52nd International Symposium on Multiparticle Dynamics (ISMD 2023)

Registrants Book

Table of contents

Mr Khachik Abraamyan #78

Personal Data

Email Address: abraamyan@jinr.ru

Affiliation: Joint Institute for Nuclear Research

City:

Country: Russia

Talk/abstract submission

Proposed talk title: Observation of structures at □17 and □38 MeV/c2 in the γγ invariant mass spectra in pC, dC, and dCu collisions at plab of a few GeV/c per nucleon

Topic: Physics of X17 and other beyond standard model states

Abstract: The results of an analysis of the invariant mass spectra of photon pairs produced in dC, pC and dCu interactions at momenta of 2.75, 5.5 and 3.83 GeV/c per nucleon respectively, are presented. Signals in the form of enhanced structures at invariant masses of about 17 and 38 MeV/c2 are observed. The results of testing of the observed signals, including the results of the Monte Carlo simulation are presented. The test results support the conclusion that the observed signals are the consequence of detection of the particles with masses of about 17 and 38 MeV/c2 decaying into a pair of photons

Mr Alisher Aitbayev #70

Personal Data

Email Address: a.ali.970424@gmail.com

Affiliation: Joint Institute for Nuclear Research

City: Dubna

Country: Russia

Talk/abstract submission

Proposed talk title: Nuclear modification factor of inclusive charged particles in Au+Au collisions at √sN N = 27 GeV with the STAR experiment

Topic: Collectivity in high energy collisions: jets and flows

Abstract: The Beam Energy Scan (BES) program at RHIC aims to explore the QCD phase diagram, including the search for the evidence of QGP formation and the QCD critical point. One of the features observed in the study of the QGP is the effect of suppression of particle production with high transverse momentum p_T (> 2 GeV/c) at $\sqrt{s_{NN}}$ = 62.4-200 GeV, as evident from the charged-particle nuclear modification factor (R_{CP}) measured using the STAR BES-I data. In 2018, STAR collected 500 million events from Au+Au collisions at $\sqrt{s_{NN}}$ = 27 GeV, which is about a factor of 10 times of BES-I 27 GeV data size. In this talk, we present new measurements of charged particle production and the nuclear modification factor R_{CP}, from this new 27 GeV data and compare them with the BES-I results. The new measurements extend the previous BES-I results to higher transverse momentum range, which can better explore possible jet quenching effects, and may have implications on the formation and properties of QGP at lower energies.

Dr Victor E. Ambrus #35

Personal Data

Email Address: victor.ambrus@e-uvt.ro
Affiliation: West University of Timisoara
City:
Country: Romania

Talk/abstract submission

Proposed talk title: Applicability of hydrodynamics in small and large systems

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Relativistic hydrodynamics can be regarded as an effective theory describing the collective behaviour of systems close to thermodynamic equilibrium in the limit of long wavelengths. Despite these conceptual limitations, hydrodynamics has proven remarkably successful at reproducing experimental data for flow observables in both small and large collision systems, which are affected by strong non-equilibrium effects. In this talk, we address the applicability of hydrodynamics to such systems from the perspective of expected accuracy in comparison to kinetic theory, which is expected to correctly capture the system dynamics far from equilibrium [1,2]. [1] PRL 130 (2023) 152301. DOI: 10.1103/PhysRevLett.130.152301. [2] PRD 107 (2023) 094013. DOI: 10.1103/PhysRevD.107.094013.

Prof. Dmitry Anchishkin

#114

Personal Data

Email Address: dmytro.kiev@gmail.com

Affiliation: Bogolyubov Institute for Theoretical Physics of the National Academy of Sciences of Ukraine

City: Kyiv

Country: Ukraine

Talk/abstract submission

Proposed talk title: A quantum generalization of the Cooper-Frye formula

Topic: Multiparticle correlations and fluctuations

Abstract: The single-particle spectrum arising from relativistic collisions of particles and nuclei is calculated within the thermal quantum field theory framework. The starting point of consideration is the solution to the initial-value problem of particle emission from a space-like hypersurface. In the following steps, we obtain the single-particle spectrum using the ``smaller'' Green's function associated with the fireball medium. Based on this result, several specific examples of particle emission are considered.

Prof. Alejandro Ayala #41

Personal Data

Email Address: ayala@nucleares.unam.mx

Affiliation: Instituto de Ciencias Nucleares, Universidad Nacional Autonoma de Mexico

City:

Country: Mexico

Talk/abstract submission

Proposed talk title: Collision energy dependence of source sizes for primary and secondary pions in HIC's at NICA energies

Topic: Femtoscopy

Abstract: Two-particle correlation studies provide a useful tool to help determine the size of the fireball created in relativistic heavy-ion collisions. Since pions are abundantly produced in this kind of reactions, they are used as one of the main handles for correlation studies. Pions can be of primary or of secondary origin. At large transverse momentum, the former come mainly from fragmentation while at low transverse momentum they come mainly from quark coalescence. On the other hand, the latter originate from resonance decays. In this sense, primary pions more directly probe the information on the size and characteristics of the QGP. In this work, we present a study at Monte Carlo level aimed to extract the different sizes of the sources where primary and secondary pions originate. We produce samples of 10 million events using the UrQMD event generator which is then fed to the Correlation After Burner (CRAB) to produce sets of quantum correlated pions. We separate this samples into primary and secondary pions and determine the size of each of their corresponding sources to then follow the evolution of these sizes as we vary the energy of the collision. When accounting for detector resolution effects, we also study how the height of the correlation varies as a function of the collision energy. We consider energies in the NICA rage where the relative contribution to pion production from the QGP is expected to be less dominant for smaller energies.

Dr Vipul Bairathi #16

Personal Data

Email Address: vipul.bairathi@gmail.com

Affiliation: Instituto de Alta Investigación, Universidad de Tarapacá

City:

Country: Chile

Talk/abstract submission

Proposed talk title: Measurements of strange and multi-strange hadrons elliptic flow in isobar collisions at RHIC by STAR

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Data from Isobar collisions, $^{96}_{44}$Ru+$^{96}_{44}$Ru and $^{96}_{40}$Zr+$^{96}_{40}$Zr, at $\sqrt{s_{\mathrm {NN}}}$ = 200 GeV have been collected by the STAR experiment at RHIC. Anisotropic flow is an important tool to understand properties of the Quark-Gluon Plasma. Elliptic flow (v_{2}) is the second-order coefficient in the Fourier expansion of the azimuthal angle distribution of produced particles with respect to the reaction plane. Elliptic flow of charged hadrons has been measured in the isobar collisions at $\sqrt{s_{\mathrm {NN}}}$ = 200 GeV. The magnitude of v_{2} shows difference between the two isobar collisions despite the same nucleon number. This indicates a difference in nuclear structure and deformation between these nuclei. The v_{2} measurements of the strange and multi-strange hadrons are excellent probes for understanding these initial state anisotropies of the medium produced in these collisions, owing to their smaller hadronic cross-section compared to light hadrons. In this talk, we will report measurements of elliptic flow of K_{s}^{0}, Λ, $\overline{\Lambda}$, ϕ, Ξ^{-}, $\overline{\Xi}^{+}$, and Ω^{-}+ $\overline{\Omega}^{+}$ at mid-rapidity for Ru+Ru and Zr+Zr collisions at $\sqrt{s_{\mathrm {NN}}}$ = 200 GeV. The transverse momentum (p_{T}) dependence of v_{2} for minimum bias collisions and various centrality intervals will be shown. The p_{T}-integrated v_{2} of these strange and multi-strange hadrons will also be shown. System size dependence of v_{2} will be investigated by comparing the results in isobar collisions with those from Cu+Cu, Au+Au, and U+U collisions. The number of constituent quark (NCQ) scaling for these strange hadrons will also be tested. Experimental data will be compared with transport model calculations to provide insight into the nuclear structure of the isobars.

Mr Hicham Benmansour #80

Personal Data

Email Address: hicham.benmansour@pi.infn.it
Affiliation: INFN Pisa
City: Pisa
Country: Italy

Talk/abstract submission

Proposed talk title: The X17 search with the MEG-II apparatus

Topic: Physics of X17 and other beyond standard model states

Abstract: A resonant structure has been observed at ATOMKI in the invariant mass of electron-positron pairs, produced after excitation of nuclei such as ^{8}Be and ^{4}He by means of proton beams. Such a resonant structure can be interpreted as the production of an hypothetical particle (X17) whose mass is around 17 MeV. The MEG-II experiment at the Paul Scherrer Institut whose primary physics goal is the search for the charged lepton violation process μ $\rightarrow$ $ e \gamma$ is in the position to confirm and study this observation. MEG-II employs a source of protons able to accelerate them up to a kinetic energy of about 1 MeV. These protons are absorbed on a thin target where they excite nuclear transitions to produce photons for the Xenon calorimeter calibration of the MEG-II detector. By using a 2um-thin lithium target, the ^{7}Li(p,e$^+$e^{-})^{8}Be process is being studied with a magnetic spectrometer including a cylindrical drift chamber and a system of fast scintillators. This aims to reach a better invariant mass resolution than previous experiments and to study the production of the X17 with a larger acceptance and therefore to shed more light on the nature of this observation. After a 2022 engineering run, a month-long data-taking was conducted in February 2023. We report about our first results on the search and the study of the hypothetical X17 particle.

Marek Bombara

#128

Personal Data

Email Address: marek.bombara@cern.ch

Affiliation: Pavol Jozef Safarik University (SK)

City: Kosice

Country: Slovakia

Talk/abstract submission

Proposed talk title: Recent results on jets and collective phenomena in ALICE experiment

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Collective effects observed in small collision systems like pp or p-Pb indicate that they are not unique to heavy-ion collisions and could point to a common partonic origin in both systems. On the other hand, a lack of strong evidence of jet modification in small systems similar to central heavy-ion collisions makes the interpretations of the collective effects in small systems more ambiguous. In the contribution, the most recent results on strangeness and nuclei production in jets, long ranged correlations and flow from small (pp and p-Pb) to large collision systems (Xe-Xe and Pb-Pb) at various energies measured by ALICE will be reported. Prospects of future measurements with ALICE will also be discussed in light of the performance of the ALICE detector in Run 3.

Dr Noah Bray-Ali

#106

Personal Data

Email Address: nbrayali@msmu.edu
Affiliation: Mount Saint Mary's University-Los Angeles
City: Los Angeles
Country: United States

Talk/abstract submission

Proposed talk title: Dark Matter and the W Mass

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Recent analysis of weak vector boson production in hadron collisions suggests a discrepancy with the value of the W boson predicted by the Standard Model of particle physics. We argue instead that dark matter from the local halo of the galaxy shifts the strong coupling constant that enters through the virtual gluon exchange between the quark of one hadron and the antiquark of the other hadron as they annihilate to produce the vector boson. The argument leads to the prediction of a percent level, odd-parity correlation in the jet azimuth for high energy collisions that are dominated by virtual gluon exchange. Prospects for detecting the resulting breaking of the combined charge conjugation and space inversion CP symmetry operation by strongly interacting particles are discussed.

Wojciech Broniowski

#105

Personal Data

Email Address: wojciech.broniowski@ifj.edu.pl

Affiliation: Inst. of Nuclear Physics PAN & UJK

City: Krakow

Country: Poland

Talk/abstract submission

Proposed talk title: Multiparton picture of harmonic flow decorrelation in rapidity in pp collisions at the LHC

Topic: Multiparticle correlations and fluctuations

Abstract: We analyze the decorrelation of collective flow in forward and backward rapidity in pp collisions, recently measured by ATLAS (ATLAS-CONF-2022-020) in the framework of the wounded parton model. In this simple model, we find that a proper size and activity dependence of the F_2 decorrelation coefficient for the highest multiplicity events is obtained when numerous collisions of partons occur. This points to a multiparton picture of the high-multiplicity pp collisions at the LHC energies.

Ms Yu-Chen (Janice) Chen #44

Personal Data

Email Address: yu-chen.chen@cern.ch

Affiliation: Massachusetts Institute of Technology

City:

Country: United States

Talk/abstract submission

Proposed talk title: Measurement of Two-Particle Correlations and Flow Coefficients in High Multiplicity e+e- Collisions Using Archived ALEPH Data at 91-209 GeV

Topic: Collectivity in high energy collisions: jets and flows

Abstract: We present measurements of two-particle angular correlations of charged particles emitted in high-energy e^+e^- collisions using data collected by the ALEPH detector at LEP between 1992 and 2000. The correlation functions are measured over a wide range of pseudorapidity and azimuthal angle as a function of charged particle multiplicity. Previous measurement with LEP1 data at $\sqrt{s}=91$ GeV shows no significant long-range correlations in either lab coordinate or thrust coordinate analyses, with associated yield distributions in agreement with predictions from the PYTHIA v6.1 event generator. The use of higher collision energy LEP2 data allows access to not only higher event multiplicitybut also to additional production channels beyond the $e^+e^- \to \gamma^\star/Z \to q\bar{q}$ process. Notably, the highest multiplicity bin ($N_{\rm trk} \ge 50$) suggests a tantalizing disagreement with MC and implies the potential to search for collective phenomena in small systems. This measurement is pushing the studies of long-range correlation to the smallest collision system limit and includes the first flow coefficient (v_n) measurement in e^+e^- collisions, which uses a Fourier decomposition analysis to quantify the anisotropy in the azimuthal two-particle correlation as a function of charged particles' transverse momentum. This work supplements our understanding of small-system references to long-range correlations observed in proton-proton, proton-nucleus, and nucleus-nucleus collisions.

Dr Carlos Contreras #25

Personal Data

Email Address: carlos.contreras@usm.cl
Affiliation: Universiadad Tecnica Federico Santa Maria
City:
Country: Chile

Talk/abstract submission

Proposed talk title: Pomerons Interactions

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: We will discuss the formulation in the exact renormalization group ERG -approach the Pomerons and Odderon interaction.

Mate Csanad #9

Personal Data

Email Address: mate.csanad@cern.ch
Affiliation: Eotvos University, Budapest
City:
Country: Hungary

Talk/abstract submission

Proposed talk title: Femtoscopy with Lévy sources from SPS through RHIC to LHC
Topic: Femtoscopy
Abstract:

Prof. Tamas Csorgo #14

Personal Data

Email Address: tamas.ferenc.csorgo@cern.ch

Affiliation: MATE Institute of Technology KRC (Gyöngyös) and Wigner RCP (Budapest)

City:

Country: Hungary

Talk/abstract submission

Proposed talk title: Cross-checking Odderon signals at small values of four-momentum transfer

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: Recently there is a debate in the literature about the validity of Odderon signals at small four-momentum transfers, in particular near the t=0 optical point. In this talk I present a new analysis of ATLAS pp and Tevatron and SppbarS data to address this question. I summarize earlier papers that find a statistically significant Odderon signal in the region of diffractive interference and evaluate the Odderon significance using data exclusively in the diffractive cone region.

Ms Archita Rani Dash #88

Personal Data

Email Address: archita.rani.dash@cern.ch
Affiliation: Westfälische Wilhelms-Universität Münster
City: Münster
Country: Germany

Talk/abstract submission

Proposed talk title: Recent Jet Measurements in Pb-Pb Collisions with ALICE

Topic: Collectivity in high energy collisions: jets and flows

Abstract: The strongly interacting, deconfined state of quarks and gluons called the quark-gluon plasma (QGP) filled our early universe a few microseconds after the Big Bang and is recreated today in ultrarelativistic heavy-ion collisions at the Large Hadron Collider (LHC). Jets are multi-hadronic correlations that provide valuable probes of the QGP and its microscopic structure, based on observable effects such as yield suppression due to energy loss, internal structure modification, and jet scattering. This medium-induced jet modification is known as “jet quenching.” Jet measurements are based on reclustering algorithms which aim to reconstruct the kinematics of the originating parton. In this talk we present recent ALICE measurements of jet quenching in central Pb+Pb collisions at √sNN = 5.02 TeV. We present the first measurement of the angle between different jet axes in both Pb-Pb and pp collisions, which probes the coherence of the energy loss process. We also report coincidence measurements of jets recoiling from a trigger hadron (hadron+jet), which provide unique access to jet energy loss and scattering processes at low jet momentum and large cone radius R, where jet quenching effects are expected to be largest. We compare these measurements to theoretical calculations.

Prof. Laszlo Dr. Csernai #56

Personal Data

Email Address: laszlo@csernai.no
Affiliation: University of Bergen
City: Bergen
Country: Norway

Talk/abstract submission

Proposed talk title: Femtoscopy for the NAPLIFE nano-fusion project?

Topic: Femtoscopy

Abstract: Abstract: Femtoscopy is widely used in ultra-relativistic heavy ion research to determine the size and the timespan of the emission of particles based on two particle correlations. At LHC energies the in one single collision several thousand particles are emitted and detected, so such correlations can be studied in good precision. In fusion research this method is not known yet, while in laser induced inertial confinement fusion with simultaneous ignition we can expect numerous emitted protons or alpha particles. We plan theoretical studies as this method could be used in the 1-dim. configuration of NAPLIFE with short colliding laser ignition beams. The ignition is planned to be time-like, i.e. simultaneous but the burning (or fusion) may take some time. Our aim is to work out a measurement method to characterize this dynamics. Preferred date for oral presentation is Aug. 24 Thursday morning at at ~ 11:00 in the second "Femtoscopy" section. A relatively short talk is sufficient.

Jan Ebr #84

Personal Data

Email Address: janebr@email.cz

Affiliation: FZU - Institute of Physics of the Czech Academy of Sciences

City: Prague

Country: Czechia

Talk/abstract submission

Proposed talk title: Ultra-high-energy hadronic physics at the Pierre Auger Observatory

Topic: Cosmic ray and astroparticle physics

Abstract: The Pierre Auger Observatory uses several methods to measure the properties of extensive air showers initiated in the atmosphere by interactions of ultra-high-energy cosmic rays (UHECRs). These measurements allow us to put hadronic interaction models to a test at energies far beyond the capabilities of human-made accelerators. Hybrid measurements combining data from the surface and fluorescence detectors have been shown already many years ago to imply a deficit of muons when simulations are compared with the observed showers. Recently, these results have been extended in several novel ways. Using an array of underground muon detectors, the presence of the muon deficit in simulations has been confirmed in a much larger span of primary energies. Shower-to-shower fluctuations of the muon number have been determined from the inclined hybrid data, with results pointing towards the observed muon discrepancy being rather the result of a gradual accumulation of deviations from the model predictions during the shower development than of a major change in the properties of the first interaction. A global fit of the data on hybrid showers has shown that even when allowing for ad-hoc changes in model predictions not only for the muon number, but also for the depth of the maximum of the shower development in the atmosphere, the disagreement persists, albeit on a lower scale. Currently, the Pierre Auger Observatory is undergoing an upgrade which will, among other benefits, significantly improve its ability to measure the muon content of extensive air showers, which has proven to be the key handle on the properties of the hadronic physics in the air showers. Furthermore, advanced data processing techniques, such as Recurrent Neural Networks are being successfully tested in order to extract more muon information from the surface detector data.

Prof. Jonathan Lee Feng #87

Personal Data

Email Address: jlf@uci.edu
Affiliation: University of California Irvine (US)
City:
Country: United States

Talk/abstract submission

Proposed talk title: Collider Searches for X17 and Other Light Gauge Bosons
Topic: Physics of X17 and other beyond standard model states
Abstract:

Dr Fernando Gardim #85

Personal Data

Email Address: fernando.gardim@unifal-mg.edu.br

Affiliation: Federal University of Alfenas

City:

Country: Brazil

Talk/abstract submission

Proposed talk title: The smallest drop of QGP: thermodynamic properties of p-Pb collisions

Topic: Collectivity in high energy collisions: jets and flows

Abstract: In spite of the extensive experimental evidence gathered over the last decade for the production of quark-gluon plasma in colliding systems such as Au-Au and Pb-Pb, the formation of quark-gluon plasma (QGP) in the collision of smaller systems such as p-Pb remains an open question. In this study, we investigate this question by employing a state-of-the-art hybrid model based on relativistic hydrodynamics to simulate p-Pb collisions. We extract an effective temperature encapsulating the fluid evolution and show that its dependence on the average transverse momentum is in agreement with that previously observed in hydrodynamical simulations of Pb-Pb events. Combining this relation with experimental data from the ALICE experiment, we are able to obtain thermodynamic properties of the matter formed in p-Pb collisions. We show that the resulting entropy density is in agreement ith the results from Lattice QCD for the events with the highest multiplicity. These results support the formation of a collective phase of strongly interacting matter in high-multiplicity p-Pb collisions. Based on 2212.11710

Giuliano Giacalone

#104

Personal Data

Email Address: giulianogiacalone@gmail.com
Affiliation: Universität Heidelberg
City:
Country: Germany

Talk/abstract submission

Proposed talk title: Building a fluid particle by particle: Real time imaging of the emergent hydrodynamic behavior of few strongly-interacting fermions

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Collective flow is observed in high-energy proton-proton and proton-nucleus collisions where particle multiplicities are small and a quark-gluon plasma description is hard to justify. Here, we address the origin of such observations from a new angle, by performing an experimental investigation of the emergence of hydrodynamics in two-dimensional ultra-cold Fermi gases with with controllable interactions and in the regime of small particle numbers. We study the inversion of the aspect ratio (akin to elliptic flow) in the expansion of samples of atoms initially prepared in elliptical traps. To overcome the finiteness of the samples, a statistical measure of the elliptic anisotropy is devised in full analogy with the methods employed in the analysis of high-energy collisions. With ten or more fermions, we observe the emergence of elliptic flow due to inter-particle interactions, which justifies a hydrodynamic interpretation. We show that ideal hydrodynamic predictions using the equation of state of a macroscopic 2D Fermi gas underestimate the measured elliptic anisotropy. Hence, we witness the breakdown of ideal hydrodynamics due to quantum corrections beyond standard dissipative ones but rather induced by the mesoscopic nature of our samples. We discuss how hydrodynamic equations could be generalized to account for these effects, and give an outlook on further possibilities with our experimental setup to advance our understanding of collective phenomena in few-particle systems.
Based on: Floerchinger et al., "Qualifying collective behavior in expanding ultracold gases as a function of particle number", Phys. Rev. C 105, 044908 (2022)
Brandstetter et al., "Emergent hydrodynamic behavior of few strongly interacting fermions", to appear

Mateusz Goncerz #26

Personal Data

Email Address: mateusz.goncerz@cern.ch
Affiliation: Institute of Nuclear Physics Polish Academy of Sciences (PL)
City:
Country: Poland

Talk/abstract submission

Proposed talk title: MUonE experiment

Topic: Other important new results in HEP

Abstract: The anomalous magnetic moment of muon has been a long standing issue in the field of particle physics. The recent results by Fermilab have pointed to a possible discrepancy of 4.2 sigma with respect to the Standard Model prediction. Although the future measurements will undoubtedly strengthen this result, the large uncertainty of the prediction, caused by its non-perturbative contributions, remains an issue. The MUonE experiment is designed to provide an independent, precise measurement of such contribution, originating in the hadronic vacuum polarization, by employing a series of tracking stations, each with a low-Z target, to accurately determine the shape of differential cross-section of an elastic ue->ue scattering. It is expected to increase the result's significance to at least 7 sigma, thus solidifying the discovery. The design of the detector allows also for searches of displaced vertices from New Physics phenomena.

Dr Lukasz Kamil Graczykowski

#110

Personal Data

Email Address: lukasz.kamil.graczykowski@cern.ch

Affiliation: Warsaw University of Technology (PL)

City:

Country: Poland

Talk/abstract submission

Proposed talk title: Recent developments in angular correlations of identified particles (experiment & theory)

Topic: Multiparticle correlations and fluctuations

Abstract: Angular (ΔηΔφ) correlations of identified particles measured in ultrarelativistic proton-proton and heavy-ion collisions exhibit a number of features which depend on the collision system and particle type under consideration. Those features are produced by various mechanisms, such as (mini)jets, elliptic flow, resonance decays, and conservation laws. In addition, of particular importance are those related to the quantum statistics (QS) and final-state interactions (FSIs). Latest measurements of ΔηΔφ correlations of identified particles from ALICE [1] and STAR [2] show differences in particle production between baryons and mesons. While the correlation functions for mesons exhibit the expected near-side ((Δη,Δφ)≈(0,0)) peak dominated by effects of mini-jet fragmentation and are well reproduced by general-purpose Monte Carlo (MC) generators, the story is different for baryons. For pairs of particles of the same baryon number a surprising near-side anti-correlation structure is observed instead of a peak, implying that two such particles are rarely produced with similar momentum. Until recently, this effect has not been reproduced by any of the MC models, however, several developments on the theory side have been made since the publication of experimental results (i.e. [3,4]). The discrepancy poses fundamental questions on the production mechanism of baryons. Moreover, in our recent work [5] we show how to unfold the QS and FSI contributions in angular correlation functions using momentum correlations (femtoscopy). In particular, we show how those effects modify the shape of the angular correlation function with emphasis on proton-proton pairs. Most importantly, specific structures in the near-side region of the two-baryon angular correlation function, namely a small enhancement in the middle of a depletion for proton-proton pairs is reproduced with the proposed unfolding procedure. However, the unfolding of the FSI and QS effects is not able to explain the wide anticorrelation effect at near-side observed by ALICE and STAR. [1] J. Adam et al. (ALICE Collaboration), Eur. Phys. J. C77 (2017) 56, https://arxiv.org/abs/1612.08975 [2] J. Adam et al. (STAR Collaboration), Phys. Rev. C 101, 014916 (2020), https://arxiv.org/abs/1906.09204 [3] L.Y. Zhang et al., Phys. Rev. C 98 (2018) 3, 034912, L.Y. Zhang et al., Phys. Lett. B 829 (2022) 137063 [4] N. Demazure, V. Gonzalez, F. Llanes-Estrada, https://arxiv.org/abs/2210.02358 [5] Ł. Graczykowski, M. Janik, Phys. Rev. C 104, 054909 (2021) Primary author

Mr Wenda Guo #20

Personal Data

Email Address: wenda.guo@cern.ch

Affiliation: Central China Normal University CCNU (CN)

City:

Country: China

Talk/abstract submission

Proposed talk title: Non prompt J/psi production as a function of multiplicity in pp collision at 13 TeV with ALICE experiment

Topic: Other important new results in HEP

Abstract: The study of the production of non-prompt ${\rm J/\psi}$ originating from the decay of beauty hadrons, besides allowing to isolate the prompt ${\rm J/\psi}$ cross section from the inclusive ${\rm J/\psi}$ cross section, can be used to estimate open beauty-hadron production. Heavy-flavour particle production in pp collisions as a function of charged-particle multiplicity could provide insight into the processes occuring in the collision at the partonic level, as well as the interplay between the hard and soft mechanisms in particle production. In this contribution, measurements of the non-prompt ${\rm J/\psi}$ fraction as a function of charged-particle pseudorapidity density (${\rm d}N_{\rm ch}/{\rm d}\eta$) in pp collisions at $\sqrt{s}=13$ TeV with ALICE are reported. ${\rm J/\psi}$ mesons are reconstructed at midrapidity ($|\textit{y}|<0.9$) in the dielectron decay channel. Events are classified based on the charged-particle multiplicity at midrapidity ($|\eta| < 1$). The multiplicity reach is seven times larger than the average charged particle multiplicity of inelastic collisions, thanks to the usage of high-multiplicity triggered events. The measurement of the fraction of non-prompt ${\rm J/\psi}$ is performed via unbinned maximum likelihood fit down to $p_{\rm T} = 1\ {\rm GeV}/c$. The status of the prompt and non-prompt ${\rm J/\psi}$ yield extraction as a function of ${\rm d}N_{\rm ch}/{\rm d}\eta$, both normalized to the corresponding multiplicity integrated quantities, will also be shown.

Dr Wlodzimierz Guryn #27

Personal Data

Email Address: guryn@bnl.gov

Affiliation: Brookhaven National Laboratory

City:

Country: United States

Talk/abstract submission

Proposed talk title: Physics with tagged forward protons in proton-proton collisions at RHIC

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: We describe the physics program with tagged forward protons at the Relativistic Heavy Ion Collider (RHIC). The program started with the proton–proton elastic scattering experiment (PP2PP), for which a set of Roman Pot stations to measure proton-proton elastic scattering was built. The PP2PP experiment took data at RHIC as a dedicated experiment at the beginning of RHIC operations. Measurements of elastic scattering and its spin dependence were made in few dedicated data taking periods. Following this expansion of the physics program to include non-elastic channels with forward protons, such as Central Exclusive Production (CEP), Central Production (CP) and Single Diffraction Dissociation (SD) was proposed and the equipment of the PP2PP experiment was merged with the STAR experiment at RHIC. The STAR experiment has excellent acceptance and particle identification in the center of rapidity. Consequently, the expanded program, which included both elastic and inelastic channels became a part of the physics program and operations of the STAR experiment. In this talk we present the physics results obtained by the PP2PP and STAR experiments to date.

Dr Najmul Haque #46

Personal Data

Email Address: nhaque@niser.ac.in
Affiliation: NISER, India
City:
Country: India

Talk/abstract submission

Proposed talk title: QCD mesonic screening masses: Beyond perturbative study

Topic: Other important new results in HEP

Abstract: The screening masses of mesons provide a gauge invariant and definite order parameter of chiral symmetry restoration. Different mesonic correlation lengths for flavor non-singlets, at least up to NLO, are well-defined gauge invariant physical quantities calculated earlier using the perturbative resummation techniques. The NLO perturbative results are in agreement with the available non-perturbative lattice QCD results only at the high-temperature regime. We have studied the spatial correlation lengths of various mesonic observables using the non-perturbative Gribov resummation, both for quenched QCD and (2 + 1) flavor QCD and our results are in good agreement with the lattice result down to temperature around 300 MeV,

Florian Hechenberger #93

Personal Data

Email Address: florian.hechenberger@tuwien.ac.at

Affiliation: TU Wien

City: Vienna

Country: Austria

Talk/abstract submission

Proposed talk title: Vector Glueballs in Holographic QCD

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: Gauge/Gravity duality has led to novel insights in the strong coupling behaviour of large N_c QCD. Most notably is the type IIA supergravity construction by Witten, which was extended by Sakai and Sugimoto to include chiral quarks. This setup enables one to study interactions between glueballs, mesons and photons in an almost parameter-free manner. After giving a brief introduction to the model, I will focus on the decay rates of the vector glueball, its mixing with vector mesons as well as its connection to the longstanding rho-pi-puzzle and the Odderon.

Prof. Byungsik Hong

#122

Personal Data

Email Address: byungsik.hong@cern.ch

Affiliation: Korea University (KR)

City: Seoul

Country: South Korea

Talk/abstract submission

Proposed talk title: Overview of underground and ion accelerator facilities for nuclear physics in Asia

Topic: Other important new results in HEP

Abstract: There are several underground and ion accelerator facilities in Asia-Pacific region. Some of them have been run for decades and some others just started their operation. There are also large-scale heavy-ion accelerators under construction for nuclear physics. This presentation plans to provide an overview of those facilities for the future Collaborations.

Mr Cameron Ikin #42

Personal Data

Email Address: cameron.ikin@capsa.group
Affiliation: Capricorne Spatial Agence
City:
Country: Australia

Talk/abstract submission

Proposed talk title: The Future of Quantum Supercomputing and Space
Topic: Other important new results in HEP
Abstract: Quantum Supercomputing and its assistance with Future Space Technology

Dr Amaresh Jaiswal #45

Personal Data

Email Address: jaiswal.amaresh@gmail.com
Affiliation: National Institute of Science Education and Research
City:
Country: India

Talk/abstract submission

Proposed talk title: Relativistic spin-(magneto)hydrodynamics

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Relativistic dissipative hydrodynamics has been applied quite successfully to understand the space-time evolution of strongly interacting hot and dense matter formed in high energy heavy-ion collisions. Recent relativistic heavy-ion collision experiments have also found evidence for the generation of strong magnetic field and global angular momentum. The presence of these effects requires us to revisit our formulation of relativistic hydrodynamics. I will outline our contribution in the development of hydrodynamic formulation for evolution of a dissipative fluid having global angular momentum and in the presence of a magnetic field.

Prof. László Jenkovszky #52

Personal Data

Email Address: laszlojenkovszky@gmail.com
Affiliation: Bogolubov ITP, Kiev, Ukraine
City: Kiev
Country: Ukraine

Talk/abstract submission

Proposed talk title: On dip-bump structures in proton diffractive dissociation at the LHC

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: Possible diffractive (dip-bump) structures are predicted in proton's single and double dissociation at the LHC

Dr Ze-Fang Jiang #31

Personal Data

Email Address: jiangzf@mails.ccnu.edu.cn
Affiliation: Hubei Engineering University
City:
Country: China

Talk/abstract submission

Proposed talk title: Global polarization of Lambda hyperons in heavy ion collisions: tilted bulk medium, velocity field and its correlation with directed flow

Topic: Collectivity in high energy collisions: jets and flows

Abstract: We present a study of the global and local polarization for $\Lambda/\bar{\Lambda}$ hyperons and discuss the impact of initial tilted bulk medium, velocity profile, and their possible correlations with directed flow. Using a modified 3D-Glauber model that includes both a tilted deformation of the QGP fireball and a non-zero longitudinal flow velocity field coupled to a (3+1)-dimensional viscous hydrodynamic model CLVisc, we present a satisfactory description of the experimental data measured at 27 GeV and 200 GeV. Our calculation indicates that the global polarization is sensitive to the initial geometry and the initial longitudinal flow velocity. Therefore, the polarization of Lambda hyperons can provide a complementary constraint on the initial condition of nuclear matter created in heavy-ion collisions. We then compare the results for the global polarization in the tilted Glauber model, AMPT and SMASH initial conditions, and find that the global polarization of hyperons is sensitive to the QGP initial conditions. We further calculate the directed flow of hyperons within the same theoretical framework, where we observe a correlation between the slope of the directed flow and the global polarization. Finally, we investigate the dependence of the local polarization on the geometry of QGP fireball and the flow velocity field.

Prof. Sonia Kabana #50

Personal Data

Email Address: sonja.kabana@cern.ch
Affiliation: Instituto De Alta Investigación, Universidad de Tarapacá (CL)
City:
Country: Chile

Talk/abstract submission

Proposed talk title: Heavy flavor and quarkonia from experiments at RHIC

Topic: Collectivity in high energy collisions: jets and flows

Abstract: We propose to present a mini review on results from heavy flavor and quarkonia production, measured by the PHENIX and STAR experiments at RHIC with emphasis on collectivity.

Ms Anna Kaczmarska

#112

Personal Data

Email Address: anna.kaczmarska@cern.ch
Affiliation: Polish Academy of Sciences (PL)
City: Kraków
Country: Poland

Talk/abstract submission

Proposed talk title: Searches for new physics in the Higgs sector at ATLAS

Topic: Physics of X17 and other beyond standard model states

Abstract: The discovery of the Higgs boson with a mass of 125 GeV confirmed the mass generation mechanism via spontaneous electroweak symmetry breaking and completed the particle content predicted by the Standard Model (SM). Even though this model is well established and consistent with many experimental measurements, it is not capable of solely explaining some observations. Many extensions of the SM introduce additional scalar fields to account for the electroweak symmetry breaking and thereby extra Higgs-like bosons, which can be either neutral or charged. Some models also introduce exotic production modes and/or decays of the SM-like Higgs boson. This talk presents recent searches for additional low- or high-mass Higgs bosons, as well as exotic decays of the 125 GeV Higgs boson, using LHC collision data at 13 TeV collected by the ATLAS experiment in Run 2.

Prof. Joseph Kapusta #23

Personal Data

Email Address: kapusta@umn.edu
Affiliation: University of Minnesota
City:
Country: United States

Talk/abstract submission

Proposed talk title: Anomalous kaon correlations measured in Pb-Pb collisions at the LHC as evidence for the melting and refreezing of the QCD vacuum

Topic: Multiparticle correlations and fluctuations

Abstract: Measurements of the dynamical correlations between neutral and charged kaons in central Pb-Pb collisions at $\sqrt{s_{NN}} = 2.76$ TeV by the ALICE Collaboration display anomalous behavior relative to conventional heavy-ion collision simulators. We consider other conventional statistical models, none of which can reproduce the magnitude and centrality dependence of the correlations. The data can be reproduced by coherent emission from domains which grow in number and volume with increasing centrality. We study the dynamical evolution of the strange quark condensate and show that the energy released during the expansion and cooling of the system may be sufficient to explain the anomaly.

Dr Bithika Karmakar #40

Personal Data

Email Address: bithika@ipb.ac.rs
Affiliation: Institute of Physics Belgrade
City:
Country: Serbia

Talk/abstract submission

Proposed talk title: Study of η/s through high-p□ tomography

Topic: Collectivity in high energy collisions: jets and flows

Abstract: The properties of Quark Gluon Plasma (QGP) are typically investigated using low $p_\perp$ data. However, high $p_\perp$ probes offer valuable insights into global QGP features, such as temperature profiles and initial conditions. In this study, we try to determine if it is possible to constrain the η/s of QGP using the high $p_\perp$ data/theory. We assume three different parametrizations of (η/s)(T) and compute the high-$p_\perp$ R_{AA} and flow coefficients v_2, v_3 and v_4. The results indicate that the high-$p_\perp$ data alone cannot differentiate between various (η/s)(T) parametrizations when the evolution is constrained to reproduce the low-$p_\perp$ data. As an alternative approach, we utilize our dynamical energy loss model to compute the quenching strength (q̂/T^3) and then transform it into the (η/s)(T) of the evolving medium. The temperature dependence of (η/s) computed in this approach agrees surprisingly well with the (η/s)(T) inferred through state-of-the-art Bayesian analysis of the low-$p_\perp$ data.

Mr Gábor Kasza #15

Personal Data

Email Address: kaszagabor.24@gmail.com
Affiliation: Wigner RCP and MATE KRC
City:
Country: Hungary

Talk/abstract submission

Proposed talk title: Scaling behaviour of dN/dy in high energy collisions

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Recently we have generalized the famous Hwa-Bjorken solution of relativistic hydrodynamics for an accelerating velocity field and an arbitrary constant speed of sound such that the fluctuations of the initial temperature can be chosen arbitrarily. We have shown that the pseudorapidity distribution formula derived from our new solution is suitable for describing both small (p+p) and large (A+A) systems, which is a manifestation of hydodynamic scaling. To illustrate this, we have introduced a new scale variable, and we have shown that the data points of the rapidity distributions of different systems lie on the same curve.

Prof. Valery Khoze #99

Personal Data

Email Address: v.a.khoze@durham.ac.uk
Affiliation: University of Durham (GB)
City: Durham
Country: United Kingdom

Talk/abstract submission

Proposed talk title: Hunting for QCD Instantons at the LHC in the Forward Proton mode
Topic:
Abstract:

Prof. Tibor Kibedi #54

Personal Data

Email Address: tibor.kibedi@anu.edu.au
Affiliation: Australian National University
City: Canberra
Country: Australia

Talk/abstract submission

Proposed talk title: Searching for the X17 boson with magnetic selection
Topic: Physics of X17 and other beyond standard model states
Abstract:

Dr Eiji Kido #64

Personal Data

Email Address: eiji.kido@riken.jp

Affiliation: RIKEN Cluster for Pioneering Research, Astrophysical Big Bang Laboratory

City: Saitama

Country: Japan

Talk/abstract submission

Proposed talk title: The latest results of the Telescope Array experiment

Topic: Cosmic ray and astroparticle physics

Abstract: The Telescope Array (TA) experiment has been observing ultrahigh-energy cosmic rays (UHECRs) using a surface detector (SD) array and fluorescence detector (FD) stations since 2008. This is the largest UHECR observatory in the northern hemisphere. The TA experiment extended additional SDs and FDs to lower and higher energies. The extension to lower and higher energies was named the TA Low Energy extension (TALE) and TAx4 experiment, respectively. Those detectors enable us to observe approximately five orders of magnitude of energies greater than $10^{15.3}$ eV. I will begin with an overview of the results of the TA experiment and show the latest results putting stress on the updates of the evidence of anisotropies reported in the arrival directions and energy spectra at the highest energies.

Dr Dániel Kincses

#119

Personal Data

Email Address: kincses@ttk.elte.hu
Affiliation: Eötvös Loránd University
City: Budapest
Country: Hungary

Talk/abstract submission

Proposed talk title: STAR femtoscopy results TBA
Topic: Femtoscopy
Abstract:

Prof. Masakiyo Kitazawa #94

Personal Data

Email Address: kitazawa@yukawa.kyoto-u.ac.jp
Affiliation: YITP, Kyoto University
City:
Country: Japan

Talk/abstract submission

Proposed talk title: Exploring strongly interacting matter in heavy-ion collisions

Topic: Multiparticle correlations and fluctuations

Abstract: Exploring phase transitions of strongly interacting matter at extremely high density is one of the central subjects in relativistic heavy-ion collisions. Active experimental analyses are ongoing, and future experiments are planned all over the world. In this talk, I would like to give a theoretical overview on recent development of the investigation of the QCD critical point and color superconductivity.

Mr Stefan Kluth #21

Personal Data

Email Address: skluth@mpp.mpg.de

Affiliation: Max Planck Society (DE)

City:

Country: Germany

Talk/abstract submission

Proposed talk title: Observation of the dead cone effect in charm and bottom quark jets and its QCD explanation

Topic: Hadronic final states in high pT interactions

Abstract: The production of a heavy quark is accompanied by gluon bremsstrahlung which is suppressed at small angles Θ□MQ/EΘ□MQ/E for mass MQMQ and high energy EE according to perturbative Quantum Chromo Dynamics (QCD) (``dead cone effect''). As particles at small angles typically have large momenta, the heavy quark mass also causes a suppression of high momentum particles. In this paper, we studied this effect in c- and b-quark events using data from Z boson decays in e+e−e+e− annihilation. The heavy quark fragmentation function for charged particles is reconstructed in the momentum fraction variable xx or ξ=ln□(1/x)ξ=ln(1/x) by removing the decays of the heavy quark hadrons. Indeed, we find an increasing suppression of particles with rising xx down to a fraction of □1/10□1/10 for particles with x□0.2x□0.2 in b-quark and x□0.4x□0.4 in c-quark jets in comparison to light quark fragmentation. The sensitivity to the dead cone effect in the present momentum analysis is considerably increased in comparison to the recently presented angular analysis. This amount of suppression and the differences between c- and b-quark fragmentation are in good quantitative agreement with the expectations based on perturbative QCD within the Modified Leading Logarithmic Approximation (MLLA) in the central kinematic region. The data also support a two parameter description in the MLLA of these phenomena (``Limiting Spectrum''). The sensitivity of these measurements to the heavy quark mass is investigated.

Dr Anderson Kohara

#120

Personal Data

Email Address: anderson.kendi@gmail.com
Affiliation: AGH-Krakow
City: Krakow
Country: Poland

Talk/abstract submission

Proposed talk title: Structure of the real amplitude in forward pp scattering at the LHC

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: In elastic pp scattering, the interplay between the Coulomb and strong forces is still a big puzzle that remains to be unraveled. We analyse the structure of the complex nuclear amplitude and its interference with the Coulomb part in a broad energy range (from ISR to LHC) and very forward regime, and we show that at the LHC there might be some new features in the differential cross section which could enlighten the interference between the real nuclear and the Coulomb parts.

Boris Kopeliovich #19

Personal Data

Email Address: boris.kopeliovich@gmail.com

Affiliation: UTFSM, Valparaiso

City:

Country: Chile

Talk/abstract submission

Proposed talk title: 1) The Pomeron spin structure and new data in the CNI region 2) Excess of low-kT photons: the puzzle lasting four decades

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: 1) Polarized pp elastic scattering at small angles in the Coulomb-nuclear interference (CNI) region offers a unique opportunity to study the spin structure of the Pomeron. Recent data from the fixed-target HJET experiment at the BNL for small angle pp and pA elastic scattering are analyzed and well explained. 2) Abundant radiation of low-kT photons in inelastic hadronic collisions with multi-particle production, has been observed in numerous experiments. The yield of soft photons significantly exceeds the anticipations based on the bremsstrahlung model. We show that the model incorrectly employs the Low theorem, which has been proven only for diffractive photon radiation. Novel calculations based on the color-dipole model, well agree with data.

Mr Balazs Korodi #12

Personal Data

Email Address: balazs.korodi@cern.ch

Affiliation: Eotvos Lorand University (HU)

City:

Country: Hungary

Talk/abstract submission

Proposed talk title: Event-by-event investigation of the two-particle source function in 2.76 TeV PbPb collisions with EPOS

Topic:

Abstract: The investigation of the two-particle source function in lead-lead collisions simulated by the EPOS model at a center of mass energy per nucleon pair of 2.76 TeV is presented. The two-particle source functions are reconstructed directly on an event-by-event basis for pions, kaons and protons separately, using the final stage of EPOS. A Lévy source shape is observed for all three particle species in the individual events, deviating significantly from a Gaussian shape. The source parameters are extracted as functions of collision centrality and pair average transverse mass. The Lévy exponent is found to be ordered accordingly to particle mass. The Lévy scale parameter is found to scale for all particle species with the transverse mass according to Gaussian hydrodynamical predictions; however, there is no transverse mass scaling found across these species. In case of pions, the effect of the decay products is also investigated, and it is found, that both the Lévy scale and the Lévy exponent are decreased when decay products are also included in the analysis.

Prof. Andrew Koshelkin #66

Personal Data

Email Address: and.kosh59@gmail.com
Affiliation: In person
City: Moscow
Country: Russia

Talk/abstract submission

Proposed talk title: Relativistic two-particle problem in the Lagrange formalism

Topic: Other important new results in HEP

Abstract: The relativistic two-particle problem is consider in terms of the Lagrange formalism. The effective Lagrangian governing the dynamics of a quasi-particle with an effective mass is derived in the case of spinless and fermion particles. The obtained motion equations are found to be in a good relation to the one, having been already derived in the consistent dynamics approach[1,2] . Based on the developed formalism the decay of a parapositronium in a strong magnetic field is considered. We show that the strong magnetic field leads to increasing the decay width due to compressing the parapositronium states in the plane being perpendicular to the magnetic field direction. The situation of the extra strong magnetic fields[3] is discussed. 1. I . T . Todorov, Phys. Rev. {\bf 3} 2351 (1971). 2. H.W.Crater, P. van Alstine, Phys. Rev. {\bf D36} 3007 (1987). 3.B. Machet, M. I. Vysotsky, Phys. Rev {\bf D 83} 025022 (2011).

Piotr Kotko #95

Personal Data

Email Address: piotr.kotko@fis.agh.edu.pl
Affiliation: AGH UST
City: Krakow
Country: Poland

Talk/abstract submission

Proposed talk title: J/Psi hadroproduction with color reconnection effects

Topic: Hadronic final states in high pT interactions

Abstract: We study the hadroproduction of J/ψ mesons, defined as low-invariant-mass c-cbar singlets, produced in a mixture of perturbative and nonperturbative mechanisms provided by the PYTHIA Monte Carlo. We find that in this model the color reconnection mechanism, which breaks the factorization, is essential to reasonably describe the experimental data. Based on ArXiv:2303.13128

Ms Anna Kraeva #67

Personal Data

Email Address: annakraeva555@gmail.com

Affiliation: Joint Institute for Nuclear Research (JINR)

City: Dubna

Country: Russia

Talk/abstract submission

Proposed talk title: Two-pion Bose-Einstein correlations in Au+Au collisions at $\sqrt{s_{NN}}$ = 3 GeV in the STAR experiment

Topic: Femtoscopy

Abstract: The correlation femtoscopy technique makes it possible to estimate the geometric dimensions and lifetime of the particle emission region after the collision of ions. Measurements of the emission region characteristics not only at midrapidity, but also at the backward (forward) rapidity can provide new information about the source and make it possible to impose constraints on the heavy-ion collision models. This work is devoted to revealing the dependence of the spatial and temporal parameters of the emission region of identical pions in Au+Au collisions at $\sqrt{s_{NN}} = 3$ GeV on the fixed-target program of the STAR experiment. The extracted femtoscopic radii ($R_{out}, R_{side}, R_{long}, R_{out-long}^{2}$) and the correlation strength, λ, are presented as a function of collision centrality, pair rapidity and transverse momentum. Physics implications will be discussed.

Prof. Attila Janos Krasznahorkay #24

Personal Data

Email Address: attila.janos.krasznahorkay@cern.ch
Affiliation: Institute for Nuclear Physics (ATOMKI, HU)
City: Debrecen
Country: Hungary

Talk/abstract submission

Proposed talk title: An Update on the Hypothetical X17 Particle

Topic: Physics of X17 and other beyond standard model states

Abstract: Seven years ago we published our results on the anomalous internal pair creation of the 18.15 MeV electromagnetic transition of the 8Be nucleus [1]. While the internal pair creation process can in general be very accurately described in the Standard Model of Particle Physics, we found a peak-like deviation in the angular correlation of the e+e- pairs formed in this transition at large angles, at 140 degrees. In our paper we interpreted this result by the creation and decay of a new neutral particle, which was later named the X17 particle in further literature. Although our article has attracted great international interest with more then 400 citations, and many experiments have been planned to replicate it, no group has yet reported on supporting or exclusionary experimental results. In the present talk I will summarize our experimental results obtained for the X17 particle. These confirm our previous results for the 8Be nucleus by examining transitions of the 4He [2] and 12C [3] nuclei in addition. With the energy of these nuclear transitions being different, we observed the anomalies at different angles in the angular correlation of the e+e- particles, in accordance with our expectations. Thereby, these new results greatly enhanced the evidence for the X17 particle. I will also present some preliminary results measured in the decay of the electric Giant Dipole Resonance (GDR) of the 8Be nucleus, which are also consistent with the existence of an X17 particle. Since GDR can be observed in all nuclei, our result may pave the way for a systematic nuclear physics search for the X17 particle. References: [1] A.J. Krasznahorkay et al., Phys. Rev. Lett. Phys. Rev. Lett. 116, 042501 (2016). [2] A.J. Krasznahorkay et al., Phys. Rev. C 104, 044003 (2021). [3] A.J. Krasznahorkay et al., Phys. Rev. C 106, L061601 (2022).

Marcin Kucharczyk #18

Personal Data

Email Address: marcin.kucharczyk@cern.ch

Affiliation: Polish Academy of Sciences (PL)

City:

Country: Poland

Talk/abstract submission

Proposed talk title: Study of the Bose–Einstein correlations in proton-proton and proton-lead collisions at LHCb

Topic: Femtoscopy

Abstract: A study of the Bose–Einstein correlations for same-sign charged pions originating from proton-proton and proton-lead collisions recorded in the LHCb experiment at sqrt(s) = 7 TeV centre-of-mass energy and sqrt(sNN) = 5.02 TeV centre-of-mass energy per nucleon. Both measurements are the first of this type performed in the forward region at LHC energies. The proton-proton (proton-lead) dataset used in the analysis was recorded in 2011 (2013) and corresponds to an integrated luminosity of 1.0 fb-1 (1.6 nb-1). Correlation parameters are determined for different regions of charged-particle multiplicity. It is observed that the correlation radius (the intercept parameter) increases (decreases) with the charged-particle multiplicity, which is consistent with observations from other experiments at the LHC in the central rapidity region. The measured correlation radii scale linearly with the cube root of the charged-particle multiplicity. Such a behaviour is compatible with predictions based on the hydrodynamic models. Moreover, hints for a dependence of the correlation radius on pseudorapidity are observed.

Aleksander Kusina

#117

Personal Data

Email Address: aleksander.kusina@ifj.edu.pl
Affiliation: Institute of Nuclear Physics PAN, Krakow
City: Krakow
Country: Poland

Talk/abstract submission

Proposed talk title: Nuclear parton distribution functions

Topic: Proton structure, small-x and large-x physics

Abstract: I will review recent results on nuclear parton distribution functions from the nCTEQ collaboration.

Prof. Su Houng Lee

#10
1

Personal Data

Email Address: suhoung@gmail.com
Affiliation: Yonsei University
City: Seoul
Country: South Korea

Talk/abstract submission

Proposed talk title: Diquarks and heavy hadron production in heavy ion collisions

Topic: Multiparticle correlations and fluctuations

Abstract: Using a quark model with parameters that well reproduce the ground state hadron masses, we show that a (us) diquark is more stable than the $(u)d$ diquark. In fact, the mass of the (us) diquark is found to be smaller than the sum of the individual quark masses, while the latter is larger. Such an attraction in the (us) diquark could lead to enhanced production of Ξ_c/D in high energy pp or ultrarelativistic heavy ion collisions.

Mr Jianlong Lu #37

Personal Data

Email Address: jianlong@nus.edu.sg

Affiliation: National University of Singapore

City:

Country: Singapore

Talk/abstract submission

Proposed talk title: Remarks on the implications of $|\mathrm{U}_{\mu i}| = |\mathrm{U}_{\tau i}|$ in the canonical seesaw mechanism

Topic: Cosmic ray and astroparticle physics

Abstract: Recently in JHEP \textbf{06} (2022) 034, the author claims that the experimentally favoured possibility $|U_{\mu i}| = |U_{\tau i}|$ (for $i=1,2,3$) necessarily implies $|R_{\mu i}| = |R_{\tau i}|$ (for $i=1,2,3$) in the context of canonical seesaw mechanism, from which the author further claims that in the typical scenario $\mathrm{U} = \mathcal{P}\mathrm{U}^{*}$ with $\mathcal{P} = \begin{pmatrix} 1 & 0 & 0\\ 0 & 0 & 1\\ 0 & 1 & 0 \end{pmatrix}$ the relation $\mathrm{R} = \mathcal{P}\mathrm{R}^{*}$ is a necessary consequence and there is a corresponding minimal flavour symmetry in the neutrino mass term under the transformation $\nu_{e\mathrm{L}}\rightarrow (\nu_{e\mathrm{L}})^{c}$, $\nu_{\mu\mathrm{L}}\rightarrow (\nu_{\tau\mathrm{L}})^{c}$, $\nu_{\tau\mathrm{L}}\rightarrow (\nu_{\mu\mathrm{L}})^{c}$ on the left-handed neutrino fields and arbitrary unitary CP transformation on the right-handed neutrino fields. In this paper, we show that the above implication is based on an incorrect manipulation of matrix equalities and the relation $\mathrm{R} = \mathcal{P}\mathrm{R}^{*}$ is no more than one of many possibilities that can accommodate $\mathrm{U} = \mathcal{P}\mathrm{U}^{*}$ in the context of canonical seesaw mechanism. Therefore we show that the minimal symmetry mentioned earlier does not necessarily exist in the scenario of $\mathrm{U} = \mathcal{P}\mathrm{U}^{*}$.

Vinh Luong

#123

Personal Data

Email Address: lbavinh@gmail.com
Affiliation: Joint Institute for Nuclear Research
City: Dubna
Country: Russia

Talk/abstract submission

Proposed talk title: Recent Flow Results from STAR Experiment at RHIC

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Relativistic heavy-ion collision is an excellent tool to study the QCD phase structure. The azimuthal anisotropic flow is sensitive to the initial geometry, transport properties, and equation of state of the medium formed in the collisions. We report recent results on anisotropic flow measured by STAR for different colliding systems: Au+Au, Zr+Zr, Ru+Ru, ${}^{3}\mathrm{He}$+Au, d+Au, p+Au at $\sqrt{s_\mathrm{NN}}$ = 200 GeV and for Au+Au collisions at $\sqrt{s_\mathrm{NN}}$ = 3--54.4 GeV collected during the Beam Energy Scan II program.

Prof. MAGNO MACHADO #72

Personal Data

Email Address: magnus@if.ufrgs.br
Affiliation: Instituto de Física - UFRGS
City: Porto Alegre
Country: Brazil

Talk/abstract submission

Proposed talk title: Reggeometric pomeron model and light vector meson photoproduction in UPCs collisions at the LHC

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: By using the Reggeometric Pomeron model for vector meson production which successfully describes the high energy lepton-nucleon data, we analyse the light meson production in ultra-peripheral heavy ion collisions at the Large Hadron Collider (LHC). The rapidity distributions for ρ and ϕ photoproduction in lead-lead, xenon-xenon and oxygen-oxygen collisions are investigated.

Dr Klaudia Maj

#13
1

Personal Data

Email Address: klaudia.burka@cern.ch

Affiliation: AGH University of Krakow (PL)

City: Krakow

Country: Poland

Talk/abstract submission

Proposed talk title: BSM physics using photon-photon fusion processes in UPC in Pb+Pb collisions with the ATLAS detector

Topic: Physics of X17 and other beyond standard model states

Abstract: Relativistic heavy-ion beams at the LHC are accompanied by a large flux of equivalent photons, leading to multiple photon-induced processes. This talk presents searches for physics beyond the standard model enabled by photon-photon processes in both di-tau and di-photon final states. The tau-pair production measurements can constrain the tau lepton's anomalous magnetic dipole moment (g-2), and a recent ATLAS measurement using muonic decays of tau leptons in association with electrons and tracks provides one of the most stringent limits available to date. Similarly, light-by-light scattering proceeds via loop diagrams, which can contain particles not yet directly observed. Thus, high statistics measurements of light-by-light scattering shown in this talk provide a precise and unique opportunity to investigate extensions of the Standard Model, such as the presence of axion-like particles.

Dr Pawel Malecki #82

Personal Data

Email Address: pawel.malecki@cern.ch

Affiliation: INP PAS Kraków, PL

City: Kraków

Country: Poland

Talk/abstract submission

Proposed talk title: Pacific Ocean Neutrino Experiment (P-ONE): status and development

Topic: Cosmic ray and astroparticle physics

Abstract: Following the breakthrough discoveries of very-high-energy neutrinos of astrophysical origin by IceCube, a new field of research, neutrino astronomy, was established in the previous decade. Even though two sources of such neutrinos have been identified by now, TXS 0506+056 and NGC 1068, the origin and processes of creation of astrophysical neutrinos are still mostly unexplored. To advance quickly in this new field, more neutrino telescopes are needed. In this talk I will describe the current status and plans for the development of the Pacific Ocean Neutrino Experiment (P-ONE), which is under construction in the Pacific Ocean near Vancouver Island. The construction of P-ONE is expected to start in 2024 exploiting the already available deep-sea infrastructure provided by Ocean Networks Canada. P-ONE will complement the existing IceCube and KM3NeT neutrino telescopes not only with its large detection volume, but also by providing an insight into the southern celestial hemisphere, where the central region of the Galactic Plane is located.

Mr Neelkamal Mallick

#107

Personal Data

Email Address: neelkamal.mallick@cern.ch

Affiliation: Indian Institute of Technology Indore

City: Indore

Country: India

Talk/abstract submission

Proposed talk title: Estimating elliptic flow coefficient in heavy ion collisions using deep learning

Topic: Collectivity in high energy collisions: jets and flows

Abstract: In recent years, deep learning has found many applications in the field of high energy heavy-ion collisions. In this work, we explore the prospects of using deep learning methods such as a feed-forward deep neural network (DNN) to estimate the elliptic flow (v_2) in heavy-ion collisions at RHIC and LHC energies. A novel method is implemented to process the input observables from particle kinematic information. The proposed DNN model is trained with Pb--Pb collisions at $\sqrt{s_{\rm NN}}=5.02$ TeV minimum bias events simulated with AMPT model. It is shown that the DNN learns and preserves the centrality, energy, transverse momentum dependence of v_2 very well. This work also investigates the elliptic flow for light-flavour hadrons such as pions, kaons, and protons. The baryon-meson v_2, and the number of constituent quark scaling are preserved by the DNN model. Error estimation was subjected to an event simulation with additional random noise, and the proposed DNN model is found to keep the robustness and prediction accuracy intact up to a reasonable extent. Results are compared to experimental data wherever possible. Further investigations are being carried out to implement this method in experiments. References: 1. N. Mallick, S. Prasad, A. N. Mishra, R. Sahoo, and G. G. Barnaf\"oldi, Phys.Rev.D 105, 114022 (2022). 2. N. Mallick, S. Prasad, A. N. Mishra, R. Sahoo, and G. G. Barnaf\"oldi, Phys.Rev.D 107, 094001 (2023).

Dr Saverio Mariani #32

Personal Data

Email Address: saverio.mariani@cern.ch

Affiliation: CERN

City:

Country: Switzerland

Talk/abstract submission

Proposed talk title: Fixed-target measurements contributing to cosmic rays studies

Topic: Cosmic ray and astroparticle physics

Abstract: Owing to the injection of noble gases in the LHC accelerator through a system called SMOG, the LHCb experiment at CERN has been operated since 2015 as the highest-energy fixed-target experiment ever. Within the accessed physics programme, helium injection allows collisions between cosmic rays and the interstellar medium to be reproduced, setting constraints to theoretical models in poorly explored kinematic regions. In view of the LHC Run3 period of data-taking, the SMOG system was upgraded to SMOG2, mainly a gas storage cell allowing for higher gas pressure and more gas species, even non-noble ones, to be injected. In particular, nitrogen and oxygen injections will provide inputs for atmospheric cosmic ray characterization. In this contribution, the first results with injected helium, the commissioning of the SMOG2 system and the physics prospects connected to cosmic rays physics will be discussed.

Prof. Tomasz Matulewicz #28

Personal Data

Email Address: tomek.matulewicz@cern.ch

Affiliation: University of Warsaw (PL)

City:

Country: Poland

Talk/abstract submission

Proposed talk title: Thermal model interpretation of particle production in pp interactions around $\sqrt{s}\simeq$10 GeV

Topic: Multiparticle correlations and fluctuations

Abstract: The statistical hadronization model ThermalFist [1] was applied to numerous hadron yields measured in p+p collisions at $\sqrt{s}$ = 8.8, 12.3 and 17.3 GeV, including recently published yields of K_0^S mesons, measured by the NA61/SHINE Collaboration [2]. We consistently used the energy-dependent widths of Breit-Wigner mass distributions of hadronic resonances, as this approach was generally found to provide better agreement with experimental data [3-5]. We consequently account for the well-established experimental ϕ meson yields (although neglecting this particle improves the fit quality). The canonical treatment of particles with open strangeness with the grand canonical approach for non-strange particles gave a reasonable agreement with the measured yields, provided the volume of strange particles was allowed to vary freely. This volume is found to be greater than the canonical one, similarly to the conclusions [6] of the analysis of p+p (7 and 13 TeV), p+Pb (5.02 TeV) and Pb+Pb (2.76 TeV) data measured by ALICE. [1] V. Vovchenko, H. Stoecker, Computer Physics Communication {\bf 244} (2019) 295. [2] M. \'Cirkovi\'c for the NA61/SHINE Collab. Proceedings of BPU11 (2022), Int. J. Mod. Phys. A (2023), to be published. [3] T. Matulewicz and K. Piasecki, J.Phys.G: Nucl.Part.Phys. {\bf 48} (2021) 085004. [4] K. Piasecki and T. Matulewicz, PoS 242 {\bf PANIC2021} (2022) 242. [5] T. Matulewicz and K. Piasecki, EPJ Web of Conferences {\bf 276} (2023) 03012. [6] J. Cleymans, P.M. Lo, K. Redlich, N. Sharma, Phys.Rev. {\bf C103} (2021) 014904.

Dr Itaru Nakagawa #68

Personal Data

Email Address: itaru@bnl.gov

Affiliation: RIKEN

City:

Country: Japan

Talk/abstract submission

Proposed talk title: Readiness for physics data taking of sPHENIX experiment at RHIC

Topic: Collectivity in high energy collisions: jets and flows

Abstract: sPHENIX is a new versatile detector at the Relativistic Heavy Ion Collider (RHIC) in the Brookhaven National Laboratory, and in the middle of commissioning prior to physics data taking this Summer to Fall. The sPHENIX experiment will collect high statistics nucleus-nucleus, proton-nucleus and proton-proton data, enabling state-of-the-art studies of jet modification, upsilon suppression and open heavy flavor production to probe the microscopic nature of the strongly-coupled Quark Gluon Plasma complementaly to thoese measurements from the LHC experiments, and will allow a broad range of cold QCD studies. The sPHENIX detector will provide precision vertexing, tracking and electromagnetic and hadronic calorimetry in the central pseudorapidity region $|\eta| < 1.1$, with full azimuth coverage, at the full RHIC collision rate, delivering unprecedented data sets for hard probe tomography measurements at RHIC. sPHENIX folllows the typical geometry of collider detectors, with a tracking system consisting of a MAPS microvertex detector (MVTX), a silicon strip intermediate tracker (INTT) and a time projection chamber (TPC). The calorimeter stack includes a tungsten/scintillating fiber electromagnetic calorimeter (EMCAL) and a steel/scintillator tile hadronic calorimeter (HCAL), divided into inner and outer parts. The inner HCAL sits inside a 1.4 T superconducting solenoid, which was obtained from the decommissioned BaBar detector. In this talk, I will introduce physics goal of the sPHENIX experiment and the latest status of the detector commissioning.

Prof. Megumi Naruki #91

Personal Data

Email Address: naruki@post.kek.jp
Affiliation: Kyoto Univ.
City:
Country: Japan

Talk/abstract submission

Proposed talk title: Dilepton Measurement and Future Possibilities at J-PARC

Topic: Other important new results in HEP

Abstract: A brief overview of recent results at the J-PARC Hadron Facility will be given. It has been designed as a multi-purpose experimental facility, which covers a wide range of physics. Some selective topics in hadron physics including hyperon-nucleon scattering will be highlighted, mainly focusing on the dilepton measurement at the high-momentum beamline which has been newly constructed in 2020. The hadron mass in medium will be precisely examined using vector mesons produced in pA reactions with the primary proton beam at J-PARC. I will also give an outlook on the future prospects of hadron mass programs, together with baryon spectroscopies.

Dr Hugo Natal Da Luz

#133

Personal Data

Email Address: hugonluz@cern.ch
Affiliation: Czech Technical University in Prague
City: Prague
Country: Czechia

Talk/abstract submission

Proposed talk title: The construction of the X17 spectrometer at CTU in Prague

Topic: Physics of X17 and other beyond standard model states

Abstract: The Institute of Experimental and Applied Physics at the Czech Technical University in Prague is assembling a system of detectors based on different detector technologies (Si sensors coupled to Timepix3, multiwire proportional counters and time projection chambers) to reproduce the anomalies in the correlation angles between electrons and positrons emitted from internal pair creations in 8Be and 4He nuclei, as measured in ATOMKI. The three main lines of this project will be addressed in this contribution: (i) a summary of the measurements performed with a reduced setup of Timepix3 detectors using e+e- from Oxygen-16, demonstrating the 3D reconstruction of the source position within 2 mm, (ii) the simulations using different generators confirming angular resolution better than 10 degrees and (iii) the status of the assembly of the experiment, with recent test results of the Timepix3 hexagon, current performance of the multiwire proportional counters and technical aspects of the TPC.

Dr Kishora Nayak #58

Personal Data

Email Address: k.nayak1234@gmail.com

Affiliation: Department of Physics, Panchayat College (Govt.), Bargarh (Sambalpur University) 768028, Odisha, India

City: Bargarh

Country: India

Talk/abstract submission

Proposed talk title: Understanding the effect of strangeness and electric charge on the NCQ scaling of directed flow

Topic: Collectivity in high energy collisions: jets and flows

Abstract: A suitable combination of directed flow (v_{1}) of identified hadrons has been used to demonstrate the Number of Constituent Quarks (NCQ) Scaling in the STAR experiment RHIC~[PRL 120, 062301; 2018]. Similarly, by considering the v_{1} of seven produced identified hadrons (K^{-}, $\overline{p}$, $\overline{\Lambda}$, ϕ, $\overline{\Xi}^{+}$, Ω^{-} and $\overline{\Omega}^{+}$), a new method to test NCQ scaling has been proposed in the Ref~[PRC 105, 014912; 2022]. We show that the Δv_{1}-slope from the NCQ scaling is non-zero and it depends on both the electric charge ($\Delta \rm q_{ud}$, $\Delta \rm q$) and strangeness number ($\Delta \rm S$). We derive the coefficients from simultaneous fitting of Δv_{1}-slopes as a function of $\Delta \rm q_{ud}$ (or $\Delta \rm q$) and $\Delta \rm S$. We further demonstrate these relationships with a multi-phase transport model calculation of Au+Au collisions at $\sqrt{s_{\rm NN}}$ = 7.7, 14.5, 27, 54.4, and 200 GeV.

Dr Frigyes Janos Nemes #7

Personal Data

Email Address: frigyes.janos.nemes@cern.ch
Affiliation: CERN (also at Wigner RCP Budapest, Hungary)
City: Budapest/Geneva/Gyöngyös
Country: Hungary

Talk/abstract submission

Proposed talk title: Recent results from the TOTEM experiment
Topic:
Abstract:

Dr Toshihiro Nonaka #92

Personal Data

Email Address: nonaka.toshihiro.ge@u.tsukuba.ac.jp

Affiliation: University of Tsukuba

City:

Country: Japan

Talk/abstract submission

Proposed talk title: Methods and Results on Conserved-Charge Fluctuations from RHIC-BES and FXT

Topic: Multiparticle correlations and fluctuations

Abstract: One of the ultimate goals in heavy-ion collision experiments is to understand the QCD phase structure and the nature of the phase transition. At RHIC, cumulants up to the sixth-order of the net-particle multiplicity distributions have been measured for the Beam Energy Scan (BES) and fixed-target (FXT) program (2010-2017), from which some interesting hints on the phase structure have been obtained. The higher-order cumulants are more sensitive not only to the QCD phase structure but also to the experimental artifacts such as detector efficiencies, initial volume fluctuations, and event pileups. In this talk, we will briefly discuss about the analysis techniques to overcome those issues. We will then present the experimental results from RHIC-BES and FXT [1-4], and current interpretations. We will also discuss about the importance of the pT acceptance correction [5] and future measurements including hyperons [6]. References [1] J. Adam et al., Phys. Rev. Lett., 126.092301(2021) [2] Mohamed Abdallah et al., Phys. Rev. C, 104.024902(2021) [3] M. S. Abdallah et al., Phys. Rev. Lett., 128.202303(2022) [4] Mohamed Abdallah et al., Phys. Rev. Lett., 127.262301(2021) [5] M. Kitazawa et al., Nucl.Phys.A 1030.122591(2023) [6] T. Nonaka, Nucl.Instrum.Meth.A 1039.167171(2022)

Dr Tamás Novák #10

Personal Data

Email Address: novak.tamas@uni-mate.hu
Affiliation: MATE Institute of Technology Karoly Robert Campus (HU)
City: Gyöngyös
Country: Hungary

Talk/abstract submission

Proposed talk title: Recent J/ψ results measured with PHENIX

Topic: Hadronic final states in high pT interactions

Abstract: Finalized PHENIX results are presented on J/ψ modification from the RHIC system-size scan, which include p+Al, p+Au, and 3He+Au (small systems) collisions as well as AA (large systems) collisions at forward and backward rapidity ($1.2 < |y| < 2.2$). Comparisons with state-of-the-art theory calculations and LHC data will be discussed. The forward rapidity data in small systems are well described by model calculations for all three systems, however, the backward rapidity p+Au and 3He+Au data are not reproduced by the shadowing calculation alone. J/ψ v2 meausrements in Au+Au collisions at forward rapidity is consistent with zero.

Dr Zongjin Ong #61

Personal Data

Email Address: ongzongjin@u.nus.edu

Affiliation: National University of Singapore (SG)

City:

Country: Singapore

Talk/abstract submission

Proposed talk title: Forward-Backward multiplicity analysis and cluster formation in pp collisions at \sqrt{s} = 0.9, 7 and 8 TeV from the CMS experiment

Topic: Multiparticle correlations and fluctuations

Abstract: The forward-backward multiplicity distributions of pp collisions at \sqrt{s} = 0.9, 7 and 8 TeV from the CMS experiment are analysed using a modified Chou-Yang scheme. The total multiplicity component was found to be well-described by a weighted superposition of a Negative Binomial Distribution and a Furry-Yule Distribution. The forward-backward asymmetry component revealed a continued increase of the mean cluster size formed with increasing collision energy, which is possibly related to an increase in the initial number of gluons produced.

Prof. Kenneth Osterberg #96

Personal Data

Email Address: kenneth.osterberg@cern.ch
Affiliation: University of Helsinki
City: Helsinki
Country: Finland

Talk/abstract submission

Proposed talk title: D0-TOTEM Odderon observation: an update

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: The pp elastic cross section at 1.96 TeV, obtained from a data-driven extrapolation of the cross sections measured by TOTEM at 2.76, 7, 8, and 13 TeV, have been found to disagree at the 3.4sigma level with the D0 ppbar elastic cross section at 1.96 TeV in the region of the diffractive minimum and the second maximum of the pp cross section, thus providing evidence of Odderon exchange [1]. These results have been combined with a TOTEM analysis of Odderon exchange based on the total cross section and the ρ parameter in pp elastic scattering [2]. The combined significance is larger than 5sigma and interpreted as the first observation of Odderon exchange. In this presentation, a comprehensive list of questions and objections raised to the published analysis are answered and supplementary material is provided. These demonstrate that the methods and assumptions made for the extrapolation of the pp elastic cross section to 1.96 TeV and its comparison to the D0 measurement in ppbar are valid and reasonable, even conservative on key points, leading in fact to an conservative estimate for the significance. Same is true for the methods and choices made by TOTEM for the total cross section and the ρ measurements. [1] V.M. Abazov et al. (D0 and TOTEM Collaborations), Odderon Exchange from Elastic Scattering Differences between pp and ppbar Data at 1.96 TeV and from pp Forward Scattering Measurements, Phys. Rev. Lett. 127, 062003 (2021). [2] G. Antchev et al. (TOTEM Collaboration), First determination of the ρ parameter at √s = 13 TeV: probing the existence of a colourless C-odd three-gluon compound state, Eur. Phys. J. C. 79, 785 (2019).

Prof. Ken Oyama

#103

Personal Data

Email Address: ken.oyama@cern.ch

Affiliation: Nagasaki Inst. of Applied Science (JP)

City: Nagasaki

Country: Japan

Talk/abstract submission

Proposed talk title: ALICE upgrade with Forward Calorimeter - exploring CGC and ultimately low-x region

Topic: Proton structure, small-x and large-x physics

Abstract: ALICE at the LHC is planning an upgrade by introducing a new high-granularity Forward Calorimeter (FoCal) during the next LHC long shutdown to explore physics in an unprecedentedly low-x range down to 10^-6 with Q~2-50 GeV/c. The FoCal consists of two sub-detectors which are electromagnetic (FoCal-E) and hadron (FoCal-H) calorimeters, and covers from 3.4 to 5.8 in pseudorapidity and 2-pi in azimuth. FoCal-E is made of 20 layers of tungsten plates alternating with sensor layers. Sensor layers are mostly pad sensors. However 2 layers out of 20 layers are replaced by silicon pixel sensors to achieve very high spatial resolution to distinguish single photon or electrons from neutral pions. While FoCal-H consists of copper capillary tubes with scintillator fibers to measure mainly hadronic components of jets. ALICE is planning to start data taking with completed FoCal from 2029 using different collision systems of p-p, p-Pb and Pb-Pb, and collects high integrated luminosity data. It measures various probes including single/direct photons, neutral pions, jets, and electrons originated from vector mesons from ultra-peripheral collisions to explore nuclear PDFs, gluon saturation and color glass condensate (CGC) which gives a key information to understand quark-gluon plasma formation in nucleus-nucleus collisions. The FoCal detector design is near completed and its performance is examined with various test beam experiments. Presently, readout electronics and trigger system design is being developed. In particular, since FoCal-E is combination of fast pad readout and slow pixel readout, we are developing peculiar trigger and readout system provides full compliance with other ALICE detectors with streamline trigger-less readout system. In this presentation, an overview of the FoCal detector and its contributions to small-x physics programme are discussed together with expected performance of the FoCal studied by both test beam experiments and simulations. Additionally, our challenges and new technologies on detector system and readout and trigger system which hopefully are useful knowledge for future HEP experiments will be introduced.

Prof. Kyoichiro Ozawa #76

Personal Data

Email Address: ozawa@post.kek.jp
Affiliation: KEK
City: Tsukuba
Country: Japan

Talk/abstract submission

Proposed talk title: Experimental study of finite density matter at J-PARC

Topic: Other important new results in HEP

Abstract: Study of finite density matter attracts wide interests in the field of hadron physics research to understand the phase diagram of Quantum Chromo Dynamics (QCD). Historically, a high temperature region of the QCD diagram is studied in high-energy heavy ion collisions, which are realized at RHIC and LHC, to observe a Quark-Gluon-Plasma. Experimental information for a high-density region is still not enough. A new project to study the high-density matter is being prepared at J-PARC. According to past experiments and model calculations, heavy ion collisions in a beam energy range of few GeV can produce a high-baryon density matter, which has few times larger density than a normal nuclear matter. The new project realize such heavy ion collisions at J-PARC. We have designed a heavy-ion acceleration scheme and spectrometer for the experiment. We can achieve beam energies of 1-12 AGeV/c and the collision rates of 10^{11} Hz. One the main purpose of the experiment is to explore the phase structures of the QCD phase diagram in a high-baryon density regime such as the first-order phase boundary and the QCD critical point, and search for color-superconducting phase. We will also measure various strange particles/nuclei and study their correlations to unveil the EOS of the matter. In addition, we also measure hadron properties, such as interactions, mass, width and decay rates, in a dese medium. Such measurements will give a bright experimental information on hadron physics in a high-density region. In this presentation, we will show details of the project. The project is planned using a staging approach to realize the experiment as soon as possible, As the first phase of the project, we will perform the experiment with upgrades of the existing J-PARC E16 spectrometer with 10^{8} Hz beams. The E16 experiment is an on-going experiment at J-PARC and aims to measure properties of vector mesons in a nucleus. We will introduce details of measurements at the first phase. Also, relations with the current activities on hadron physics studies at J-PARC will be shown.

Dr Sanghwa Park #59

Personal Data

Email Address: sanghwapark@gmail.com

Affiliation: Jefferson Lab

City:

Country: United States

Talk/abstract submission

Proposed talk title: Direct photon cross section and double-helicity asymmetry measurement at PHENIX

Topic: Proton structure, small-x and large-x physics

Abstract: Direct photon production in proton collisions is an excellent tool to study the structure of the proton. At RHIC, direct photons are produced mainly by quark-gluon Compton scattering process. Unlike hadrons and jets, direct photons can provide clean access to the gluon distribution inside the proton without complications of final state interactions. As the world’s only polarized proton collider, RHIC provides unique opportunities to study polarized proton structure. Measurement of the double-helicity asymmetry of direct photons in longitudinally polarized proton collisions can directly probe both sign and magnitude of the gluon helicity inside the proton. In particular, the sign of the gluon contributions to the proton spin has remained unresolved from the previous jet and other hadron data. The direct photon measurement, on the other hand, is linearly sensitive to the gluon helicity and can provide an important new input to extract the gluon helicity distribution. In this talk, we will present the first cross section and double-helicity asymmetry results at \sqrt{s} = 510 GeV from p+p collisions with the PHENIX detector.

Dr Roman Pasechnik #48

Personal Data

Email Address: roman.pasechnik@cern.ch
Affiliation: Lund university
City:
Country: Sweden

Talk/abstract submission

Proposed talk title: Glueball Dark Matter

Topic: Cosmic ray and astroparticle physics

Abstract: We delve deeper into the potential composition of dark matter as stable scalar glueballs from a confining dark SU(N) gauge theory, focusing on N={3,4,5}. To predict the relic abundance of glueballs for the various gauge groups and scenarios of thermalization of the dark gluon gas, we employ a thermal effective theory that accounts for the strong-coupling dynamics in agreement with lattice simulations. We compare our methodology with previous works and find that our approach is more comprehensive and reliable. The results are encouraging and show that glueballs can account for the totality of dark matter in many unconstrained scenarios with a phase transition scale 20 MeV□Λ□10 GeV, thus opening the possibility of exciting future studies.

Mr Vladimir Pastushenko

#102

Personal Data

Email Address: past.vlad2@gmail.com
Affiliation: http://pva1.mya5.ru/
City:
Country: Ukraine

Talk/abstract submission

Proposed talk title:
Topic:
Abstract:

Prof. Vladimir Petrov #97

Personal Data

Email Address: vladimir.petrov@cern.ch

Affiliation: Logunov Institute for High Energy Physics of NRC Kurchatov Institute (RU)

City: Protvino

Country: Russia

Talk/abstract submission

Proposed talk title: Strong Interactions at High Energy: 100 Years of Inquiery

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: I'll give a cursory scrutiny of the conceptual evolution and milestone results in studies of strong interactions at high energies from the 20s of the last century to the present day.

Prof. Christopher Plumberg

#130

Personal Data

Email Address: christopher.plumberg@pepperdine.edu

Affiliation: Pepperdine University

City:

Country: United States

Talk/abstract submission

Proposed talk title: BSQ Hydrodynamics and Challenges with a 4D Equation of State

Topic: Collectivity in high energy collisions: jets and flows

Abstract: It is well known that nuclear collisions at the LHC exhibit event-by-event fluctuations in the local energy density which can be modelled and propagated hydrodynamically. However, it is also possible to generate fluctuations in the local densities of conserved charges such as baryon number (B), net strangeness (S), and electric charge (Q). In this talk, I will present an upgraded version of the hydrodynamic model v-USPhydro, known as CCAKE, which models the out-of-equilibrium BSQ charge dynamics in nuclear collisions while respecting the associated charge conservation laws exactly. I will focus specifically on technical challenges which arise in the numerical treatment of the full 4-D equation of state {T,μB,μS,μQ} taken from Lattice Quantum ChromoDynamics (LQCD). The resulting simulations exhibit strong fluctuations in chemical potentials at freeze-out, even at LHC energies. I will conclude with some preliminary calculations of standard spectra and flow observables.

Andrei Poblaguev #36

Personal Data

Email Address: apoblaguev@gmail.com

Affiliation: Brookhaven National Laboratory

City:

Country: United States

Talk/abstract submission

Proposed talk title: The $p^\uparrow$ and ^{3}He$^\uparrow$ beam polarization measurements at the RHIC and future EIC using the Polarized Hydrogen Gas Jet Target.

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: At the Relativistic Heavy-Ion Collider (RHIC), the Polarized Hydrogen Gas Jet Target Polarimeter (HJET) is used to measure absolute transverse (vertical) polarization of the proton beams with low systematic uncertainties of approximately $\sigma^\text{syst}_P/P\le0.5\%$. To do this, the beam and jet spin assymtries a for low energy ($|t|<0.02$ GeV^2) recoil protons are experimentally determined and the beam polarization is calculated as $P_\text{beam}=P_\text{jet}a_\text{beam}/a_\text{jet}$, with the well known jet polarization, $P_\text{jet}\approx0.96\pm0.001$. At RHIC, the single $A_\text{N}(t)$ and double $A_\text{NN}(t)$ spin analyzing powers were measured for both 100 and 255 GeV proton beams. A carried out Regge fit suggested a non-zero Pomeron spin-flip contribution. Preliminary results for inelastic $p^{\uparrow}p$ and elastic $p^{\uparrow}A$ (for d, O, Al, Ru, Zr, and Au nuclei) analyzing powers were also obtained. The successful performance of HJET at RHIC has suggested its use for proton beam polarimetry with a required accuracy of 1\% at the upcoming Electron-Ion Collider (EIC). Additionally, the idea of using the target for the ^{3}He (h) beam polarization measurements at EIC has been suggested, with the understanding that $a_\text{beam}/a_\text{jet}$ used to calculate the beam polarization must be adjusted by the ratio of the $p^{\uparrow}h$ and $h^{\uparrow}p$ analyzing powers, which in the leading order approximation (-1.283) is defined by the magnetic moments of proton and helion alone. However, it was also noted that hadronic spin-flip amplitudes and possible breakup of the ^{3}He in the scattering may need to be taken into account. Based on the principles of the Glauber approach, it was shown that the $p^{\uparrow}h$ and $h^{\uparrow}p$ hadronic spin-flip amplitudes can be related, with a sufficient accuracy, to the $p^{\uparrow}p$ one (measured at HJET). Analysis of the breakup effect demonstrated that while it can cause corrections to the spin-flip interference terms of up to 4\%, the effect cancels out to a negligible value in the analyzing power ratio. Detailed explanations of the estimates done will be provided.

Prof. Mauro Raggi

#100

Personal Data

Email Address: mauro.raggi@cern.ch

Affiliation: Roma La Sapienza

City: Roma

Country: Italy

Talk/abstract submission

Proposed talk title: Search for the resonant X17 boson production in PADME Run III

Topic: Physics of X17 and other beyond standard model states

Abstract: We discuss the potential experimental reach of the Frascati PADME experiment in searching for the X17 bosons via their resonant production in positron annihilation on fixed target. A scan in the mass range in the range 16.4 17.4 MeV has been performed by PADME during Run III in autumn of 2022. We will provide insights into the data quality and sensitivity of PADME.

Dr Jesus Rendon #71

Personal Data

Email Address: jesus.rendon@correo.nucleares.unam.mx
Affiliation: Instituto de ciencias nucleares UNAM
City: Mexico city
Country: Mexico

Talk/abstract submission

Proposed talk title: Pion screening mass in a magnetized medium

Topic: Collectivity in high energy collisions: jets and flows

Abstract: In this work we investigate the screening mass of neutral pions immersed in a magnetized medium using the linear sigma model with quarks (LSMq). We compute the magnetic field induced modifications to the screening mass at one-loop. We show preliminary results and compare our findings with other effective models such as the Nambu–Jona-Lasinio model and also with non perturbative approaches such as LQCD.

Mr Vítor Hugo Ribeiro #62

Personal Data

Email Address: vitorhibeiro@gmail.com

Affiliation: IFGW - UNICAMP

City: Campinas

Country: Brazil

Talk/abstract submission

Proposed talk title: Jet-medium interactions through vortex ring formation inside the QGP

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Relativistic hydrodynamic theory has proved to be effective in describing the strongly interacting matter created in heavy ion collisions. A general feature of fluids is the formation of vortex rings. In the context of the QGP medium, one of the situations that can give rise to such a toroidal structure is the medium response to jet thermalization~[1]. In this scenario, a quenched jet contributes to the flow gradients of the fluid medium and leads to the formation and evolution of a vortex ring inside the QGP. As a result, the vorticity generated by the ring formation induces the polarization of the Lambda particles emitted from the event. Based on this picture, in this talk, we will present a systemic study performed on Lambda's polarization using a new experimental observable that we called as ``ring observable''~[2]. We conduct simulations with a state-of-the-art (3+1)D theoretical framework and we show that the ring observable is highly sensitive for probing the thermalizing energy-momentum currents deposited from the quenched jet into the medium. Our results indicates that the magnitude of the signal measured from the jet-medium interaction is of the order of the polarization induced by the global angular momentum. An experimental indication of such ``smoke rings'' inside the QGP would represent a significant advancement in studying emergent phenomena in QCD and the jet energy loss phenomenon, as it would confirm that deposited jet energy locally thermalizes and flows like a fluid. [1] W. M. Serenone, D. D. Chinellato, M. A. Lisa, C. Shen, J. Takahashi and G. Torrieri - ``Lambda polarization from thermalized jet energy,'' Phys. Let. B ,820, 126500 (2021) [2]V. H. Ribeiro, W. M. Serenone, D. D. Chinellato, M. A. Lisa, C. Shen, J. Takahashi and G. Torrieri - ``Lambda polarization from vortex ring as medium response for jet thermalization,'' arXiv:2305.02428 [hep-ph]

Prof. Christophe Royon #22

Personal Data

Email Address: christophe.royon@cern.ch

Affiliation: The University of Kansas (US)

City:

Country: United States

Talk/abstract submission

Proposed talk title: (a) Mueller Navelet and Mueller Tang processes at the LHC (b) Recent results from PPS (c) The Large Hadron Collider and the structure of the protons

Topic: Proton structure, small-x and large-x physics

Abstract: (a) We will discuss the BFKL NLO description of Mueller Tang processes and compare with recent measurements at the LHC. We will also describe possible new measurements for Mueller Navelet processes at the LHC. (b) Recent results from PPS" and the abstract: "We will describe the most recent results from PPS concerning exclusive production, the search for axion-like particles as well as future prospectsWe will describe the most recent results from PPS concerning exclusive production, the search for axion-like particles as well as future prospects. (c) Invited talk in the science outreach section.

Prof. Mariusz Sadzikowski

#125

Personal Data

Email Address: mariusz.sadzikowski@uj.edu.pl

Affiliation: Jagiellonian University

City: Krakow

Country: Poland

Talk/abstract submission

Proposed talk title: Twist decomposition of non-linear effects in Balitsky-Kovchegov evolution of proton structure functions

Topic: Proton structure, small-x and large-x physics

Abstract: Effects of non-linear small-x evolution of the gluon distribution given by the Balitsky-Kovchegov equation are analyzed within the collinear approximation framework. We perform a twist decomposition of the proton structure functions F2 and FL obtained from the Balitsky-Kovchegov equation using the Mellin representation of the scattering cross-sections at high energies. In both the structure functions we find strong corrections coming from the non-linear effects in the gluon evolution at twist 2, and strongly suppressed higher twist effects. This implies that unitarization effects of high energy scattering amplitudes are mostly the leading twist effect.

Dr NIHAR RANJAN Sahoo

#135

Personal Data

Email Address: nihar@rcf.rhic.bnl.gov
Affiliation: Texas A&M; University
City:
Country: United States

Talk/abstract submission

Proposed talk title: Recent results on Jet-medium interaction at RHIC
Topic: Collectivity in high energy collisions: jets and flows
Abstract:

Prof. Raghunath Sahoo #55

Personal Data

Email Address: raghunath.sahoo@cern.ch
Affiliation: Indian Institute of Technology Indore (IN)
City: Indore
Country: India

Talk/abstract submission

Proposed talk title: Small system QGP: Observations and Challenges

Topic: Other important new results in HEP

Abstract: With the advent of unprecedented collision energy at the Large Hadron Collider, CERN, Geneva, a new domain of particle production and possible formation of Quark-Gluon Plasma (QGP) in high-multiplicity proton-proton collisions and the collisions of light nuclei has been a much-discussed topic recently. In this overview, I shall discuss some of the recent observations leading to such a possibility, associated challenges, and some predictions for the upcoming light-nuclei collisions at the LHC.

Dr Debojit Sarkar #69

Personal Data

Email Address: debojit.sarkar@cern.ch

Affiliation: Niels Bohr Institute, University of Copenhagen, Denmark

City: Copenhagen

Country: Denmark

Talk/abstract submission

Proposed talk title: Collectivity in small collisions systems (soft probes) - Experimental overview

Topic: Collectivity in high energy collisions: jets and flows

Abstract: This talk would be an updated version of my invited plenary talk at Initial Stages 2023 conference. I wonder if the talk would fit "outstanding new results category (invitations closing...)". Please let me know.

Prof. Edward Sarkisyan-Grinbaum

#121

Personal Data

Email Address: edward.sarkisyan-grinbaum@cern.ch
Affiliation: UTA (US) / CERN (CH)
City: Geneva
Country: Switzerland

Talk/abstract submission

Proposed talk title: Search for New Physics with Multiparticle Correlations and Cosmological Analogies

Topic:

Abstract:

Rainer Schicker

#109

Personal Data

Email Address: schicker@physi.uni-heidelberg.de
Affiliation: Heidelberg University (DE)
City: Heidelberg
Country: Germany

Talk/abstract submission

Proposed talk title: Strangeness production in double gap events in ALICE

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: The ALICE detector at the LHC has undergone a major upgrade in the long shutdown 2019-2022 for being able to take data at higher rates in Run 3 and beyond. I will present the various challenges of this upgrade, and will show first results of strangeness production in double gap events taken in 2022 by presenting distributions of kaon pairs.

Dr Daiki Sekihata

#113

Personal Data

Email Address: daiki.sekihata@cern.ch
Affiliation: University of Tokyo (JP)
City: Tokyo
Country: Japan

Talk/abstract submission

Proposed talk title: Electromagnetic radiation in ALICE at the LHC

Topic: Other important new results in HEP

Abstract: Electromagnetic probes such as photons and dielectrons (e^{+}e^{-} pairs) are a unique tool to study the space-time evolution of the hot and dense matter created in ultra-relativistic heavy-ion collisions. They are produced at all stages of the collision with negligible final-state interactions.\par Real photons can be reconstructed via external photon conversions using the excellent tracking capabilities, and via direct measurements in the two different types of calorimeters. Combining these different methods, we can measure the direct-photon production from low transverse momentum ($p_{\rm T,\gamma}$) of 0.4 GeV/c, where thermal direct photons are expected to be dominant, to high $p_{\rm T,\gamma}$, where prompt direct photons dominate. \par With dielectrons ($\rm \gamma^{*} \to e^{+}e^{-}$), thermal radiation from the quark-gluon plasma carries information about the early temperature of the medium at intermediate dielectron invariant mass ($m_{\rm ee} > 1$ GeV/c^{2}). However, it is dominated by a large background from correlated heavy-flavour hadron decays at LHC energies. At smaller $m_{\rm ee}$, thermal radiation from the hot hadronic phase contributes to the dielectron spectrum via decays of ρ mesons, whose spectral function is sensitive to chiral-symmetry restoration. Finally, at vanishing $m_{\rm ee}$, the real direct photon fraction can be extracted from the dielectron data. In pp collisions, such measurement in minimum bias events serves as a baseline and a fundamental test for perturbative QCD calculations, while studies in high charged-particle multiplicity events allow us to search for thermal radiation in small colliding systems. The latter shows similar phenomena to those observed in heavy-ion collisions. \par In this talk, latest ALICE results, measurements of the dielectron and direct-photon production in central Pb--Pb at the centre-of-mass energy per nucleon pairs $\sqrt{s_{\rm NN}}$ = 2.76 and 5.02 TeV, as well as direct photons in minimum bias and high-multiplicity pp collisions at $\sqrt{s} = 13$ TeV, will be discussed. Finally, first results in pp collisions at $\sqrt{s} = 13.6$ TeV with the upgraded ALICE detector in Run 3 will be reported.

Mr Sharang Rav Sharma #34

Personal Data

Email Address: sharang.rav@students.iisertirupati.ac.in

Affiliation: IISER Tirupati

City:

Country: India

Talk/abstract submission

Proposed talk title: First-order event plane correlated directed and triangular flow from fixed-target energies at RHIC-STAR

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Relativistic heavy-ion collisions produce a deconfined state of quarks and gluons known as the Quark Gluon Plasma (QGP). Lattice QCD calculations have demonstrated that the transition between the QGP and the hadronic matter is a smooth crossover at vanishing baryon chemical potential (μB) and high temperature (T). However, various QCD effective models have suggested that the transition between the QGP and the hadronic matter is a first-order phase transition at large μB and low T. Anisotropic flow parameters (vn) are important observables as they provide insight into the collective hydrodynamic expansion and transport properties of the medium produced in relativistic heavy-ion collisions. Among these parameters, directed flow (v1) describes the collective sideward motion of produced particles in heavy-ion collisions. It is an important probe to study the in-medium dynamics as it is sensitive to the equation of state (EoS) of the produced medium. Minimum in the slope of directed flow (dv1/dy) as a function of collision energy has been proposed as a signature of the first-order phase transition between hadronic matter and QGP. Triangular flow (v3) typically arises from the initial state fluctuations and is expected to be uncorrelated to the reaction plane. However recent measurements at lower collision energies show a correlation between v3 and the first-order event plane angle (Ψ1). In this presentation, we will report the first measurements of v1 and v3 for π, K, p, d, and t in Au+Au collisions at √ sNN = 3.2, 3.5, 3.9, and 4.5 GeV in fixed-target mode from the second phase of the beam energy scan (BES-II) program at RHIC-STAR. The rapidity, centrality, and collision energy dependence of v1 and v3 will be presented, and their physics implications will be discussed.

Dr Zhaozhong Shi #73

Personal Data

Email Address: zhaozhongshi@lanl.gov
Affiliation: Los Alamos National Laboratory
City: Los Alamos
Country: United States

Talk/abstract submission

Proposed talk title: Heavy flavor physics at the sPHENIX experiment

Topic: Hadronic final states in high pT interactions

Abstract: The sPHENIX experiment is a state-of-the-art jet and heavy flavor physics detector currently taking its first Au + Au collision data at 200 GeV at RHIC. sPHENIX will provide heavy flavor physics measurements covering an unexplored kinematic region and unprecedented precision at RHIC to explore the parton energy loss mechanism, parton transport coefficients in quark-gluon plasma, and the hadronization process under various medium conditions. At the center of sPHENIX, the Monolithic-Active-Pixel-Sensor (MAPS) based VerTeX detector (MVTX) is a high-precision silicon pixel detector. The MVTX provides excellent position resolution and the capability of operating in continuous streaming readout mode, allowing precise vertex determination, and recording a large data sample, both of which are particularly crucial for heavy flavor physics measurements. In this talk, we will show the general performance of heavy-flavor hadron reconstruction. In addition, we will discuss the commissioning experience with sPHENIX. Finally, we will provide the projection of b-hadron and jet observables and discuss the estimated constraints on theoretical models.

Dr Maya Shimomura #74

Personal Data

Email Address: maya.shimomura@cern.ch

Affiliation: Nara Women's University (JP)

City: Nara

Country: Japan

Talk/abstract submission

Proposed talk title: Measurement of azimuthal anisotropy using new event categorization with multiplicity at PHENIX

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Previous study indicates that the strongly interacted QGP are produced in high-energy heavy-ion collisions, and various attempts have been made to understand this hot matter. In these studies, centrality is estimated by the multiplicity, which indirectly represents the impact parameter, and from there, the number of particles participating in the collision (Npart), the geometrical initial shape (eccentricity), and other quantities that characterize the collision have been calculated. However, even taking into account the MPI effect reported in recent QGP studies of small collision systems, a closer look at each event shows some range in the number of particles generated for the same Npart. In this study, using the AuAu 200 GeV data at PHENIX experiment, we introduced the spectator (Nspec) axis measured by ZDC as a new axis in addition to the previous multiplicity measurement of centrality and used this 2-D centrality to measure v2 in detail. As a result, we observed that even when the number of generated particles is the same, which is the same centrality by the conventional definition, the v2 results are different for different ZDC bins. In this talk, I will report the results of measuring v 2 using this 2-dimensional centrality, separating the effects of Npart and multiplicity, and discuss the possible interpretation.

Mayank Singh #49

Personal Data

Email Address: singhmayank23@hotmail.com
Affiliation: University of Minnesota
City: Minneapolis
Country: United States

Talk/abstract submission

Proposed talk title: Simulating heavy-ion collisions at BES energies

Topic: Collectivity in high energy collisions: jets and flows

Abstract: The beam energy scan program at RHIC has made non-zero baryon density regions of the QCD phase diagram accessible to experiments. This needs to go in tandem with the development of theoretical and phenomenological tools to extract the relevant physics from these experiments. Towards this effort, we present the results of our hydrodynamic modeling of Au-Au collisions at BES energies. Our model has three novel components. Firstly, we use a new LEXUS model inspired 3D Monte Carlo initial state. Secondly, we use a crossover equation of state at non-zero baryon chemical potential where the pQCD equation of state at high temperatures is matched to the hadron resonance gas equation of state using a smooth switching function. This is matched to the equation of state from lattice QCD at zero baryon densities. Finally, we present new departure functions which were used to match the non-equilibrium contributions to the energy-momentum tensor in the hydrodynamic phase to the particle distribution function in the hadronic transport phase. These departure functions were derived from the quasiparticle theory of transport coefficients and account for particle energy dependent relaxation times. We find that the departure functions give significant correction to proton multiplicities for low energy collisions.

Dr Iwona Anna Sputowska #98

Personal Data

Email Address: iwona.sputowska@cern.ch

Affiliation: Polish Academy of Sciences (PL)

City: Krakow

Country: Poland

Talk/abstract submission

Proposed talk title: Forward-backward correlations with the Σ quantity in the wounded-constituent framework at energies available at the CERN Large Hadron Collider

Topic: Multiparticle correlations and fluctuations

Abstract: Σ is a new correlation measure, quite recently introduced to heavy-ion physics. This measure, defined in the independent source model as a strongly intensive quantity, is expected to be free of the effects of system volume and volume fluctuations. In this talk, the forward-backward (FB) correlation quantified with the Σ observable calculated in the framework of the wounded nucleon model (WNM) and wounded quark model (WQM) will be discussed. Findings show that the wounded-constituent approach outperforms the commonly used heavy-ion Monte Carlo generators, such as HIJING , AMPT , or EPOS , by accurately describing the experimental data on FB correlations with Σ measured by the ALICE Collaboration in Xe-Xe reactions at √sNN = 5.44 TeV and in Pb-Pb collisions at √sNN = 2.76 and 5.02 TeV. This talk demonstrates that Σ can be a unique tool for determining the fragmentation function of a wounded constituent in a symmetric nucleus-nucleus collision. However, in the wounded-constituent framework, it is no longer a strongly intensive quantity.

Rafał Staszewski

#11
1

Personal Data

Email Address: rafal.staszewski@ifj.edu.pl

Affiliation: IFJ PAN Cracow (PL)

City: Cracow

Country: Poland

Talk/abstract submission

Proposed talk title: Forward proton tagging in ATLAS – status of detectors and new physics results

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: Forward proton tagging is an experimental technique of selecting diffractive and photon-induced events in proton interactions. It uses dedicated detectors capable of measuring protons scattered at very low angles and propagating through the accelerator pipe close to the beam. The ATLAS experiment consists of two systems of such detectors, both using the Roman-pot technique. The ALFA detectors allow registering protons scattered elastically and can operate during LHC runs with a special optics of the accelerator. The AFP detectors can take data during standard LHC operations and can detect protons that lost few percent of their momentum in the interaction. During the talk, the ALFA and AFP systems as well as some aspects of their operations and performance will be discussed. The recent physics results will be presented: the measurement of elastic pp scattering in the CNI region at 13 TeV and search for axion-like particles in two-photon processes.

András Ster #17

Personal Data

Email Address: ster.andras@wigner.mta.hu
Affiliation: Wigner Research Center for Physics
City: Budapest
Country: Hungary

Talk/abstract submission

Proposed talk title: Levy generalization of the Phillips-Barger model for high energy elasctic pp and ppbar scattering

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: We have extended the primal Phillips-Barger model to successfully describe pp and ppbar collision data at LHC energies in the whole available -t kinematic regions with the help of the Levy orthonormal expansion series in a model independent way. The functional form of the differential cross sections were extrected from fits to high energy elastic data. The results were combined with those of lower ISR energy ones. This allawed us to inter- and extarpolate to energies not measured so far and perform detailed studies from which we could draw reasonable physical conclusions. The Levy expansion method already worked well in our earlier project, as well, that led to the discovery Odderon. This time we combine the method with the analytic ingredients of a phenomenological model to perform data description in a model independent way. The first preliminary results confirm the existence of the Odderon and give deeper details about the spectecular growth of the total interaction cross sections at increasing energies. We have found indications that these kind of proton-proton (anti-pronton) phenomena can entirely be attributed to the growths of the individual quark-quark cross sections.

Mr Stefan Stojku #38

Personal Data

Email Address: stefan.stojku@yahoo.com

Affiliation: Institute of Physics Belgrade, University of Belgrade

City:

Country: Serbia

Talk/abstract submission

Proposed talk title: Initial stages and QGP anisotropy constrained through high-pt data

Topic: Collectivity in high energy collisions: jets and flows

Abstract: We will discuss how tau0 (the onset time of energy loss and QGP fluid-dynamical evolution) can be constrained by using high-pt data, and propose a novel method to determine this important parameter of our description the evolution of QGP created in relativistic heavy-ion collisions. We first consider a scenario without pre-equilibrium evolution, and demonstrate that high-pt data clearly prefers later tau0. After that, we consider several more sophisticated scenarios with pre-equilibrium evolution and show that high-pt RAA and v2 are sensitive to different initializations and early expansion dynamics and that they prefer later onset of energy loss and transverse expansion. Moreover, we consider the spatial anisotropy of the QGP, as it is one of the main properties of this system. We propose a novel method to extract the spatial anisotropy from high pt data. Based on numerical calculations and comparisons with experimental data, we show that a modified ratio of v2 and RAA observables reaches a well-defined saturation value, which is directly proportional to the time-averaged anisotropy of the evolving QGP. We relate this ratio to a new observable, which we call jet-perceived anisotropy, and we argue that it can provide constraints on bulk-medium simulations.

Dr Michal Sumbera

#108

Personal Data

Email Address: sumbera@ujf.cas.cz
Affiliation: Nuclear Physics Institute, Acad. of Sciences of the Czech Rep. (CZ)
City: Prague
Country: Czechia

Talk/abstract submission

Proposed talk title: Cosmology from strong interactions

Topic: Cosmic ray and astroparticle physics

Abstract: The wealth of theoretical and phenomenological information about Quantum Chromodynamics (QCD) at short and long distances collected so far in major collider measurements has profound implications in cosmology. We provide a brief discussion on the significant implications of the strongly coupled dynamics of quarks and gluons and the effects due to their collective motion on the physics of the early universe and in astrophysics. In particular, we speculate on the existence of quasi-classical saturated QCD matter in the early universe and on the non-vanishing leading order contribution to the QCD ground state energy compatible with the observed cosmological constant value.

Zhandong Sun #75

Personal Data

Email Address: sunzd@rcf.rhic.bnl.gov

Affiliation: Institute for Nuclear Research(Atomki)

City: Debrecen

Country: Hungary

Talk/abstract submission

Proposed talk title: Centrality dependence of direct photon and π^0 production in d+Au collisions

Topic: Hadronic final states in high pT interactions

Abstract: Collision centrality is usually characterized by the event activity in heavy-ion collisions, based on the fact that the bulk productions are always soft even in the presence of a hard collision, assuring the proportionality between centrality (impact parameter) and soft particle production. In large-on-large ion collisions, studying the nuclear modification factor, it is observed that jets and final state hadrons show energy loss and the energy loss goes higher as the events go central explained by that in central collisions the bigger-sized media would absorb more energy. High p_T direct photons produced in initial hard scattering, due to the property of colorlessness, are immune to "colorful" media. Using centrality based on the Glauber model, in small systems, e.g. p+Au or d+Au collisions, where only small QGP droplets are expected, surprisingly, high-transverse-momentum neutral hadrons are seen to be suppressed in central events , while enhanced in peripheral events. In this talk, we will present that studying on high p_T direct photons γ^{dir} and π^0 in d+Au collisions proves that biases in centrality determination inherent in using standard Glauber model could be found and corrected by defining binary collisions based on color-free photon production $N_{coll}^{exp}= \frac{\gamma_{xAu}^{dir}}{\gamma_{pp}^{dir}}$. Meanwhile, the status of the parallel analysis for p+Au and He+Au collisions will also be reported.

Mr Istvan Szanyi #11

Personal Data

Email Address: istvan.szanyi@cern.ch

Affiliation: Eötvös University, Wigner RCP, MATE KRC

City:

Country: Hungary

Talk/abstract submission

Proposed talk title: Lévy alpha-stable model for the non-exponential low-|t| proton-proton differential cross section

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: It is known that the Real Extended Bialas-Bzdak (ReBB) model describes the proton-proton (pp) and proton-antiproton ($p\bar p$) differential cross section data in a statistically not excludible way in the center of mass energy range 546~GeV $\leq\sqrt{s}\leq 8$ TeV and in the squared four-momentum transfer range 0.37 GeV^2 $\leq -t\leq1.2$ GeV^2. Considering, instead of Gaussian, a more general L\'evy α-stable shape for the parton distributions of the constituent quarks and diquarks inside the proton and for the relative separation between them, a generalized description of data is obtained, where the ReBB model corresponds to the $\alpha = 2$ special case. Extending the model to $\alpha < 2$, we conjecture that the validity of the model can be extended to a wider kinematic range, in particular to lower values of the four-momentum transfer $-t$. We present the formal L\'evy α-stable generalization of the Bialas-Bzdak model and show that a simplified version of this model can be successfully fitted, indeed with $\alpha<2$, to the non-exponential, low $-t$ differential cross-section data of elastic proton-proton scattering at $\sqrt{s} = 8$ TeV.

Prof. Tomasz Szumlak #39

Personal Data

Email Address: szumlak@agh.edu.pl
Affiliation: AGH University of Krakow (PL)
City:
Country: Poland

Talk/abstract submission

Proposed talk title: Central Exclusive Production at LHCb

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: In this talk, results regarding the CEP processes observed in the LHCb detector will be presented.

Adam Takacs

#118

Personal Data

Email Address: adam.takacs@uib.no
Affiliation: Heidelberg University
City: Heidelberg
Country: Germany

Talk/abstract submission

Proposed talk title: Jets in hot nuclear matter
Topic: Hadronic final states in high pT interactions
Abstract:

Prof. Zebo Tang

#126

Personal Data

Email Address: zebo.tang@cern.ch
Affiliation: University of Science and Technology of China (CN)
City:
Country: China

Talk/abstract submission

Proposed talk title: Track baryon number with heavy ion collisions
Topic: Other important new results in HEP
Abstract:

Yossathorn Tawabutr

#129

Personal Data

Email Address: yossathorn.j.tawabutr@jyu.fi
Affiliation: University of Jyväskylä
City: Jyväskylä
Country: Finland

Talk/abstract submission

Proposed talk title: Small-x Helicity Evolution and Recent Developments

Topic: Proton structure, small-x and large-x physics

Abstract: One of the long-standing problems in high-energy QCD is the proton spin puzzle, including the possible contribution from the region of small Bjorken x. To help understanding this problem, a small-x helicity evolution has been derived in 2016–2018 and received an important modification in 2022. Afterwards, several aspects of the evolution have been studied, including the resulting asymptotic behaviors of helicity PDFs and g_1 structure function and a fit to the small-x helicity-dependent DIS and SIDIS data. Furthermore, this result provides a necessary building block for the small-x evolution of orbital angular momentum. This presentation will discuss the most recent results of this research program, including the current standing of our small-x results relative to the BER evolution and other works on similar problems.

Charles Timmermans

#124

Personal Data

Email Address: c.timmermans@science.ru.nl

Affiliation: Radboud University/Nikhef

City: Nijmegen

Country: Netherlands

Talk/abstract submission

Proposed talk title: (1) The status of the GRAND experiment (2) Outreach with cosmic rays in the Netherlands

Topic: Cosmic ray and astroparticle physics

Abstract: The Giant Radio Array for Neutrino Detection (GRAND) is a future multi-messenger detector for ultra-high-energy particles. Several prototypes for GRAND are currently being installed. I will discuss the goals and status of this exciting new detector

Prof. Thomas Trainor #13

Personal Data

Email Address: ttrainor99@gmail.com
Affiliation: University of Washington
City:
Country: United States

Talk/abstract submission

Proposed talk title: Nuclear modification factors and the Cronin effect

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Nuclear modification factors (NMFs) applied to A-B collision systems consist of pt spectrum ratios rescaled by an estimated number of nucleon-nucleon binary collisions. Interest in NMFs is motivated by possible modification (suppression?) of jet production in more-central A-B collisions conjectured to arise from a deconfined quark-gluon plasma or QGP. Interpretation of NMFs is complicated by the so-called Cronin effect wherein similar ratios derived from fixed-target p-A data exhibited suppression at lower pt and enhancement at higher pt with increasing atomic weight A. This presentation describes precision analysis of identified-hadron spectra from 5 TeV p-Pb collisions that accurately isolates the entire jet contribution. Evolution of NMF spectrum ratios with p-Pb centrality is interpreted in terms of variation of corresponding jet contributions to spectra. The same method is then applied to Chicago-Princeton fixed-target spectrum data from the seventies wherein the Cronin effect was first observed. Soft and hard particle densities vary as fixed powers of A. Inferred jet contributions are quantitatively consistent with extrapolation from higher energies. The Cronin effect is a simple result of rescaling particle-density spectra by factor $1/A^{1/3}$.

Mr The Anh Tran #63

Personal Data

Email Address: ttanhhus@gmail.com
Affiliation: VNU University of Sciences.
City: Hanoi
Country: Vietnam

Talk/abstract submission

Proposed talk title: Confirmation the 8Be anomaly with a different spectrometer.

Topic: Physics of X17 and other beyond standard model states

Abstract: We have repeated the experiment performed recently by Krasznahorkay et al., (Phys. Rev. Lett. 116, 042501 (2016)), which may indicate a new particle called X17 in the literature. In order to get a reliable, and independent result, we used a different type of electron-positron pair spectrometer which have a more simple acceptance/efficiency as a function of the correlation angle, but the other conditions of the experiment were very similar to the published ones. We could confirm the presence of the anomaly measured at the Ex=18.15 MeV resonance, and also confirm their absence at the Ex=17.6 MeV resonance, and at Ep= 800 keV off resonance energies. A.J. Krasznahorkay (1), J. Molnar(1), T.T.Anh(2), T.D.Trong(3), N.T.Nghia(2), N.A.Viet(2), B.T.Hoa(2), D.T.K.Linh(4), L.X.Chung(4). (1)MTA-ATOMKI, Institute for Nuclear Research, Hungary; (2)VNU University of Science, Vietnam; (3)Institute of Physics, Vietnam Academy of Science and Technology; (4) Institute for Nuclear Science and Technology, VINATOM, Vietnam.

Ms Ana Uzelac

#134

Personal Data

Email Address: anauzelac@ymail.com
Affiliation: mag.educ.phys.
City: Zagreb
Country: Croatia

Talk/abstract submission

Proposed talk title: Proposals for two new games for which a deck of elementary particle cards can be used - "Interactions of elementary particles" and "The Eightfold Path
Topic:
Abstract:

Zoltan Varga #81

Personal Data

Email Address: zoltan.varga@cern.ch

Affiliation: Wigner Research Centre for Physics (Wigner RCP) (HU)

City:

Country: Hungary

Talk/abstract submission

Proposed talk title: New measurements of charged jet fragmentation properties in pp and p−Pb collisions with ALICE

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Jets are important tools to test pQCD calculations and to understand cold nuclear matter effects in small collision systems. Studying intra-jet properties, such as jet multiplicity and fragmentation functions, provides valuable insight into the perturbative partonic showering and non-perturbative hadronization processes. The KNO scaling, i.e. the collapse of the event multiplicity distributions onto a universal scaling curve was first proposed to be present in collision events, but was later found to be violated beyond a certain energy threshold. In this talk we present the first measurement of a KNO-like scaling for single jets in proton-proton collisions at $\sqrt{s} = 13$ TeV, which may help to differentiate between certain fragmentation models. We also present the mean jet multiplicities and fragmentation functions in previously unexplored kinematic ranges as a function of jet p_{T} in minimum bias pp collisions, as well as in minimum bias and high-multiplicity p--Pb collisions at $\sqrt{s} = 5.02$ TeV.

Prof. Sandor Varro

#132

Personal Data

Email Address: varro.sandor@wigner.hu
Affiliation: Wigner Research Centre for Physics
City: Budapest
Country: Hungary

Talk/abstract submission

Proposed talk title: (a) Proposal for an electromagnetic mass formula for the X17 particle (b) Correlations of wave intensities and particle numbers - before dinner talk

Topic: Physics of X17 and other beyond standard model states

Abstract:

Prof. Andre Veiga Giannini #60

Personal Data

Email Address: avgiannini@gmail.com

Affiliation: Grande Dourados Federal University

City:

Country: Brazil

Talk/abstract submission

Proposed talk title: Assessing the ultracentral flow puzzle in hydrodynamic modeling of heavy-ion collisions

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Over the past two decades, the modeling of ultra-relativistic heavy-ion collisions has been heavily influenced by data from RHIC and LHC. Such events are currently best understood in term of complex, multi-staged hybrid hydrodynamic simulations. A persistent problem in the field is the incapacity of such models to describe anisotropic flow data in extremely central (``ultracentral'') collisions. Given the recent advances in constraining the potentially large parameter space associated to those simulations via Bayesian inference techniques that only employed data in typical collision centralities, we reassess the status of this puzzle by computing the anisotropic flow in ultracentral collisions from several recent (Bayesian-constrained) state-of-the-art models [1-4]. Despite the fact that non-ultracentral data is now better described when compared to previous calculations, tension with experimental data is still present and intensifies as one goes to ultracentral collisions. We verify that a simple (re)tuning the model parameters cannot remove this tension without destroying the good overall agreement at other centralities. Therefore, it is probable that additional elements are required in the standard modeling of heavy-ion collisions. We will also discuss some ideas on possible strategies and ongoing studies like a improved modeling of the pre-equilibrium phase that could help solving this puzzle. Based on: A.V. Giannini, M.N. Ferreira, M. Hippert, D.D. Chinellato, G.S. Denicol, M. Luzum, J. Noronha, T. Nunes da Silva, and J. Takahashi [ExTrEMe Collaboration], Phys. Rev. C 107 (2023) 4, 044907 [1] D. Everett et al. [JETSCAPE], Phys. Rev. Lett. 126, no.24, 242301 (2021); Phys. Rev. C 103, no.5, 054904 (2021) [2] J. S. Moreland, J. E. Bernhard and S. A. Bass, Phys. Rev. C 101, no.2, 024911 (2020) [3] G. Nijs, W. van der Schee, U. Gürsoy and R. Snellings, Phys. Rev. C 103, no.5, 054909 (2021); Phys. Rev. Lett. 126, no.20, 202301 (2021) [4] G. Nijs and W. van der Schee, Phys. Rev. C 106, no.4, 044903 (2022)

Robert Vertesi #83

Personal Data

Email Address: vertesi.robert@wigner.hu

Affiliation: Wigner Research Centre for Physics (Wigner RCP) (HU)

City: Budapest

Country: Hungary

Talk/abstract submission

Proposed talk title: The role of the underlying event in the heavy-flavor baryon enhancement

Topic:

Abstract: Recent experimental results, coming from ALICE and CMS, show a low-pT enhancement of charm baryon production over model predictions, which are based on e+e- collisions. This new development challenges the assumption that the fragmentation function is universal, i.e. independent of the collision system. Several scenarios have been proposed to explain the discrepancy between the predictions and the experimental data, including the enhanced color re-connection model, which is capable of describing the charm enhancement in pp collisions. We studied the charm-baryon enhancement in collision events generated by PYTHIA 8 and applied the enhanced color-reconnection model. We proposed a measurement method based on several event-activity classifiers, to identify the origin of the charm-baryon enhancement. Our conclusion is, that within the scenario under investigation, the excess charm production is connected to the underlying event and is independent of the jet production [1]. Our studies have been extended to higher mass baryons, and also explored the role of the isospin [2,3]. These new observables we explored, provide a unique opportunity in the upcoming measurements from the high-luminosity LHC Run 3 period to better understand heavy-flavor fragmentation mechanisms, and will help the further development of models. [1] J.Phys.G 49 (2022) 7, 075005 [arXiv:2111.00060] [2] arXiv:2210.01593 [3] J.Phys.G 50 (2023) 7, 075002 [arXiv:2302.09740]

Mr Oleksandr Vitiuk #89

Personal Data

Email Address: oleksandr.vitiuk@cern.ch

Affiliation: University of Wroclaw

City: Wroclaw

Country: Poland

Talk/abstract submission

Proposed talk title: Phenomenological Equation of State of Strongly Interacting Matter with Modified Excluded-Volume Mechanism

Topic: Other important new results in HEP

Abstract: In this talk, we present a phenomenological equation of state of strongly interacting matter based on the recently developed modified excluded-volume mechanism [1,2]. The conventional excluded-volume approach is extended by incorporating a functional dependence of available volume fraction on particle scalar densities through effective degeneracy factors. This modification governs the appearance of rearrangement contributions on thermodynamic quantities and particle potentials, ensuring thermodynamic consistency. The degeneracy factors are parameterized to facilitate the transformation of nucleons to quarks, pions to gluons, and the suppression of other hadronic states at high temperatures and densities. The resulting equation of state can be used for hydrodynamical simulation of heavy-ion collisions. [1] Typel, S.; Blaschke, D., Universe (2018), 4, 32 [2] Typel, S., Eur. Phys. J. A (2016), 52, 16

Prof. Serguei Vorobiov #86

Personal Data

Email Address: sergey.vorobyev@ung.si
Affiliation: University of Nova Gorica, Slovenia
City: Nova Gorica
Country: Slovenia

Talk/abstract submission

Proposed talk title: Highlights from the Pierre Auger Observatory

Topic: Cosmic ray and astroparticle physics

Abstract: Ultra-high-energy cosmic rays (UHECRs) are mostly protons and heavier nuclei arriving on Earth from space and producing particle cascades in the atmosphere, called extensive air showers. As of today, the most precise and high-statistics data set of the rare (≤ 1 particle per sq. km per year above 10 EeV) UHECR events is obtained by the Pierre Auger Observatory, a large area (~3000 sq.km) hybrid detector in Argentina. The Pierre Auger Observatory determines the arrival directions and energies of the primary UHECR particles and provides constraints for their masses. In this talk, I will present and discuss the recent results, including the detailed measurements of the cosmic-ray energy spectrum features, the study of the anisotropies in the UHECR arrival directions at large and intermediate angular scales, the multi-messenger searches, and the inferred cosmic-ray mass composition. Finally, the progress of the current upgrade of the Observatory, "AugerPrime" which is aimed at improving the sensitivity to the mass composition of ultra-high-energy cosmic rays, will be presented.

Prof. Shu-yi Wei #53

Personal Data

Email Address: shuyi@sdu.edu.cn
Affiliation: Shandong University
City:
Country: China

Talk/abstract submission

Proposed talk title: Elliptic flow in small collisional systems

Topic: Collectivity in high energy collisions: jets and flows

Abstract: Based on rare fluctuations in strong interactions, we argue that there is a strong physical resemblance between the high multiplicity events in photo-nuclear collisions and those in pA collisions, in which interesting long range collective phenomena are discovered. This indicates that the collectivity can also be studied in certain kinematic region of the upcoming Electron-Ion Collider (EIC) where the incoming virtual photon has a sufficiently long lifetime. Using a model in the Color Glass Condensate formalism, we first show that the initial state interactions can explain the recent ATLAS azimuthal correlation results measured in the photo-nuclear collisions, and then we provide quantitative predictions for the long range correlations in eA collisions in the EIC regime. With the unprecedented precision and the ability to change size of the collisional system, the high luminosity EIC will open a new window to explore the physical mechanism responsible for the collective phenomenon. References [1] Exploring collective phenomenon at the Electron-Ion Collider, Y. Shi, L. Wang, S.Y. Wei, B.W. Xiao, L. Zheng. Phys.Rev.D103, 054017. (2021) [2] Elliptic flow of heavy quarkonia in pA collisions, C. Zhang, C. Marquet, G.Y. Qin, S.Y. Wei, B.W. Xiao. Phys.Rev.Lett.122, 172302. (2019)

Dr György Wolf

#116

Personal Data

Email Address: wolf.gyorgy@wigner.mta.hu
Affiliation: Wigner RCP
City: Budapest
Country: Hungary

Talk/abstract submission

Proposed talk title: Heavy mesons in medium
Topic: Other important new results in HEP
Abstract:

Prof. Georg Wolschin #29

Personal Data

Email Address: wolschin@uni-hd.de
Affiliation: Heidelberg University
City:
Country: Germany

Talk/abstract submission

Proposed talk title: Heavy-ion stopping and limiting-fragmentation scaling

Topic: Forward physics: Diffraction, Odderon and Pomeron

Abstract: During the initial stages of relativistic heavy-ion collisions at energies reached at SPS, RHIC and LHC, the fast local thermalization of gluons in the fireball [1] occurs on the same time scale of □eq<0.1 fm/c as the stopping of the fragments [2]. Valence quarks thermalize on a slightly larger timescale due to Pauli's principle, and their smaller color factor [3]. In the present contribution [4], we investigate the stopping process in a nonequilibrium-statistical relativistic diffusion model [5] that accounts for the time-dependence of the stopping process, and is consistent with quantum chromodynamics (QCD). Within this approach, the net-proton rapidity distributions of the individual fragments exhibit a scaling behaviour similar to limiting fragmentation (LF) that is related to geometric scaling in the color-glass condensate (CGC) and depends upon the gluon saturation scale. We compare with forward-angle net-proton data from SPS and RHIC. New data at energies reached at the LHC are required to verify the prediction. [1] G. Wolschin, Physica A 597, 127299 (2022) [2] Y. Mehtar-Tani, G. Wolschin, Physical Review Letters 102, 182301 (2009) [3] T. Bartsch, G. Wolschin, Annals of Physics 400, 21 (2019) [4] J. Hoelck, E. Hiyama, G. Wolschin, Phys. Lett. B 840, 137866 (2023) [5] J. Hoelck, G. Wolschin, Phys. Rev. Res. 2, 033409 (2020)

Dr Cheuk-Yin Wong #30

Personal Data

Email Address: wongcyor@gmail.com

Affiliation: Oak Ridge National Laboratory

City:

Country: United States

Talk/abstract submission

Proposed talk title: QED meson description of the anomalous particles and the X17 particle

Topic: Physics of X17 and other beyond standard model states

Abstract: The anomalous soft photons, X17 particle, and the E38 particle are anomalous particles beyond the Standard Model as their masses in the region of many tens of MeV lie outside the families of the Standard Model. Applying the Schwinger confinement mechanism to quarks interacting in QED, we find that a quark and an antiquark are confined in the QED interaction in (1+1)D and the masses of QED-confined quark-antiquark states fall within the region of the anomalous particles, when we represent the open-string in (1+1)D as an idealized flux tube in (3+1)D. Accordingly, we propose the QED meson description of the anomalous particles as composite $q\bar q$ systems of a light quark and a light antiquark bound and confined by the QED interaction (PRC81(2010)064903, JHEP2020(8)165). The agreement of the predicted QED meson masses with the observed X17 and E38 masses lends support to the QED mesons as the description of the anomalous particles. Implications of possible quark confinement in the QED interaction on dark matter and on new physics are discussed.

Mr Dusan Zigic #51

Personal Data

Email Address: zigic@ipb.ac.rs
Affiliation: Institute of Physics Belgrade
City:
Country: Serbia

Talk/abstract submission

Proposed talk title: DREENA: A State-of-the-Art Tomography Framework for Unveiling the Properties of Quark-Gluon Plasma

Topic: Collectivity in high energy collisions: jets and flows

Abstract: We present a novel framework ebe-DREENA, based on a state-of-the-art dynamical energy loss model, which can include any temperature profile from bulk medium simulations. The framework is fully optimized to exploit different state-of-the-art medium evolutions - both event-by-event hydrodynamics and kinetic transport theory. It does not use fitting parameters within the energy loss model, allowing it to fully exploit differences in temperature profiles, as the only input in the framework. The framework applies to both light and heavy flavor observables, and both large (A+A) and small (e.g. p+A) systems. We calculate high-pt harmonics up to 6th order and exploit how the differences in the temperature profiles affect them, which will be especially useful with the upcoming high-luminosity measurements at RHIC and LHC. These comparisons of predictions and data are done within the same formalism and parameter set. We, therefore, propose ebe-DREENA as a unique tomography tool, which allows systematic and comprehensive mapping of QGP properties.

Mr Radek Zlebcik

#127

Personal Data

Email Address: zlebcik@ipnp.mff.cuni.cz

Affiliation: Charles University

City: Prague

Country: Czechia

Talk/abstract submission

Proposed talk title: "New measurements of event shape observables in DIS" AND "Deep learning assisted unbinned measurements of jet substructure observables with H1"

Topic: Hadronic final states in high pT interactions

Abstract: ========== New measurements of event shape observables in deep-inelastic electron-proton scattering ========== Event shapes provide incisive probes of QCD, both its perturbative and nonperturbative aspects. In this contribution, a first measurement of the 1-jettiness event shape observable in neutral-current deep-inelastic electron-proton scattering is presented, as well as a first measurement of groomed event shape observables. The data were taken in the years 2003 to 2007 with the H1 detector at the HERA ep collider at a center-of-mass energy of 319 GeV. The 1-jettiness observable is defined such that it is equivalent to the thrust observable defined in the Breit frame. The triple-differential cross sections are presented as a function of the 1-jettiness $\tau_1^b, the event virtuality Q² and the inelasticity in the kinematic region Q²>150 GeV², and the data are compared to various recent predictions. Grooming techniques have been developed to separate perturbative from non-perturbative components of jets in a theoretically well-controlled way, and have been applied extensively to jet measurements in hadronic collisions. Here, the first application of grooming techniques to event shape measurements at HERA is presented. The analysis is based on the novel Centauro jet clustering algorithm, which is designed specifically for the event topologies of ep DIS collisions. Cross-section measurements of groomed event 1-jettiness and groomed invariant jet mass are shown and compared to Monte Carlo models, fixed order pQCD predictions, as well as to calculation based on Soft Collinear Effective Theory. ========== ========== Deep learning assisted unbinned measurements of jet substructure observables and azimuthal angular asymmetry in deep-inelastic scattering with the H1 detector ========== The radiation pattern within quark- and gluon-initiated jets (jet substructure) is used extensively as a precision probe of the strong force and for optimizing event generators for particle physics. Jet substructure measurements in electron-proton collisions are of particular interest as many of the complications present at hadron colliders are absent. In this contribution, a detailed study of jet substructure observables, so-called jet angularities, are presented using data recorded by the H1 detector at HERA. The measurement is unbinned and multi-dimensional, using a novel machine learning technique to correct for detector effects. All of the available

reconstructed object information inside a jet is interpreted using a graph neural network and training of these networks was performed using the Perlmutter supercomputer at Berkeley Lab. Results are reported at high transverse momentum transfer $Q^2>150$ GeV^2, and the analysis is also performed in sub-regions of Q^2, thus probing scale dependencies of the substructure variables. At leading order in ep collisions, a lepton scatters off a quark through virtual photon exchange, producing a quark jet and scattered lepton in the final state and the total transverse momentum of the system is typically small. However, deviations from zero can be attributed to initial and final state emissions in the form of soft gluon radiation, and the transverse momentum difference, |P□ □|, can become much greater than the total transverse momentum of the system, |q□ □|, which should result in a measurable azimuthal asymmetry between P□ □ and q□ □. This measurement is performed using a new machine learning method to unfold eight observables simultaneously and unbinned. Then, the azimuthal angular asymmetry is then derived these unfolded and unbinned observables. Quantifying the contribution of soft gluon radiation to this asymmetry serves as a novel test of perturbative QCD, and results are compared with parton shower Monte Carlo predictions as well as soft gluon radiation calculations from a Transverse Momentum Dependent (TMD) factorization framework.
==========

Ms Georgina Anna Zsóri

#137

Personal Data

Email Address: georgina.zsori@gmail.com
Affiliation: Berze Secondary Grammar School, Gyöngyös, Hungary
City: Gyöngyös
Country: Hungary

Talk/abstract submission

Proposed talk title: Find your own Odderon!

Topic:

Abstract: A new particle physics outreach card game will be described and demonstrated within the BerzeTÖK Science Club in Berze Secondary School, Gyöngyös, Hungary,