Triggering Discoveries in High Energy Physics

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Department of Physics and Electronics, University of Jammu

Book of Abstracts

Contents

Session 20 / **89**

Trrigering Principles _II

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7

Non-Fermi liquid corrections to the kick velocity of a neutron star

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In this work we have studied the non-Fermi liquid behavior that enters into the expression of the pulsar kick velocity due to assymetric neutrino emission. We have incorporated leading order as well as next-to-leading order corrections to the velocity and compared the results with the simple Fermi liquid case. The relation between quark phase radius and temperature
has been shown.
We have also approximated our results for the case of large magnetic field present
in neutron stars.

Session 8 / **65**

Implications of Recent Measurements in Neutrino Sector and Future Directions

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The discovery of neutrino mixing and oscillations over the past decade provides firm evidence for new physics beyond the Standard Model, needed to explain non-zero neutrino masses and mixing in the leptonic sector. In this talk, first I will give a brief description of the recent measurements in neutrino sector with a special emphasis on the discovery of moderately large value of 1-3 mixing angle. Then I will discuss the possible implications of these new findings from both theoretical and experimental perspectives. Finally I will focus on the expected physics reach of current and future neutrino experiments in addressing several open issues in neutrino physics.

Session 10 / **77**

ATLAS Trigger Overview

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The ATLAS Experiment is a general purpose detector aimed at studying a wide range of processes and final states. To this end the ATLAS Detector and trigger must be able to detect and record a very large variety of objects and topologies. In particular events containing final state electrons, muons, photons and jets are used in analyses making precision Standard Model meausurements as well as searches for the Higgs Boson and extensions to the Standard Model.
The ATLAS Detector, running at the LHC bunch crossing rate of 40MHz, produces a raw data rate of approximately 1 Petabyte per second. It is unfeasible to record all of this due to limitations in read-out technology, storage space and the CPU time required for full reconstruction. To overcome these difficuulties the recording rate must therefore be reduced to 200-400Hz, depending on beam conditions. To achieve this ATLAS employs a 3 level trigger, the first of which is built from fast electronics and the remaining two consist of high power computer farms. The design of the ATLAS Trigger, and in particular the Level-1 Calorimeter Trigger, is presented here.

16

A Novel Mechanism for J/Ppsi Disintegration in Relativistic Heavy Ion Collisions

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Here we discuss the possibility of J/Psi disintegration due to the Z(3) domain walls that are expected to form in QGP medium. These domain walls give rise to localized color electric field which disintegrates J/Psi, on interaction, by changing the color composition and simultaneously exciting it to higher excited states of charm-anti charm system. For E = 5GeV (or higher) we find that about 90 % (or more) of J/Psi interacting with the domain wall make the transition.

28

Probing gauge decays of left right symmetric composite fermions

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One possibility for new physics beyond the Standard Model (SM) is manifestation of new degrees of freedom through compositeness. Due to internal structure composite fermions should exhibit various excited states, which undergo specific decays to SM gauge bosons which have been studied previously. If however the SM gauge symmetry is descended from the left-right symmetric SU(2)R ×SU(2)L×U(1)B-L group, the decay modes and rates would change. In our study we merge two leading Beyond Standard Model scenarios, namely compositeness and left-right symmetry, and probe the resulting collider signatures in the leptonic case. If excited leptons were coupled to a left-right symmetric extension of the SM, we observe that the cross section times branching ratio of the photon decay channel is strongly depressed, bringing down the exclusion limit of the mass of excited electrons and muons obtained by existing searches from around 2 TeV to less than 1 TeV. On

the other hand, the cross section times branching ratio of the Z decay channel is significantly enhanced and is always greater than that of the photon channel. We thus propose analyzing the Z decay channel in existing collider data in order to search for signature of left-right symmetry as well as excited leptons with masses above 1 TeV.

Session 3 / **41**

Higgs Results from CMS

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On July 4, 2012, the CMS experiment at the LHC, along with ATLAS, announced the observation of a new particle which is like the Higgs boson as predicted within the Standard Model of High Energy Physics. Since that time, more data have been accumulated and the signal is more firmly established. Some of the properties of production and decay of this new state have been studied. We plan to present the recentresult from the CMS experiment.

19

Evolutions of longitudinal structure function F_L from QCD Evolution equation upto next-to-leading orders at small-x

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The calculation of longitudinal structure function F_L from Quantum Chromodynamics (QCD) evolution equation in next-to-leading order (NLO) at small-x is presented. The calculation of F_L is important for the phenomenological study of gluon distribution function inside the nucleon at small values of Bjorken variable x. Here we use Taylor Series Expansion method to solve the evolution equation for small-x and thus obtain the t- and x-evolution of F_L structure function. The calculated results are compared with H1 and ZEUS data and results of MRST parameterization, Block and Donnachie-Landshoff (DL) models.

75

Measurement of Angular Distributions of Z0/γ^*+Jet with CMS detector at $\sqrt{s}$ = 7TeV

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The area-normalized angular distributions in events containing a Z0 boson and a jet, using the electron decay mode will be presented. The data samples correspond to ˜5fb-1 of proton-proton collisions at √s=7 TeV, collected by the CMS detector. Events in which there is a Z boson and at least one jet, with a jet transverse momentum threshold of 30 GeV/c and absolute jet rapidity less than 2.4, are selected for this analysis. We compare our measurements with a next-to-leading-order perturbative QCD calculation and two generators that combine tree-level matrix element calculations with parton showers.

Session 20 / **84**

Trigger of ATLAS experimet at LHC II

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ATLAS is one of two general-purpose, high Pt experiments at the LHC collider at CERN. In these lectures, ATLAS trigger will be described. In the first lecture, general trigger strategy and trigger design will be discussed. In second lecture I will concentrate on one particular trigger subsystem (Level 1 calorimeter trigger) and describe it in more detail.

Session 17 / **82**

Trigger of ATLAS experimet at LHC I

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ATLAS is one of two general-purpose, high Pt experiments at the LHC collider at CERN. In these lectures, ATLAS trigger will be described. In the first lecture, general trigger strategy and trigger design will be discussed. In second lecture I will concentrate on one particular trigger subsystem (Level 1 calorimeter trigger) and describe it in more detail.

Session 5 / **39**

Viscous hydrodynamic model for Relativistic Heavy Ion Collisions

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Viscous hydrodynamical modeling of relativistic heavy ion collisions has been highly successful in explaining bulk of the experimental data in RHIC and LHC energy collisions. We briefly review viscous hydrodynamics modeling of high energy nuclear collisions. Basic ingredients of the modeling, the hydrodynamic equations, relaxation equations for dissipative forces initial conditions, freezes-out process etc. will be discussed. We will also show some representative simulation results in comparison with experimental data. Lastly, recent developments in event-by-event hydrodynamics will be discussed briefly.

14

Exclusive dilepton photoproduction in pp and p-Pb collisions with CMS :

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We'll present studies of exclusive photoproduction of dileptons in proton-proton at √s=7 TeV and p-Pb at √s=5.02 TeV with the CMS detector. The events selected with back-to-back muon pairs and no significant additional activity in the detector. The physics process corresponds to these events are two photon exchange and exclusive photo-production of Upsilon (1S,2S,3S) mesons. We'll present the latest experimental measurements and comparisons to theoretical expectations.

Session 13 / **85**

ATLAS Triger Upgrades

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After the successful operation of the ATLAS trigger and data-acquisition systems during Run 1 at the LHC, essential upgrades are required to prepare for future luminosity conditions, expected to exceed 2x10ˆ34 cmˆ-2sˆ-1 by 2019. An important part of the programme is the upgrade of the Level-1 hardware-based trigger, which is a fixed latency pipelined system processing signals from the electromagnetic and hadronic calorimeters and muon systems. The challenge is to preserve the trigger performance for a wide range of physics processes, including measuring the properties of the newly discovered Higgs boson particle. This means maintaining low energy thresholds under higher pile-up conditions and within a maximum upgraded level-1 event rate of 100 kHz. In this presentation we will review the ATLAS trigger upgrade programme with particular empathises on the Run 2 (2015-2017) and Run 3 (2019-2021) preparations for the Level-1 trigger.

18

Analysis of the gluon distribution function from the solution of nonlinear GLR-MQ evolution equation at small-x

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We present the solution of the nonlinear Gribov, Levin, Ryskin, Mueller and Qiu (GLR-MQ) evolution equation at small-x by incorporating Regge-like behavior of the gluon distribution function G(x,Qˆ2) at small-x. We have also performed the study of Qˆ2 and x dependence of gluon distribution function from the solution of GLR-MQ evolution equation in the small-x region. Moreover, we have investigated the effect of nonlinearity in the results and observed that with the inclusion of the nonlinear terms, the growth of
G(x,Qˆ2) slows down relative to the linear DGLAP gluon distribution. Further for each x, the Qˆ2-dependence of the data is well described by nonlinear corrections to the GLR-MQ equation. It is an impressive observation from our results that nonlinearities decrease with increasing correlation radius (R) between two interacting gluons. Here we have also examined the sensitivity of λ_G in our calculations, where λ_G is the Regge intercept for gluon distribution function. We made comparisons of the computed gluon distribution function with H1 and ZEUS data and with those obtained by the global QCD fits viz. GRV1998, MRST2001, MSTW2008, CT10. Results are also compared with the EHKQS model. The comparison is performed for different input parametrisations for 2≤Qˆ2≤20 GeVˆ2 and 10ˆ{−5}≤x≤10ˆ{−2}.

21

Discriminating mass and species type behavior of produced particles at FAIR energies - A new approach

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The variation of width of the rapidity distribution on beam rapidity and the rapidity distribution of strangeness enhancement factor have been studied with UrQMD generated mesons and baryons at various FAIR energies to ascertain mass/species type behavior of produced articles. The width of the rapidity distribution is found to bear a power law with beam rapidity with a clear indication of violation of mass ordering when both mesons and baryons are plotted together. Results on strangeness enhancement factor E_S of various strange particles also reveal a similar mass ordering violation indicating species (meson/baryon) -type behavior of produced particles at FAIR energies.

Session 2 / **55**

An Overview of Heavy-Ion Results from the LHC at CERN

Author: David Evans[1]

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At extreme energy densities, hadronic matter undergoes a phase transition into a deconfined system of quarks and gluons, known as a Quark-Gluon Plasma (QGP). Such a state of matter may be formed by colliding ultra-relativistic heavy-ions together, which reproduce the high temperatures and densities thought to have existed about ten microseconds after the Big Bang. Lead ions have

been accelerated and collided in the Large Hadron Collider (LHC) at CERN in order to allow experiments to study of the properties of the QGP. Data from proton-proton and proton-lead collisions, where no QGP formation is expected, have also been collected and analysed as a comparison to the lead-lead data.

A brief summary of the main results from lead-lead collisions, at the LHC, will be presented together with relevant results from proton-proton and proton-lead collisions

Session 9 / **68**

Recreating the Big Bang with the World's Largest Machine - The LHC at CERN

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The 27km Large Hadron Collider (LHC), situated 150 metres under the Swiss-French boarder at CERN near Geneva, is the World's most powerful particle accelerator.
In March 2010, protons (hydrogen nuclei) were smashed together at 0.999999991 times the speed of light recreating, for a tiny instant, the violent particle collisions which would have existed less than a billionth of a second after the Big Bang. In November of the same year, lead nuclei were accelerated and collided in the LHC producing the highest temperatures and densities ever made in an experiment and recreating the exotic primordial soup which existed at the birth of our Universe. Professor David Evans, from the University of Birmingham, will explain the physics behind the LHC, what we expect to learn, and summarise the latest results.

Session 12 / **83**

Data Acquisiton and Trigger of the CBM experiment

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The CBM experiment is being designed to measure heavy-ion collisions at very high interacton rates. The interesting signals are extremely rare and their signatures are complex. These conditions call for a novel DAQ and trigger concept which is not limited by latency but by throughput. In particular, there will be no hardware trigger; online data reduction will be performed in software on a dedicated computing farm, the First-Level Event Selector (FLES). Its challenge is to reduce the raw data volume by up to three order of magnitude to a recordable rate. In this presentation, we will discuss the DAQ and FLES concept as well as the software algorithms used for online data reconstruction and selection.

Session 7 / **43**

Exploring dense QCD matter with the CBM experiment

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The properties of strongly interacting matter at high net-baryon densities are a largely unknown territory, both theoretically and experimentally. The CBM experiment at the accelerator facility FAIR, presently under construction in Darmstadt, Germany, will explore this part of the QCD phase diagram with heavy-ion collisions from 2A to 45A GeV beam energy. Its focus is the characterization of the produced medium with extremely rare probes, not accessible by experiment up to now. This requires very high interaction rates and efficient online data reduction. We will discuss the physics prospects of the experiment and some of the technological challenges for both detectors and data processing.

Session 3 / **57**

The Implications of the Higgs discovery

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The recent excitements in High energy physics is the discovery of Higgs like particle by CMS and ATLAS detectors at the LHC experiment. This discovery came almost 50 years later since it is proposed. Now the most urgent need is to establish that it is indeed the standard model Higgs by measuring its properties e.g couplings, spin etc. In addition, the discovery of this scalar particle also open up many new challenges in the context of existence of beyond standard model physics. In this talk, I shall try to discuss the various implications of Higgs discovery in the standard model and beyond standard model.

Session 4 / **29**

Review of Kaon Experiments at CERN

Author: Evgueni Gudzovskiy[1]

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A overview of the recent kaon experiments at CERN is presented. The status and the physics programme of the NA62 experiment starting in 2014 and aiming at measurements of the ultra-rare decays and searches for forbidden decays of the charged kaon are discussed.

Session 11 / **79**

Detector Control System for the ALICE Experiment at the CERN-LHC

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The ALICE (A Large Ion Collider Experiment) experiment is designed for a dedicated study of heavy ion collisions at the Large Hadron Collider (LHC) at CERN in Geneva, at energies up to 1150 TeV(2.75TeV/u). ALICE is composed of 18 detection systems based on different technologies including semiconductor, gas, scintillation, cherenkov detectors. To ensure a safe and correct operation and monitoring of the ALICE experiment, a sophisticated control system is used, called the Detector Control System (DCS). The main aim of the DCS is to provide safe and efficient operation of all the experimental equipments in such a way that the whole ALICE experiment can be operated remotely from one single workplace.

The Control System has several subsystems. These subsystems have been implemented using a commercial SCADA system called PVSS and a toolkit developed at CERN called the JCOP framework. The State Manager Interface (SMI++) has been used to model the detector behaviour on Finite State Machines (FSM). The DCS has proved its robustness and efficiency during LHC operation in previous years. Detailed features of the ALICE DCS will be discussed.

87

Identified charged particle spectra in $p+p$ collisions at $\sqrt{s}$ = 62.4 GeV at RHIC

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It is important to study the bulk production of particles as a
function of both p_T and particle species. The low-p_T
particle production, and species composition provide crucial input
for modeling of hadronic interactions and the hadronization process
in high-energy collisions [1]. In this paper, we will present the measurements of spectra for $\pi^{\pm}$, $K^{\pm}$, p and $\bar{p}$ in $p+p$ collisions at $\sqrt{s}$ = 62.4 GeV from the STAR experiment
at the Relativistic Heavy Ion Collider (RHIC). The results are
measured at the midrapidity region in the range $\mid y \mid < 0.3$.
Charged hadrons will be identified by using specific ionization energy loss method at the low momentum region (0.15 to 1.15 GeV/c) by using the STAR's Time Projection Chamber (TPC) detector and the raw yields so obtained will be corrected by applying the efficiency and energy-loss correction factors obtained from multistep embedding Monte Carlo technique. In addition to this, the raw proton yield will be corrected for background contamination (arising mainly from the interaction of the produced hadrons with the beam pipe and the detector material), which is estimated from the global DCA (Distance of Closest Approach) distribution of protons [2-3]. The errors included in all the results are statistical. The feed-down corrections are not included in this study.

References

[1] H. Satz , Rep. Prog. Phys. 63 151 (2000).
[2] B. I. Abelev et al., Phys. Rev. C 79 34909 (2009).
[3] H. Bichsel, Nucl. Instrum. Meth. A 562 154-197 (2006).

Session 2 / **34**

The QCD Critical Point from Lattice Computations

Author: Sourendu Gupta[1]

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The most recent results from lattice computations on the location of and phenomena at the QCD critical point are presented

Session 7 / **63**

Next Collider the ILC? The physics and the detectors

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The idea of constructing the next e+e- collider has been under study for almost 2 decades. A world-wide R&D effort has led to the conclusion that physics interests would best be served by a 0.5 - 1 TeV machine accompanied by precision detectors. Dubbed the International Linear Collider (ILC) it would be a cryogenic machine, whose technology has now been established. Two detector concepts named ILD and SiD (ILC Large Detector and Silicon Detector) have also been developed. With the discovery of the higgs at LHC-CERN the case for an early construction of the ILC has been greatly strengthened. The nature of physics at the ILC and how the detectors will unravel it will be described."

25

Exclusive dilepton photoproduction in pp and p-Pb collisions with CMS

Author: Manfred Jeitler[1]

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We'll present studies of exclusive photoproduction of dileptons in proton-proton at centre-of-mass energy of 7 TeV and p-Pb at centre-of-mass energy per nucleon-nucleon pair of 5.02 TeV with the CMS detector. The events selected with back-to-back muon pairs and no significant additional activity in the detector. The physics process corresponds to these events are two photon exchange and exclusive photo-production of Upsilon (1S,2S,3S) mesons. We'll present the latest experimental measurements and comparisons to theoretical expectations.

27

Upsilon Production in Pb-Pb and p-Pb Collisions at Forward Rapidity with ALICE at the LHC

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The ALICE apparatus at the LHC was designed and built to perform dedicated studies of the Quark-Gluon Plasma (QGP), a strongly interacting QCD matter of deconfined state, expected to be created in high energy heavy-ion collisions. In such collisions heavy flavours are produced at the very early stage of the interaction in the initial hard scattering processes and hence can be used to characterize the hot and dense medium. In particular the bottonium family was proposed as a thermometer of the deconfined medium. In ALICE, the $\Upsilon(1S)$ meson can be measured in its dimuon decay channel at forward rapidity $(2.5 < y < 4.0)$. In this talk, results on the $\Upsilon(1S)$ nuclear modification factor (R_{AA}) in Pb-Pb collisions at a $\sqrt{s_{NN}}$ = 2.76 TeV will be discussed and will be compared to the measurement at midrapidity by CMS and to theoretical predictions. Also results on R_{pPb} and forward to backward yield ratio (R_{FB}) in p-Pb collisions at $\sqrt{s_{NN}}$ = 5.02 TeV will be discussed.

Session 13 / **42**

ALICE O2: The Upgrade of the ALICE Online and Offline Computing after 2018

Author: Thorsten Kollegger[1]

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ALICE (A Large Ion Collider Experiment) is a heavy-ion detector studying the physics of strongly interacting matter and the quark-gluon plasma at the CERN LHC (Large Hadron Collider).

After the second long shutdown of the LHC, the ALICE apparatus will be upgraded in order to make high precision measurements of rare probes at low pT, which cannot be selected with a trigger, and therefore require a large sample of events recorded on tape. The online computing system will sample the full 50 kHz Pb-Pb interaction rate increasing by a factor 100 the present limit and read out the detector at 1 TB/s.

This huge data volume will be reduced by an online reconstruction which will result in storing only the reconstruction results and discard the raw data. This system, demonstrated in production on the TPC data since 2011, and will have to be optimized for lossless compression and for the online usage of "offline"reconstruction algorithms. It implies a much tighter coupling between online and offline computing systems.

We present in this contribution the R&D program put in place to address this huge challenge and the first results of this program.

44

High Level Trigger I

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High Level Trigger (HLT) systems are acquiring a more and more prominent role in modern high-energy particle physics experiments. These system are typically build as multi-purpose-computing clusters from mainly commodity hardware and have no or very relaxed latency requirements. Most

if not all of the detector data is available for the trigger decision, which is based on online reconstruction of the event data. Both the reconstruction code and the trigger algorithms are typically written in a high-level programming language such as C or C++, with large parts of the code shared with the offline and/or data acquisition processing.

In these lectures we will detail the role of high level triggers in todays high-energy particle and nuclear physics experiments and discuss the ALICE High Level Trigger in more detail as an implementation example. The planned increased usage of HLTs in the future, including technological trends like the usage of graphics cards (GPUs) for reconstruction and trigger algorithms; and the move away from event selection to online reconstruction farms, will be discussed as well.

45

High Level Trigger II

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Session 14 / **35**

The Alice CTP Upgrade

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After three years of successful operation of Alice Central Trigger Processor (CTP) system for proton-proton, Pb-Pb and p-Pb collisions, the Alice CTP is going to be upgraded with a new fist level trigger (L0) board in order to improve the performance of the Alice trigger system. The new first level trigger (L0) trigger board will include several new features: an additional trigger level “LM”, which will precede the L0 trigger and will improve efficiency of data taking for the Transition Radiation Detector (TRD); a new 10G Ethernet link for CTP readout and control; an extension of the number of clusters and classes. In addition to these changes, which will come into effect in 2014 at the end of ìLong Shutdown 1î (LS1), the first ideas for a CTP upgrade after ìLong Shutdown 2î (LS2) in 2018 will also be presented.

Session 5 / **52**

Review of Recent Heavy-Ion Results from RHIC

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Relativistic heavy-ion collider (RHIC) is a dedicated facility to collide heavy-ions at relativistic speed. Within first few years of its running, RHIC discovered the Quark Gluon Plasma (QGP), a hot and dense matter. After confirming the existence of QGP, experiments at RHIC now concentrate on studying the properties
of QGP and understanding the phase structure of QCD. In this talk, I review selected heavy-ion results obtained recently at RHIC for studying QGP properties and advances made for the understanding of QCD phase diagram.

17

Generalized Parton Distribution for non zero skewness in transverse and longitudinal impact parameter spaces

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We investigate the Generalized parton distributions(GPDs) by expressing them in terms of overlap of light front wave functions (LFWFs) using a simulated model. We study the spin non flip H(x,ζ,t) and spin flip E(x,ζ,t) part of GPDs for the particle conserving (n->n)overlap in the DGLAP region 0<x<ζ. Fourier transform of the GPDs with respect to the transverse momentum transfer gives the distribution of partons in the transverse position space and fourier transform w.r.t. the skewness parameter ζ gives the distribution of parton in the longitudinal position space.

59

Bottomonium Production in pp, pPb, and PbPb collisions with CMS

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Session 4 / **24**

Bottomonium production in pp, pPb, and PbPb collisions with CMS

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The three Y states (1S, 2S, 3S) were measured separately using the Compact Muon Solenoid (CMS) experimental apparatus via their dimuon decays in pp and pPb collisions, in the rapidity range |y|<1.9 in the centre-of-mass of the collision. The datasets used in the analysis correspond to recorded integrated luminosities of about 31/nb (pPb) and 5.1/pb (pp), collected in 2013 by the CMS experiment at the LHC, at a centre-of-mass energy per nucleon-nucleon pair of 5.02 TeV and 2.76 TeV respectively. Results of the production ratios of the excited states, Y(2S) and Y(3S), with respect to the ground state Y(1S) will be presented in the context of the PbPb results.

10

Effect of light flavor mass asymmetry on hot and dense nuclear matter

Author: Anirban Lahiri[1]

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We present a study of the 1+1 flavor system of strongly interacting matter in terms of the Polyakov−Nambu−Jona-Lasinio model. We find that though the small isospin symmetry breaking brought in through unequal light quark masses is too small to affect the thermodynamics of the system in general, it may have significant effect in baryon-isospin correlations and have a measurable impact in heavy-ion collision experiments.

12

Relevance of implicit parameter dependence in effective models

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Modification of Fluctuation-Dissipation Theorem is required within the framework of QCD inspired effective models within mean field approach. The effect of implicit chemical potential dependence

of thermodynamic pressure through the mean fields should be considered in order to compute the quark number susceptibility perfectly. Incorporating these dependences, the modification has been done in a semi-analytic method in NJL model and its Polyakov loop extended version.
From a general field theoretic point of view we are able to connect these implicit μ dependent terms with the disconnected diagrams of susceptibilities in non-perturbative QCD.

22

Simulation of Double Peak Structure of Electric Field for Irradiated Si-Strip Sensors.

Author: Kavita Lalwani[1]

Co-authors: Ashutosh Bhardwaj [1]; Kirti Ranjan [1]; R.K. Shivpuri [1]; Ranjeet Dalal [1]

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Silicon micro-strip sensors are the key device for the measurement of trajectories of charge particles in high energy physics experiments. In future they will be operated in harsh radiation environment which introduces defects, both in Si causing bulk damage and at Si-SiO2
interface causing surface damage that will affect the operating performance of sensors. Due to bulk damage type inversion occurs in n-type bulk resulting in the formation of double junction. As a result electric field profile shows two maxima both at the main junction and at the backside. In this work we have incorporated a simplified two-trap model in device simulation program to describe the double peak structure in the electric field after type inversion. The results for electric field, electron/hole concentration, and effective bulk doping concentration are compared against known model and a good agreement is observed.

Summary:

In future Si strip sensor will face intense radiation environment which causes surface & bulk damage in Si-sensors. In order to explain the double peak feature of the electric field after type-inversion in n-type silicon sensors due to bulk damage, EVL model with two deep level traps is implemented in simulations which are being performed using TCAD simulation package ATLAS (Silvaco).
To compare the simulation results with modeled data for electric field profile, electron/hole concentration, effective bulk doping density, a systematic parametrization study is carried out by varying electron/hole capture cross sections and their ratio, carrier life time, trap introduction rate. Additional bulk current is generated by increasing cross-sections of the trap levels from 1x10-15cm2 to 4x10-14cm2 which results in good agreement between modeled data and simulations for effective substrate concentration, electric field and electron/hole concentration for different fluences. The simulated data also reproduces the double peak feature of electric field at higher values of fluence.

Session 11 / **26**

Fabrication and Characterization of MicroTCA Electronic Components and Optical Splitters for CMS HCAL Electronics Upgrade.

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The present CMS-HCAL (Hadron Calorimeter) will require an upgrade of the instrumentation electronics to meet the expected performance of high luminosity upgrade of the LHC. The ongoing research has established the μTCA (Micro Telecommunication and Computing Architecture) as a potential candidate to replace the existing VME for the backend electronics upgrade which will provide more accessible environment and high bandwidth for global DAQ in the CMS experiment. To support the efficient and phased installation of the upgrade, it is important to demonstrate the working with the existing data link. This is done by operating the upgrade electronics (μTCA) in parallel with the present electronics (VME), and achieved by splitting the incoming optical stream using passive optical splitters. A μTCA crate as well as a proto type optical splitter has been installed at the CMS experimental site (USC) in June-2012 and January-2013. We present the test results of μTCA electronic components and optical splitter performed in India as well as at CERN. Based on the tests performed, the validation of backend electronics (μTCA) is established

Summary:

In the proposed LHC running condition, the existing CMS-HCAL back-end electronics does not support the upgraded front-end data transfer rate (4.8Gbps). Hence an attractive alternative is to replace the current VME by TCA electronics which offers a flexible, high density, high performance backplane that is based on the serial standards in use today (GbE, PCIe, SRIO, SATA, etc). In order to validate the performance of μTCA in real data taking condition, six of the AMC (Advance Mezzanine cards) are successfully installed in a μTCA crate at the CMS in June 2012. For one week the bit error rate test (BERt), link validation and data synchronization tests are performed for one HCAL slice. All cards are successfully found to receive the data, and error rate is found to be zero. A big milestone is achieved with visibility of 50 ns spacing in data. Recently a proto-type optical splitter with splitting ratio of 50:50 is fabricated and characterized by DU and successfully installed at CERN. The proto-type optical splitter worked well and less optical losses (˜3dB) are measured as compared with old splitters (OSB) where optical losses were measured to be greater than 5dB. The proto-type optical splitter has been tested at P5, CERN. Only one channel was found to be weak. This is a good result as compared with OSB where 12 channels were inactive. Also Power Mezzanine (PM) tests have been performed in India to get the stable performance of PM before mounting them on μHTR (HCAL Trigger and Readout) cards of μTCA crate. Optical Margin tests are carried out successfully at CERN to verify the optical sensitivity of PPOD receivers using variable attenuator. Based on the tests performed, the validation of backend electronics (μTCA) is established.

Session 16 / **47**

The Configuration of the STAR Trigger System

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STAR is a 4π detector and it has numerous fast detectors able to measure particles traveling in nearly every direction each bunch crossing. The STAR trigger system has the ability to combine this information in a very flexible way to produce nearly any desired trigger. The STAR trigger also incorporates higher level triggers which have access to still more information about the events, including tracking data. Furthermore, the STAR system is capable of running multiple programs, simultaneously handling up to 64 different triggers. This talk will discuss the challenge of configuring the trigger and tracking the results in this complex environment.

Session 12 / **38**

Overview and Evolution of the DAQ and Trigger Systems for the STAR Experiment at RHIC

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The Solenoidal Tracker at RHIC (STAR) detector at the Relativistic Heavy Ion Collider (RHIC) at Brookhaven National Laboratory has been in operation since the year 2000. The capabilities of the Trigger and DAQ systems have undergone constant upgrades to improve the performance, capabilities and stability during the 13 years since the beginning of operations. The performance has been increased by several orders of magnitude from design throughput of about 1 MB/sec at event rates of a few Hz, to current capabilities with sustained data throughput well over 1GB/sec and event rates in excess of 2kHz. Numerous features have been added to the system to provide an extremely flexible yet controlled general purpose multi-trigger capability. In addition extensive tools have been created to track and monitor the performance and reliability of the DAQ and Trigger systems. We will discuss the significant highlights from the development of the STAR DAQ and trigger systems.

Session 19 / **48**

The Design and Implementation of the STAR DAQ system

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The STAR Detector has evolved significantly during the 13 years of STAR operations. The DAQ system has had to support many different detectors in every phase of operation as they are added, debugged, run in production, and removed from the system. These changes to the STAR Detector are also reflected in the interface to the offline analysis group as impacted by the configuration databases as well as through the interface to access data. We will present an overview of the design and implementation of the DAQ system and how this design provides the flexibility required to meet the changing needs of the STAR collaboration.

Session 9 / **49**

Engaging the Public in Science with Particle Detectors

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Dr Cristina Lazzeroni will summarise the extensive public engagement programme done by the particle group at the University of Birmingham, focusing on how the usage of particle detectors can inspire the insterest of students and teachers to particle physics research

Session 10 / **78**

Triggers at LHCb and Its Upgrades

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The LHCb experiment is a spectrometer dedicated to the study of heavy flavor at the LHC. The rate of proton-proton collisions at the LHC is 15 MHz, of which only 5 kHz can be written to storage for offline analysis. For this reason the LHCb data acquisition system – trigger – plays a key role in selecting signal events and rejecting background. In contrast to previous experiments at hadron colliders, the bulk of the LHCb trigger is implemented in software and deployed on a farm of 20k parallel processing nodes. This system, called the High Level Trigger (HLT) is responsible for reducing the rate from the maximum at which the detector can be read out, 1.1 MHz, to the 5 kHz which can be processed offline. The inherent flexibility of this software trigger allowed LHCb to run at twice its design instantaneous luminosity in 2012. Simultaneously, the HLT performed far beyond the nominal design in terms of signal efficiencies, in particular for charm physics. It also showcased a number of pioneering concepts, for example: the deployment of an inclusive multivariate B-hadron tagger as the main physics trigger of the experiment, buffering of events to local disks, and simulation-free event-by-event trigger efficiency corrections. This talk will cover the design and performance of the LHCb trigger system, and discuss planned improvements beyond LS1 as well as plans for the LHCb upgrade trigger.

Session 4 / **51**

LHCb Physics Overview

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Owing to the large beauty production cross-section at the LHC and to the unique characteristics of the LHCb
detector and trigger, unprecedented samples of beauty decays are becoming available. The angle γ of the CKM unitarity triangle remains the least precisely measured parameter of the CKM mixing matrix. The precision measurement of this parameter is one of the main goals of the LHCb experiment. The latest LHCb measurement of γ combining all the individual inputs will be presented. Rare b⟶sμ+μ−transitions that proceed via flavour changing neutral currents are suppressed in the SM and provide a sensitive probe of new physics contributions entering in competing diagrams. Particularly interesting are the angular and isospin asymmetries in the decay B⟶K(*)0μ+μ−, which are sensitive probes of new physics. Updated measurements of CP violation and rare decays of beauty mesons will be presented.

Session 18 / **73**

Event Reconstruction Algorithms for modern HEP Experiments

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Development of fast and efficient event reconstruction algorithms is an important and challenging task for modern high energy physics experiments. The event reconstruction algorithms have to process terabytes of input data produced in particle collisions. In this lecture an overview of selected event reconstuction algorithms will be given on the example of the Compressed Baryonic Matter (CBM) experiment at the future FAIR facility. Event reconstruction containes different steps including track and ring finding and fitting, particle identification, particle finding etc. Developed track reconstruction algorithms are based on Kalman Filter, Cellular Automaton and Track Following methods. In RICH ring finding is based on Hough Transform method, fitting is based on circle or ellipse fit methods. Optimization and parallelization of the algorithms will be discussed.

Session 10 / **32**

The ALICE Trigger Overview

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The ALICE Central Trigger Processor (CTP) is designed to select events with different features at rates which can be scaled down to satisfy physics requirements and restrictions imposed by the bandwidth of Data Acquisition system. The challenge of the ALICE trigger is to make optimum use of the component detectors which are busy for widely different periods following the valid trigger, and to perform trigger selection for several different running modes: p-p, Pb-Pb and p-Pb with widely varying luminosities. In this presentation the CTP logic and design are summarized. The performance of ALICE trigger during the first years of LHC data taking is presented. The plans for trigger upgrades after current shutdown as well as after year 2017 are discussed.

9

Heavy dilepton in nucleus nucleus collision at LHC energy

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We present a study of $\tau^+\tau^-$ lepton pair production in Pb + Pb collisions at $\sqrt{s_{NN}}$ = 5.5 TeV. The larger mass of tau lepton compared to electron and muon leads to considerably small hadronic contribution to the $\tau^+\tau^-$ pair invariant mass (M) distribution relative to the production from thermal partonic sources. The quark–anti-quark annihilation processes via intermediary virtual photon, Z and Higgs bosons have been considered for the tau lepton production. The contribution from Drell–Yan process is found to dominate

over thermal yield for $\tau^+\tau^-$ pair mass from 4 to
20 GeV at the LHC energy.
We also present the ratio of
τ lepton pair yields for nucleus–nucleus collisions
relative to yields from p + p collisions scaled by number
of binary collisions at LHC energies as a function τ
lepton pair inavariant mass.
The ratio is found to be significantly above
unity for the mass range 4 to 6 GeV.
This indicates the possibility of detecting $\tau^+\tau^-$
pair from quark–gluon plasma (QGP) in the mass window 4 to 6
GeV.

8

Beta equilibrated quark matter : An effective model study

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We report a first case study of the phase diagram of 2+1 flavor strongly interacting matter in $\beta-$equilibrium, using the Polyakov−Nambu−Jona-Lasinio model. Physical characteristics of
relevant thermodynamic observables have been discussed. A comparative analysis with the corresponding observables in the Nambu-Jona-Lasinio model is presented. We find distinct differences between the models in terms of a number of thermodynamic quantities like the speed of sound, specific heat, various number densities as well as entropy. Location of charge neutral and isentropic trajectories in the $T - \mu$ plane are studied. The present study is expected to give us a better insight into the role that the superdense matter created in heavy ion collision experiments play in our understanding of the properties of matter inside the core of supermassive stars in the Universe.

Session 14 / **40**

The Trigger for the NA62 Experiment at CERN

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The NA62 Experiment aims to measure the branching ratio of the ultra-rare kaon decay $K^+ \to \pi^+\nu\bar{\nu}$ with 10\% precision, collecting $\sim$ 100 events in 2 years of data taking, starting in 2014. Assuming the value of the branching ratio as predicted by the SM ($BR(K^+ \to \pi^+\nu\bar{\nu}) = (8.5 \pm 0.7) \times 10^{-11}$), to collect enough statistics a high-intensity kaon beam is needed. Besides the $K^+ \to \pi^+\nu\bar{\nu}$ decay, many other rare or forbidden kaon decays can be studied, given the required kaon flux ($\sim 10^{13}$). The highest intensity hadron beam available at CERN is a 800˜MHz unseparated secondary beam, in which the kaon component is only the 6\% (50˜MHz average). This results in a $\sim$ 10˜MHz rate in the sub-detectors after the 65˜m long decay region.

In principle, the most flexible and unbiased way to readout sub-detector data would be using a “triggerless” acquisition system, in which all the data are unconditionally transferred to PCs. However,

the NA62 high rate and channel count ($\sim$ 100000) make this choice infeasible. Therefore, a variety of hardware lowest-level (L0) triggers will be used to reduce the overall rate below $\sim$ 1ˆMHz but preserving most of the decays of interest.
Following a L0 trigger, most sub-detectors will transfer data to dedicated PCs, where two trigger levels (L1 and L2) will be applied via software, to reach a final rate of $\sim$ 10ˆkHz.
In this talk the NA62 triggers and the relative rare decays selection algorithms will be described

Session 11 / **70**

ATLAS Trigger operation and optimization

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During the first running period of the LHC, the ATLAS trigger system has been used to select events from proton-proton collisions at centre of mass energies of up to 8 TeV and is designed to reduce the event rate from 40 MHz, the LHC design frequency, to around 400 Hz. The system employs a three-level configuration, where the first level is hardware-based and subsequent levels are software-based, to select events using specific object signatures and global event signatures.

In this presentation, an overview of the operational aspects of the ATLAS trigger is given, including the design, strategy and evolution of the trigger menu and the monitoring infrastructure. Additionally, the performance and optimisation of the trigger is discussed, particularly in the context of increasing luminosity and pileup.

76

Neutrino mass matrices and large Θ13

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Texture specific hermitian mass matrices have been investigated for both Majorana and Dirac neutrinos for their compatibility with the current neutrino oscillation data (in particular large Θ13), keeping in mind the hierarchy of neutrino masses. In case of texture 6 zero all the possibilities pertaining to Dirac neutrinos are ruled out. Only 16 possibilities can accommodate the experimental data for Majorana neutrinos with normal hierarchy. Further, texture 5 zero lepton mass matrices can accommodate all hierarchies of neutrino masses.

Session 15 / **81**

Stuff: What is it? - Introduction to Particle Physics and Accelerators

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Since the beginnings of civilisation, mankind has sought to decipher the basic building blocks of matter and the forces that bind them together. This lecture will explain how the modern view of elementary particle
physics has been reached and how it is currently being revolutionised by the work going on at the CERN Large Hadron Collider.

Session 7 / **62**

Digging Deeper: 21st Century Deep Inelastic Scattering based on the LHC

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A Deep Inelastic Scattering facility based on a new electron beam in collisions with protons and heavy ions from the Large Hadron collider could teach us much more about the structure of nuclear matter at the
smallest resolvable scales, as well as adding to our understanding of the Higgs boson and the Quark Gluon Plasma and contributing to searches for physics beyond the Standard Model. This talk will summarise the
Large Hadron electron Collider (LHeC) project, which aims to realise this.

72

Search for the Standard Model Higgs boson in WH -> WWW -> 3l3nu with CMS data at LHC

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We will present results on the search for the associated Higgs (WH) production with Higgs boson decaying into a pair of W bosons. The analysis is performed using the LHC data recorded with the CMS detector at a centre of mass energy of 7 and 8 TeV, corresponding to a total integrated luminosity of 24.4 fb-1. Candidates are selected in events with three leptons, electrons or muons, large missing energy and low hadronic activity. No significant excess of events above the standard model background expectation is observed. The observed and expected upper limits for the Higgs Boson cross section at 95% confidence level will be presented.

20

Inclusive J/ψ and ψ(2S) production in pp collisions at √s = 7 TeV at forward rapidity with ALICE at LHC

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The ALICE experiment at LHC has studied inclusive J/ψ and ψ(2S) production at forward rapidities in pp collisions at √s = 7 TeV with the ALICE Muon Spectrometer. The analysis has been carried out on a data sample corresponding to an integrated luminosity = 1.35 pb-1. The measured production cross-sections of J/ψ and ψ(2S) are:
σ_J/ψ (2.5 < y < 4, 0 < pT < 20 GeV/c) = 6.76 ± 0.04 (stat.) ± 0.64 (syst.) μb.
σ_ψ(2S) (2.5 < y < 4, 0 < pT < 20 GeV/c) = 1.28 ± 0.08 (stat.) ± 0.21 (syst.) μb.
The J/ψ and ψ (2S) differential cross-sections, in transverse momentum and rapidity, have also been measured. The results have been compared with the previous ALICE published results and also with the LHCb measurement.
The ψ(2S)/J/ψ acceptance corrected ratio integrated over pT and y is:
ψ(2S)/J/ψ (2.5 < y < 4, 0 < pT < 20 GeV/c) = 0.024 ± 0.002 (stat.) ± 0.003 (syst.).
This ratio have also been measured as a function of transverse momentum and rapidity. The ratio as a function of transverse momentum has been compared with LHCb result.

Session 8 / **66**

Gravitational Waves and Dark Matter

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Session 17 / **71**

Trigger for Kaon rare decays at the NA62 experiment at CERN SPS

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Decisive tests of SM predictions or indirect evidence of new physics can be achieved with the study of rare kaon decays. The main goal of the NA62 experiment at the CERN SPS is to measure the branching ratio of the ultra-rare K+ ⟶ π+νν decay with a 10% accuracy. The NA62 strategy foresees the collection of about 100 events of the K+ ⟶ π+νν decay, with a signal to background ratio of

10:1, in two years of data taking starting at the end of 2014. The intense flux needed in rare decay experiments implies the design of high-performance triggering and data acquisition systems, which minimise the dead time while maximising data collection reliability. The efficiency of the online selection of K+ $\longrightarrow$ π+$\nu\nu$ events and the lossless readout at high rate represent the key issues in the NA62 trigger architecture design. The main features of the online and readout systems will be presented.

15

D-MEASURE AS A VIABLE SIGNAL OF QGP FROM POLYAKOV-NAMBU-JONA-LASINIO MODEL

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Strongly interacting matter at high temperatures and densities is expected to go through a phase transition from hadronic to Quark-Gluon-Plasma phase. It is quite interesting to comprehend signals of the same. From theoretical calculations, it is obvious that fractional charges carried by quarks gives rise to such a viable signal. This leads to construct a quantity, D-measure [1] which is the ratio of the net charge fluctuation to the total charge and is expected to provide a signature of the aforesaid transition.

To perceive the same, the behaviourial pattern of D [2] is studied with variation of temperature ar

Our work is carried out within the framework of the Polyakov-Nambu-Jona-Lasinio (PNJL) model [4-7]

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Session 6 / **31**

CMS Upgrades at LHC

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Calorimetry, muon detection, vertexing, and tracking will play a central role in determining the physics reach for the High Luminosity (HL) Large Hadron Collider (LHC) era demanding unprecedented options and R&D efforts necessary to upgrade the current LHC detectors and enabling discoveries. Several detector upgrades are foreseen for the Compact Muon Solenoid (CMS) detector currently operational at the LHC which is expected to have an ultimate luminosity of more than

1034cm−2s−1 at 14 TeV targeted during Phase 1 (the first 10 year period of the accelerator) operation. In this paper, upgrade plans for Tracking, Calorimetry and the Muon system will be discussed. The Pixel system will be upgraded during Phase 1while for Phase 2 upgrade, the entire Tracker will have to be replaced with a challenging requirement that it should contribute to the stringent first level trigger. Due to radiation damage to the active material of the Hadronic Endcap (HE) calorimeters, radiation hard quartz has been proposed. Photodiodes are being replaced by magnetic tolerant and with a better signal to noise ratio. For Electromagnetic Calorimetry (ECAL), the priority is to ensure stable and excellent performance throughout Phase 1 and to provide accurate predictions for performance in Phase 2 assuming no replacement of the ECAL. The muon Drift Tube (DT) system, performance, on the expectations of an adequate operation of the detector at higher luminosity, upgrades for Phase 1 are focused on improving the reliability of the system. The present Resistive Plate Chamber (RPC) detector, which serves as a dedicated muon triggering system, will be augmented with a fourth layer in the endcap region, along with CSC chambers on either side of the CMS detector; the details on improvements will be discussed.

69

CMS RPC trigger performance using data-driven technique in single muon events

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CMS is one of the two general purpose experiments at LHC which collected and analysed p-p collisions at √s = 7 and 8 TeV. The muon system of CMS consists of three gaseous detectors with complementary features: the Drift Tubes chambers (DT) in the barrel and the Cathode Strips Chambers in the forward region provide good spatial resolution while the Resistive Plate Chambers (RPC), in both barrel and forward region, has an excellent time resolution. The measurement of the RPC system trigger efficiency using single muon data and the redundancy of the muon system of CMS using the features of global muon trigger with 7 TeV data will be presented.

Session 2 / **37**

The Mini Bang to the Big Bang"–from Collider to Cosmology

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It is now conventional wisdom that collisions between two nuclei at ultra-relativistic energies precipitate to a new state of matter, usually referred to as Quark Gluon Plasma. What have we learned from experiments carried out at RHIC and LHC, for the thermometric signals in particular? What insight can we have for the very early universe, microsecond after the Big Bang, do we have any relics of that primordial epoch?

Session 5 / **60**

Probing Relativistic Heavy Ion Collisions Using Photons, Jets, and Charm

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We discuss the continuing refinements in using using photons, jets, and heavy quarks as probes of relativistic heavy ion collisions and quark gluon plasma. We discuss a simple model which provides an quantitative explanation of jet quenching and helps us obtain the flavour dependence of energy loss of partons in quark gluon plasma.

Session 4 / **58**

Physics of B-Meson

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CP violation phenomena in B-meson decays has been very well described in Standard Model Quark-W interaction. In late 1990's two B-factory experiments, Belle at KEK, Japan, and BABAR at SLAC, USA were built to look into the CP violation in B-mesons. Both the machines are electron and positron colliders running at Upsilon(4S) resonance. In this talk I will describe how CP violation fits into Standard Model. The different ways experimentalists at B-factory look into CP violation parameters, namely, measuring CKM angles alpha, beta and gamma. The current experimental status of these parameters.The role of B-factories to explore the new physics (physics beyond Standard Model) phenomena using few precision measurements.

Session 3 / **56**

Higgs Results from ATLAS

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The talk will present an overview of results from the ATLAS collaboration on searches for the Higgs Boson. The focus will be on the latest status and results from ATLAS presented at the 2013 European Physical Society Conference on High Energy Physics, Stockholm, Sweden, July 2013.

Session 6 / **50**

Color Glass Condensate signatures at RHIC and LHC

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Deeply inelastic scattering (DIS) experiments at HERA demonstrated a rapid growth of gluon density inside a proton at small momentum fraction (x). In the framework of parton model this growth is interpreted in terms of linear gluon bremsstrahlung and predicted to saturate due non-linear processes such as gluon recombination or screening. Due to these two competing processes hadron becomes maximally occupied with gluon modes of momentum scale called the saturation scale. For small enough x, this dynamically generated scale is so large that a weak coupling effective theory called the "Color Glass condensate (CGC)" can be formulated assuming a classical description of the high occupancy states. The CGC description is universal to both hadrons and nuclei at high energies which corresponds to the small x limit (Regge-Gribov) of QCD. The framework of CGC provides an ab initio description of the multi-particle production in both DIS and hadronic/heavy ion collisions. Significant progress has been made in this framework to provide a state-of-the art modelling of the early dynamics of heavy ion collisions. In this talk a brief review of the framework will be followed by some recent phenomenological developments.

Session 7 / **36**

Status of Supersymmetry

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We summarise the status of supersymmetric models in the light of results from LHC, especially the higgs mass and the direct limits. In addition we will discuss the constraints on various flavour decays which put severe constraints on Supersymmetric models. Finally we will comment on various supersymmetry breaking models and new models of supersymmetry breaking.

Session 15 / **53**

Principles of triggering

Author: Orlando Villalobos Baillie[1]

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In this lecture reasons for having a trigger in a high-energy physics experimentwill be discussed . The idea of dead time is introduced and its effect explained. The importance of buffering in derandomizing events is explained. Simple examples from fixed target and collider experiments are given.

Session 19 / **54**

Practical examples from modern experiments.

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In this lecture I discuss the implementation of the principles discussed in Lecture 1 in modern experiments, at the LHC and elsewhere. It will include examples from the ALICE and ATLAS experiments. Acouple of details from really different experiments, such as CBM and Auger

Session 8 / **64**

Status of Indian Based Neutrino Observatory

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India-based Neutrino Observatory (INO) project is one of the biggest basic science projects initiated by large number of collaborating groups within India and supported by the Government of India. The project aims to construct a cavern complex deep under the mountains with rock cover around 3500 Mwe, accessed by a 2 km long tunnel. The magnetized Iron Calorimeter , consisting of 50 kTons of steel plates embedded with 30000 Resistive Plate Chambers, will be used to study the properties of neutrinos. The cavern complex will house several other experiments like neutrino-less double decay and dark matter searches which require low background environment.
The talk will summarize the latest status of the project in terms of various efforts being put by the collaborators in building the civil infrastructure, magnet, RPCs, electronics and data acquisition systems etc. In addition detector simulation studies will also be discussed in the light of expected physics observables.

Session 6 / **61**

Upgrades of the ATLAS Detector

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The LHC already operates at unprecedented energies and luminosities. The approved Run 2 (2015-2017, 10ˆ34 cm-2s-1) and Run 3 (2019-2021, 2 x 10ˆ34 cm-2s-1) phases, and the planned HL-LHC (2024-, up to 5 x 10ˆ34 cm-2s-1) will bring unprecedented challenges for detector and trigger systems, which must be met is the physics goals of the programme are to be achieved. ATLAS has a programme of upgrades to trigger and data-acquisition, trackers, muon detectors, calorimeters and electronics, to take the experiment through to the collection of an ultimate data sample of 3 ab-1.

In this presentation we will review some of the main physics goals of the upgrade and the solutions being developed by the different ATLAS subsystems.

Session 6 / **33**

Physics with the Upgraded ALICE Experiment

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The recently accepted Letter of Intent for the upgrade of the ALICE experiment sets the stage for the physics program once the original goal of 1/nb of Pb-Pb of the currently approved program have been achieved. This talk will focus on some of the current highlights of elementary pp, pPb, and Pb-Pb collisions at the LHC and demonstrate, how the upgrade will lead into a new era of precision measurements of the quark-gluon plasma. Following the upgrade of the major detectors, they will be able to cope with an interaction rate of 50 kHz in Pb-Pb collisions. With this set-up 10/nb shall be collected starting around 2019. With the anticipated increase in the inspection rate by an order of magnitude, the sensitivity of the experiment to rare probes will increase by two orders of magnitude.

Session 9 / **67**

Dark Matter

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Session 18 / **88**

tutorials/discussions

23

A Monte Carlo Study of Intermittency in Pb-Pb Collisions at 2.76 TeV

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A Monte Carlo Study of Intermittency in Pb-Pb Collisions At 2.76 TeV.}}
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\maketitle
\begin{abstract}

Study of fluctuations is one of the signatures to extract the information on the underlying particle production mechanism in the Heavy ion collision experiments. To expalin unexpectedly large fluctuations in high multiplicity event large local fluctuations in high multiplicity event reported by JACEE Collaboration, A. Bialas and R. Peschanski used the concept of factorial moments succesfully [1]. The concept was borrowed from the intermittency studies in the turbulence of liquids. The methodology of intermittency studies in the heavy ion collision scenario has been widely studied and many a varied results are reported [2]. In the recent publication [3] NA49 experiment, based on the intermittency studies of the data reported the observation of onset of deconfinement at SPS energies. Further as per the present information from the RHIC and LHC, QGP is observed to have liquid-like behaviour hintinmg at the hydrodynamical evolution of the system. In this scenario when String Melting(SM) AMPT Model is found to be more near to the real data points, we relook at the intermittency studies of the AMPT model (SM and Default Model(DM)) for Pb-Pb system at centre of mass energy of 2.76 TeV. We will report on the behaviour of the vertical factorial moments of charged particles in the one dimensional $\eta-$space in the low momentum transverse momentum windows. Further the values of the intermittency index in these windows will be reported for both the models. Inputs from the model based studies can further be utilized for fine tuning of the models.
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