly on the non-susy (exotic) models. The limits on various models are obtained by analyzing the 2010 data corresponding to an integrated luminosity of about 45 inverse picobarns.

Contributed Talks / 50

ATLAS ID Performance at LHC

Author: Thijs Cornelissen^{None}

Since the LHC startup in 2009, the ATLAS inner tracker has played a central role in many ATLAS physics analyses. Rapid improvements in the calibration and alignment of the detector allowed it to reach nearly the nominal performance in the timespan of a few months. The tracking performance proved to be stable as the LHC luminosity increased by five orders of magnitude during the 2010 proton run, while the performance was only slightly degraded in the extremely dense heavy ion collisions. New developments in the offline reconstruction for the 2011 run will improve the tracking performance in high pile-up conditions, as well as in highly boosted jets.

Contributed Talks / 51

ATLAS TRT and its performance at LHC

Author: Ahmet Bingul¹

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The ATLAS Transition Radiation Tracker (TRT) is the outermost of the three sub-systems of the ATLAS Inner Detector at the Large Hadron Collider at CERN. It consists of close to 300000 thin-wall drift tubes (straws) providing on average 30 two-dimensional space points with 0.12-0.15 mm resolution for charged particle tracks with $|\eta| < 2$ and $p_T > 0.5$ GeV. Along with continuous tracking, it provides particle identification capability through the detection of transition radiation X-ray photons generated by high velocity particles in the many polymer fibers or films that fill the spaces between the straws. Custom-built analog and digital electronics is optimized to operate as luminosity increases to the LHC design. In this talk, a review of the commissioning and first and current operational experience of the TRT detector and its performance at LHC will be presented. Emphasis will be given to performance studies based on the reconstruction and analysis of LHC collisions. A comparison of the TRT response and the particle identification in pp and Pb-Pb collisions will be presented. The results are also compared with the expected performance.

Contributed Talks / 52

Recent results from CMS on SUSY searches in leptonic final states

We present the results of searches for new physics in various topologies that lead to one or more isolated leptons, jets, and missing transverse energy in the final state. The searches are performed using 35 1/pb of data collected in 2010 by the CMS experiment at the LHC in pp-collisions at a center-of-mass energy of 7 TeV. Various data-driven techniques used to measure the Standard Model background are discussed. No evidence for new physics is observed and limits are set on the production

cross-section times the event acceptance for the searched topologies. To facilitate the interpretation of our data in a broader range of new physics scenarios, we provide information on our event selection, detector response, and efficiencies.

Contributed Talks / 53

Measurements of forward energy flow and forward jet production with CMS

We present measurements of the forward ($3 < |\eta| < 5$) energy flow in minimum bias events and in events with either hard jets or W and Z bosons produced at central rapidities, as well as measurements of the inclusive forward jet cross section and of associated production of forward and central jets. Results are compared to MC models with different parameter tunes for the description of the underlying event and to perturbative QCD calculations, the PYTHIA and HERWIG parton shower event generators, as well as to the CASCADE Monte Carlo

Contributed Talks / 54

Recent heavy-flavor results from CMS

The CMS experiment has measured the production of heavy flavored hadrons and jets at 7 TeV. A large range of inclusive and exclusive cross-section measurements (Quarkonia, charged and neutral B hadrons) as well as studies of B-B(bar) angular correlations were made and compared to theoretical predictions at LO and NLO precision. In this presentation we summarize these results.

Contributed Talks / 55

Searches for Supersymmetry in Hadronic Final States with the CMS Detector at the LHC

We present the results of searches for new physics in the all-hadronic final states with jets and missing transverse energy. The searches are performed using 36 1/pb of data collected in 2010 by the CMS experiment at the LHC in pp-collisions at a center-of-mass energy of 7 TeV. Various data-driven techniques used to measure the Standard Model background are demonstrated. No evidence for new physics is observed and limits are set on the predictions of a range of Supersymmetric scenarios.

Contributed Talks / 56

Next Generation Axion Helioscope

Author: Igor Garcia Irastorza^{None}

We present a proposal for a new generation axion helioscope, with a potential sensitivity to the axion photon coupling down to a few $10^{-12} \text{ GeV}^{-1}$, 1-1.5 orders of magnitude beyond the CERN

Axion Solar Telescope (CAST), currently the most powerful implementation of the axion helioscope concept. We show that such improvement is conceivable by fully exploiting innovations already introduced by CAST, namely, x-ray focusing optics and low background x-ray detectors, as well as a new magnet with substantially enlarged magnetic volume. If axions also couple to electrons, the Sun produces a larger flux for the same value of the Peccei-Quinn scale, allowing one to probe a broader class of models. Except for the axion dark matter searches, this experiment will be the most sensitive axion search ever, reaching or surpassing the stringent bounds from SN1987A and possibly testing the axion interpretation of anomalous white-dwarf cooling that predicts an axion mass of a few meV. Beyond axions, this new instrument will probe entirely unexplored ranges of parameters for a large variety of axion-like particles (ALPs) and other novel excitations at the low-energy frontier of elementary particle physics.

Contributed Talks / 57

CAST Micromegas detector performance

Author: Cenk Yildiz^{None}

CERN Axion Solar Telescope (CAST) experiment is searching for axions coming from the sun. Inside transverse magnetic fields, axions can be converted into x-rays, which can be detected by x-ray detectors. The expected signal in CAST is 1-10 keV range. Low noise and low background detectors are highly necessary to increase sensitivity of the experiment. Micro Mesh Gaseous Structure (micromegas) detectors have been used in CAST since the beginning, providing a good energy and spatial resolution for CAST's needs. CAST has been intensely studying micromegas detectors to develop new technologies, decrease background levels, increase stability and understand the nature of the background. While in 2003, there was 1 micromegas, 1 Time Projection Chamber (TPC) and 1 Charged Couple Device (CCD), improvements in micromegas detector encouraged CAST to increase the number to 3, replacing TPC with 2 micromegas detectors. In some periods during CAST run, a special phenomena called "Ultra low background" is observed, where for a few days background rate decrease to $\sim 1 \times 10^{-7} \text{ s}^{-1} \text{ cm}^{-2} \text{ keV}^{-1}$. To investigate this, simulations and shielding tests are being done at the Canfranc Underground Laboratory. If this low background is indeed not a systematic effect, that can open new possibilities on rare event searches at ground.

Plenary Talks / 58

Top physics and Higgs searches at the Tevatron

Author: Shabnam Jabeen^{None}

The search for the Higgs boson and the study of the heaviest known fundamental particle, the top quark, have been at the center of the Tevatron research program. The Higgs boson is yet to be discovered and the top quark was discovered in 1995. Both of these particles have a very special place in the "periodic table" of fundamental particles. With Tevatron having collected a lot of data and the Large Hadron Collider finally coming online, we are entering a very exciting era where many interesting questions about these intriguing particles will be answered. In this talk I will summarize the current status of Higgs boson and top quark studies at the Tevatron and will discuss a few interesting observations that could be hints for the physics beyond the Standard Model.

Plenary Talks / 59

ATLAS physics results with 2010 data and preliminary results with 2011 data

Author: Reiner Hauser¹

¹ *Michigan SU*

The ATLAS experiment has been collecting ~ 35 pb⁻¹ of collision data at a center of mass energy of 7 TeV in 2010. In addition several hundred of pb⁻¹ have been recorded in 2011 so far. After an introduction to the ATLAS experiment, its detector and operations, an overview of the physics results using both 2010 and early 2011 data will be given.

Plenary Talks / 61

ATLAS detector upgrade plans and perspectives

Author: Andreas Salzburger^{None}

With the LHC collecting first data at 7 TeV, plans are already advancing for a series of upgrades leading eventually to about five times the LHC design-luminosity some 10 years from now in the high luminosity LHC (HL-LHC) project. The goal is to extend the data set from about 300 fb⁻¹ proposed for LHC running to 3000 fb⁻¹ by around 2030. Coping with the high instantaneous and integrated luminosity will require many changes to the ATLAS detector. ATLAS is planning a multi-phase detector upgrade procedure, starting with initial modifications of the existing detector setup as early as 2013 towards large scale replacements of detector components during later shut down periods. The designs are developing rapidly for an all-new inner-tracker, big changes in the calorimeter and muon systems, as well as improved triggers. This talk summarises the environment expected at the HL-LHC and the status of the improvements to the ATLAS detector.

Plenary Talks / 62

Review of LHCb Results

Author: Stephane Monteil¹

¹ *in2p3 Clermont-Ferrand*

The physics case of the LHCb experiment will be introduced after a short description of the present flavour physics and CP violation physics landscape. An overview of the experiment will then be given, with a special emphasis on the detector and trigger performance. A selection of the main results of the LHCb collaboration, based on 2010 data and the currently available statistics recorded in 2011 LHC collisions will eventually be discussed.

Plenary Talks / 63

ALICE early results at LHC

Author: Jean Pierre Revol^{None}

I will provide a general overview of ALICE's most significant results at LHC, both in proton collisions and in lead nuclei collisions.

Plenary Talks / 64

Top quark physics results using CMS data at 7 TeV

Author: Didar Dobur^{None}

We give an overview of the most recent results on top quark properties and interactions, obtained using data collected with the CMS experiment during the years 2010-2011 at 7 TeV center-of-mass energy. Measurements are presented for both the inclusive top pair production cross section, using the dilepton, lepton+jets, hadronic and tau channels, as well as for various differential cross sections. The results are compared with standard model predictions and allow to search for possible presence of new physics. In particular, measurements of the top pair invariant mass distribution are used to search for new particles decaying to top pairs. We extract the mass of the top quark using various methods, including indirect constraints from the measured cross section. We measure total and differential cross sections for the electroweak production of single top quarks in both t- and tW-channels, also useful for constraining the CKM matrix element V_{tb} . Further results include measurements of the W helicity in top decays and the top pair charge asymmetry.

Plenary Talks / 65

Physics results from CMS

Author: Paolo SPAGNOLO^{None}

The talk shows the overview of the major results of the CMS experiment with data collected at LHC in the first year of run at 7 TeV.

Plenary Talks / 66

Heavy-ion results from the CMS experiment

We present early results of the CMS experiment from PbPb collisions at $\sqrt{s_{NN}} = 2.76$ TeV, probing quark and gluon matter at unprecedented values of energy density. The capabilities of the CMS apparatus allows us to investigate various hard probes, as well as bulk particle production and collective phenomena, using the calorimetry, muon and tracking systems covering a large range in pseudorapidity, complemented by a flexible two-level trigger system. One of the most important early observations was that dijets at high pT are found to be increasingly unbalanced as a function of collision centrality. The angular distribution of jet fragments has been also studied in these events indicating a softening and widening of the subleading jet fragmentation pattern. The overall pT-imbalance can be recovered by including tracks found at low pT and at large angles with respect to the jet axis. Furthermore, the pT-distribution of charged tracks (jet fragments) has been measured using various jet triggers, extending to pT=200 GeV/c in pp collisions at 7 TeV, and a reference spectrum is constructed to compare to PbPb collisions at 2.76 TeV/nucleon pair. The inclusive production of isolated prompt photons has also been studied in pp collision. The corresponding ongoing efforts for PbPb collisions will be reviewed. CMS is also well equipped to measure muons and dimuons in the high multiplicity environment of heavy ion collisions. Inclusive and differential measurements of the Z boson yield show no sign of modification with respect to NLO pQCD calculations. Dimuon decays of the J/psi particle and the Upsilon family are also investigated and results will be presented for pp as well as for PbPb collisions. Two-particle correlations in both collision systems will be presented at various LHC beam energies, and the complex two-dimensional structure with various short and long range correlation features in pseudorapidity will be discussed, including the long range, same-side ridge in high multiplicity pp and central PbPb events. Azimuthal angle correlations of charged hadrons were also measured as a function of transverse momentum, centrality and pseudorapidity, using the event-plane, cumulant and Lee-Yang zeros methods, featuring different sensitivities to non-flow correlations. An outlook to odd Fourier-components of the azimuthal angle distributions will also be presented. Finally, the transverse energy produced by the heavy

ion collision as a function of centrality will be discussed as well, in a wide range of pseudorapidity, to help disentangle the interplay of initial state and final state effects on energy flow, and to study the baryon energy loss and the subsequent development of the pressure of the hot partonic system.

Plenary Talks / 67

Status of the 4th SM Family

Author: Saleh Sultansoy¹

¹ *TOBB-ETU*

Existence of the fourth family follows from the basics of the standard model (SM) and the actual mass spectrum of the third family fermions. During the last two decades, the fourth SM family studies were almost blocked by incorrect interpretation of the precision electroweak data. Despite to the studies done 10 years ago this misinterpretation continued to have a place in Particle Data Group (PDG) up to 2008. Lately (in 2010), authors of the corresponding part of PDG have come close to common understanding. While there are some indirect indications (BAU, B-decays), the existence of the fourth SM family should be clarified by direct discovery of the fourth family quarks and leptons. Besides, very important consequence of the fourth SM family is enhancement of the SM Higgs boson production at hadron colliders. We discuss possible manifestations of the fourth SM family at existing and future colliders. The LHC and Tevatron potentials to discover the fourth SM family have been compared.

Plenary Talks / 68

CAST physics achievements and perspectives

Author: Konstantin Zioutas¹

¹ *Patras U.*

The CERN axion helioscope CAST will be presented, along with its results and the achievements reached so far. In addition to the inspiring direct solar axion search, the recently arisen new perspectives towards searching for particle candidates from the Hidden sector ('paraphotons') and also for the dark energy in cosmos ('chameleons'), both of solar origin, will be presented; their detection follows from CAST's working principle and its configuration. The necessary upgrades to enter into new territories imply mainly detectors with less background and / or sub-keV energy threshold. The potential of transforming CAST into a relic axion antenna is being currently investigated, with the aim being to cover the otherwise inaccessible 0.1 to 1meV relic axion rest mass range.

Plenary Talks / 69

OPERA experimental results

Author: Antonia Di Crescenzo¹

¹ *University of Naples*

The OPERA long-baseline oscillation experiment is located in the underground Gran Sasso laboratory in Italy.

OPERA has been designed to observe $\nu_\mu \rightarrow \nu_\tau$ appearance in the CNGS ν_μ beam, 730 km away from its source at CERN. The apparatus consists of a large set of emulsion-lead targets combined with electronic detectors.

The target consists of 150,000 Emulsion Cloud Chambers (ECC) bricks, which are stacks of interleaved emulsion films and lead plates. The $\nu\tau$ charged current interactions will be detected by identifying the decay topology of the τ in the ECC bricks.

The first run started in 2008. The experiment is currently in the phase of data taking and analysis.

The talk, after a short description of the OPERA setup, will present an updated status report on data reconstruction and analysis applied to present samples of neutrino events.

Plenary Talks / 70

Current status of the T2K experiment

Author: Yuichi Oyama¹

¹ KEK

T2K (Tokai to Kamioka) is a long-baseline neutrino-oscillation experiment using intense neutrino beam from J-PARC, and Super-Kamiokande detector at a distance of 295km. The primary goal of T2K is a complete understanding of the neutrino mass

matrix, especially, discovering of the last unknown angle θ_{13} . The physics data taking started in January 2010. In the talk, current status of the experiment is reported.

Plenary Talks / 71

Recent Belle results (and future prospect)

Author: Youngjoon Kwon¹

¹ Yonsei U

Since the start of data-taking in 1999, the Belle experiment has produced prolific amount of new physics results in the heavy-flavor physics and CP violations. In this talk, we present the recent physics results from Belle, in particular in the decays of B and Bs mesons as well as some new results in the bottomonium spectroscopy. We will also talk about the prospects of the Belle-II experiment.

Plenary Talks / 72

Recent Results from BaBar

Author: Nicola Neri¹

¹ INFN Sezione Di Milano

We report recent results based on the entire BaBar data sample, which consists of about 433 fb⁻¹ recorded at the $\Upsilon(4S)$, 30 fb⁻¹ recorded at the $\Upsilon(3S)$, 14 fb⁻¹ recorded at the $\Upsilon(2S)$ and of 54 fb⁻¹ off-peak data recorded close to a center-of-mass energy of 10.6 GeV. The results include searches for CP violation in charm and tau decays, searches for FCNC, lepton flavor violating and lepton

number violating charm decays, and measurements of CP violation and of branching ratios of B decays.

Plenary Talks / 74

The Large Hadron Collider

Author: Mike Lamont^{None}

The key LHC operating parameters and their impact on potential performance are recalled and a brief summary of the 2010 beam commissioning program is presented. Progress in 2011 has been good and the present performance is discussed. The short and medium term plans and their potential are outlined. Longer term options are touched upon briefly.

Plenary Talks / 75

Status of CLIC

Author: Peach Ken^{None}

New accelerator technology is required if we are to reach centre of mass energies much beyond 1 TeV in electron-positron collisions, in order to explore the new physics that is expected to be discovered at the LHC. CLIC, the Compact linear Collider, uses a novel two beam acceleration scheme, where energy is transferred from a high-current low energy electron drive beam at high gradient (100 MV/m) to the main beam. These ideas are being developed at CERN by an international collaboration of more than 40 laboratories and universities in more than 20 countries, and being tested at CLIC Test Facility CTF3. The motivation for CLIC and the status of the R&D will be presented.

Plenary Talks / 76

The LHeC: Precision sub-attometric Science

Author: John Dainton¹

¹ *University of Liverpool*

The achievement of colliding hadron beams with multi-TeV energy/unit charge at the LHC is already exposing the nature of physics in quark-quark, quark-gluon and gluon-gluon interactions at the "Terascale". The Standard Model (SM) is the gauge with which we identify and establish observation of physics at the smallest distances. Its precise quantification remains therefore pivotal to discovery, to interpretation, and to the understanding of physics at the Terascale. With this perspective, the opportunity for a programme of lepton-quark physics at a new, sub-attometric, scale using one of the LHC hadron beams in collision with either an electron or a positron beam, the Large Hadron Electron Collider (LHeC), is presented. Aspects of the physics potential, the status of the conceptual design of an LHeC experiment, and the nature of the additions to the LHC which the LHeC will entail, are presented.

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Memorial

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Closing Remarks

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The SuperB project: Status and the Physics reach

The SuperB experiment is a next generation Super Flavour Factory expected to accumulate 75ab^{-1} of data at the $Y(4S)$ in five years of nominal running, and will be built at the recently established Cabibbo Laboratory on the outskirts of Rome. In addition to running data at the $Y(4S)$, SuperB will be able to accumulate data from the $\psi(3770)$ up to the $Y(6S)$. A polarized electron beam enables unique physics opportunities at SuperB. The large samples of B, D and tau decays that will be recorded at SuperB can be used to provide both stringent constraints on new physics scenarios, and over-constraints on the Standard Model. We present the status of the project as well as the physics potential of SuperB.

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The SuperB project: Status and the Physics reach

Author: Nicola Neri^{None}