XXXI Cracow Epiphany Conference on the recent LHC Results

Report of Contributions

https://indico.cern.ch/e/1459306

Contribution ID: **1** Type: **not specified**

Welcome

Monday 13 January 2025 09:15 (10 minutes)

Presenter: LESIAK, Tadeusz (Polish Academy of Sciences (PL))

Session Classification: LHC overview

Contribution ID: **2** Type: **not specified**

Overview of the LHC performance in Run 3

Monday 13 January 2025 09:55 (30 minutes)

Presenter: ALEMANY FERNANDEZ, Reyes (CERN)

Session Classification: LHC overview

Contribution ID: **3** Type: **not specified**

Particle Physics:Now and tomorrow

Monday 13 January 2025 09:25 (30 minutes)

Presenter: THOMSON, Mark

Session Classification: LHC overview

Contribution ID: **4** Type: **not specified**

Beyond eikonal: matrix elements of SM and New Physics in lepton pair production

Monday 13 January 2025 12:00 (30 minutes)

Presenter: WAS, Zbigniew Andrzej (Polish Academy of Sciences (PL))

Session Classification: EW

Contribution ID: **5** Type: **not specified**

EW measurements in ATLAS

Monday 13 January 2025 11:00 (30 minutes)

Presenter: VACHON, Brigitte (McGill University, (CA))

Session Classification: EW

Contribution ID: **6** Type: **not specified**

EW measurements in CMS

Monday 13 January 2025 11:30 (30 minutes)

Presenter: DELLA PENNA, Luca (Universita e INFN, Perugia (IT))

Session Classification: EW

Contribution ID: **7** Type: **not specified**

SM Higgs theory

Monday 13 January 2025 14:00 (30 minutes)

Presenter: SPIRA, Michael (Paul Scherrer Institute (CH))

Session Classification: SM Higgs

Contribution ID: **8** Type: **not specified**

SM Higgs properties and rare decays in ATLAS

Monday 13 January 2025 14:30 (30 minutes)

Presenter: ESCALIER, Marc (IJCLab-Orsay)

Session Classification: SM Higgs

Contribution ID: **9** Type: **not specified**

SM Higgs properties and rare decays in CMS

Monday 13 January 2025 15:00 (30 minutes)

Presenter: BLUJ, Michal (National Centre for Nuclear Research (PL))

Session Classification: SM Higgs

Contribution ID: **10** Type: **not specified**

BSM theory

Monday 13 January 2025 16:00 (30 minutes)

Presenter: SANTOS, Rui (University of Lisbon)

Session Classification: BSM

Contribution ID: **11** Type: **not specified**

ATLAS searches in the Higgs sector

Monday 13 January 2025 16:30 (30 minutes)

Presenter: TURRA, Ruggero (Università degli Studi e INFN Milano (IT))

Session Classification: BSM

Contribution ID: **12** Type: **not specified**

CMS searches in the Higgs sector

Monday 13 January 2025 17:00 (30 minutes)

Presenter: SZLEPER, Michal (National Centre for Nuclear Research (PL))

Session Classification: BSM

Contribution ID: **13** Type: **not specified**

Top theory

Tuesday 14 January 2025 09:00 (30 minutes)

Presenter: HAGIWARA, Kaoru (KEK)

Session Classification: Top

Contribution ID: **14** Type: **not specified**

Top-quark physics highlights from ATLAS

Tuesday 14 January 2025 09:30 (30 minutes)

Presenter: ERNANI MARTINS NETO, Daniel (Polish Academy of Sciences (PL))

Session Classification: Top

Contribution ID: **15** Type: **not specified**

Top-quark physics highlights from CMS

Tuesday 14 January 2025 10:00 (30 minutes)

Presenter: ZALEWSKI, Piotr (National Centre for Nuclear Research (PL))

Session Classification: Top

Contribution ID: **16** Type: **not specified**

Heavy flavour results from ATLAS

Tuesday 14 January 2025 11:00 (25 minutes)

Presenter: WARBURTON, Andreas (McGill University, (CA))

Session Classification: Heavy flavour

Contribution ID: **17** Type: **not specified**

Heavy flavour results from CMS

Tuesday 14 January 2025 11:25 (25 minutes)

Presenter: KONECKI, Marcin (University of Warsaw (PL))

Session Classification: Heavy flavour

Contribution ID: **18** Type: **not specified**

Recent results on CP violation and rare decays from LHCb

Tuesday 14 January 2025 11:50 (35 minutes)

Presenter: KAZANECKI, Michal Krzysztof (Polish Academy of Sciences (PL))

Session Classification: Heavy flavour

Contribution ID: **19** Type: **not specified**

HI at ALICE

Tuesday 14 January 2025 14:00 (30 minutes)

Presenter: SPUTOWSKA, Iwona Anna (Polish Academy of Sciences (PL))

Session Classification: Heavy ions

Contribution ID: **20** Type: **not specified**

HI at ATLAS

Tuesday 14 January 2025 14:30 (30 minutes)

Presenter: GRABOWSKA-BOLD, Iwona (AGH University of Krakow (PL))

Session Classification: Heavy ions

Contribution ID: **21** Type: **not specified**

Heavy-ion physics results from CMS

Tuesday 14 January 2025 15:00 (30 minutes)

Presenter: KALINOWSKI, Artur (University of Warsaw (PL))

Session Classification: Heavy ions

Contribution ID: **22** Type: **not specified**

QCD theory

Wednesday 15 January 2025 09:00 (30 minutes)

Presenter: FORTE, Stefano (Università degli Studi e INFN Milano (IT))

Session Classification: QCD

Contribution ID: **23** Type: **not specified**

QCD at ATLAS

Wednesday 15 January 2025 10:00 (30 minutes)

Presenter: COLANGELI, Luca Sesto (University of Toronto (CA))

Session Classification: QCD

Contribution ID: **24** Type: **not specified**

Production of open and hidden charm in fixed target experiments at the LHC

Thursday 16 January 2025 10:00 (30 minutes)

Presenter: SZCZUREK, Antoni

Session Classification: Forward

Contribution ID: **25** Type: **not specified**

Highlights on BSM searches at ATLAS

Wednesday 15 January 2025 11:00 (30 minutes)

Presenter: LUTZ, Margaret (CERN)

Session Classification: BSM

Contribution ID: **26** Type: **not specified**

Highlights on BSM searches at CMS

Wednesday 15 January 2025 11:30 (30 minutes)

Presenter: KAZANA, Malgorzata (NCBJ Warsaw (PL))

Session Classification: BSM

Contribution ID: **27** Type: **not specified**

Dark Matter Searches by ALICE

Wednesday 15 January 2025 12:00 (30 minutes)

Presenter: JACAZIO, Nicolò (Universita e INFN, Bologna (IT))

Session Classification: BSM

Contribution ID: **28** Type: **not specified**

Entropy production and fluctuation- dissipation theorem

Wednesday 15 January 2025 15:05 (30 minutes)

Presenter: NOWAK, Maciej (Jagiellonian University)

Session Classification: prof. Zalewski's session

Contribution ID: **29** Type: **not specified**

All non-local states of identical particles, or when indistinguishability is a resource

Wednesday 15 January 2025 15:35 (30 minutes)

Entanglement due to symmetrisation of the wave function in the second-quantised theory is ubiquitous, but at the same time it is severely constrained by the inability to address individual particles. So, can it actually be turned into a useful resource of non-local correlations observed in a laboratory? I will show that this is possible with very modest passive linear optical means for almost every state of identical particles.

Presenter: BŁASIAK, Paweł (IFJ PAN)

Session Classification: prof. Zalewski's session

Contribution ID: **30** Type: **not specified**

Quantum correlations in the hadronization process

Wednesday 15 January 2025 14:05 (30 minutes)

Presenter: KUCHARCZYK, Marcin (Polish Academy of Sciences (PL))

Session Classification: prof. Zalewski's session

Contribution ID: **31** Type: **not specified**

Statistical physics, entropy and quantum entanglement

Wednesday 15 January 2025 17:15 (30 minutes)

Invitation to a journey following paths of prof. Kacper Zalewski: From thermodynamics through statistical physics to quantum mechanics and the theory of multipartite entanglement. With some humble remarks on entanglement in the theory of elementary particles…

Presenter: ŻYCZKOWSKI, Karol (Jagiellonian University)

Session Classification: prof. Zalewski's session

Contribution ID: **32** Type: **not specified**

Lecturer, Teacher and Mentor: What I have learned from Professor Zalewski?

Wednesday 15 January 2025 16:45 (30 minutes)

Among Krakow physicists, Professor Zalewski is an iconic figure. Many of us attended his lectures, discussed solutions to problems assigned "for home" while standing at the blackboard, and trembled in front of the Professor's office door waiting to enter the exam. It was hard at times, but it was worth it. Not only for a better understanding of physics, not only for the ability to patiently convey it, but, perhaps above all, for the "life wisdom" that Professor Zalewski always emanated.

Presenter: HORZELA, Andrzej (IFJ PAN)

Session Classification: prof. Zalewski's session

Contribution ID: **33** Type: **not specified**

Discussion

Wednesday 15 January 2025 18:00 (30 minutes)

Session Classification: prof. Zalewski's session

Contribution ID: **34** Type: **not specified**

On prospects of CEP studies at the LHC

Thursday 16 January 2025 09:00 (30 minutes)

Presenter: KHOZE, Valery (University of Durham (GB))

Session Classification: Forward

Contribution ID: **35** Type: **not specified**

Forward Physics in ATLAS

Thursday 16 January 2025 09:30 (30 minutes)

Presenter: TRZEBINSKI, Maciej (Polish Academy of Sciences (PL))

Session Classification: Forward

Contribution ID: **36** Type: **not specified**

Forward Physics in CMS

Session Classification: Forward

Contribution ID: **37** Type: **not specified**

Neutrino trident production at the LHC, FASER

Friday 17 January 2025 09:00 (30 minutes)

Presenter: TROJANOWSKI, Sebastian

Session Classification: Future

Contribution ID: **38** Type: **not specified**

The electron-ion collider —A collider to unravel the mysteries of visible matter

Friday 17 January 2025 09:30 (30 minutes)

Presenter: ASCHENAUER, Elke-Caroline

Session Classification: Future

Contribution ID: **39** Type: **not specified**

FCC - The Future of Particle Physics

Friday 17 January 2025 10:00 (30 minutes)

Presenter: CHRZASZCZ, Marcin (Polish Academy of Sciences (PL))

Session Classification: Future

Contribution ID: **40** Type: **not specified**

The ATLAS HL-LHC, upgrade and physics prospects

Friday 17 January 2025 12:00 (30 minutes)

Presenter: SHAW, Savanna (University of Manchester)

Session Classification: Upgrades

Contribution ID: **41** Type: **not specified**

ALICE upgrades and physics prospects

Friday 17 January 2025 11:30 (30 minutes)

Presenter: DAINESE, Andrea (INFN - Padova (IT))

Session Classification: Upgrades

Contribution ID: **42** Type: **not specified**

The CMS HL-LHC, upgrade and physics prospects

Friday 17 January 2025 11:00 (30 minutes)

Presenter: BUNKOWSKI, Karol (University of Warsaw (PL))

Session Classification: Upgrades

Contribution ID: **43** Type: **not specified**

TBA

Presenter: JEZABEK, Marek (Institute of Nuclear Physics Polish Academy of Sciences (PL))

Session Classification: LHC overview

Contribution ID: **44** Type: **not specified**

Novel Neutrino Reconstruction via Acoustic Signals at KM3NeT

Tuesday 14 January 2025 16:00 (15 minutes)

Ultra-high-energy neutrinos are a gateway into new physics beyond the Standard Model, with potentials for unraveling some of the essential mysteries in cosmology and astrophysics. Given the nature of neutrinos, with electric charge neutrality and negligible mass, they go through cosmic distances without interacting and will be an excellent candidate for multi-messenger astronomy in studying celestial objects, especially black holes. It is actually these very attributes that constitute the difficulties in the attempts at the detection of neutrinos.
The KM3NeT experiment tackles this challenge by deploying one cubic kilometer of instrumented volume at the bottom of the Mediterranean Sea. This contribution describes an innovative study related to the detection of ultra-high-energy neutrinos by means of their acoustic signal; it not only gives additional information but is also cost-efficient to implement in the frame of the existing infrastructure called KM3NeT and opens up perspectives for an improvement of the detection accuracy.
We also recommend advanced computational techniques, namely deep learning algorithms, for neutrino event reconstruction. These state-of-the-art data analysis tools will serve to increase the accuracy and reduce the errors associated with traditional methods, thus helping to advance neutrino astronomy.

Presenter: MESKAR, Amine (National Centre for Nuclear Research, Warsaw, and experiment KM3NeT.)

Session Classification: Young

Contribution ID: **45** Type: **not specified**

Prospects for acoustic detection of high-energy astrophysical neutrinos

Tuesday 14 January 2025 16:15 (15 minutes)

The KM3NeT (Cubic Kilometer Neutrino Telescope) located in the Mediterranean Sea is the next-generation neutrino Cherenkov observatory. This experiment addresses a few fundamental questions of physics, like neutrino mass hierarchy and the origins of high-energy cosmic rays. KM3NeT consists of two telescopes: ORCA (Oscillation Research with Cosmics in the Abyss) and ARCA (Astroparticle Research with Cosmics in the Abyss). KM3NeT has a state-of-the-art optical module with many sensors including LED beacon, piezo sensors, tilt meter, and hydrophones. This study aims to work on acoustic calibration and acoustic detection of UHE neutrinos. Additionally, the goal is to study these neutrinos with their potential astrophysical counterparts. In the presentation, the strategy of studying the counterparts of the high energy neutrinos will be discussed.

Presenter: MEHTA, Kalyani Chaitnya Kumar (AGH University of Karkow)

Session Classification: Young

Contribution ID: **46** Type: **not specified**

Control system for production testing of the ATLAS ITk PP2

Tuesday 14 January 2025 16:30 (15 minutes)

The ATLAS (A Toroidal LHC Apparatus) will undergo modernization between 2026 and 2030 to prepare for operations at the high luminosity regime of the HL-LHC (High-Luminosity Large Hadron Collider). To address the challenging radiation levels, higher data rates, and extremely high-occupancy environment, the ATLAS Inner Detector will be upgraded and replaced with a new all-silicon pixel and strip tracker known as the ITk (Inner Tracker). Simultaneously, a detector control system (DCS) is being developed for the ITk to ensure the proper functioning of each part of the new detector. Patch Panel 2 (PP2) is an active component of the strip tracker's power supply (PS) chain, which will be located inside the ATLAS detector. It will connect two different types of cables within the PS system and convert the 48V voltage delivered from service caverns to the 12V required for the ITk Strip detector structures. An independent readout system is needed to connect to PP2 for safety and control reasons. Currently, the PP2 system is in the pre-production phase. The equipment must undergo detailed Quality Control (QC) checks before being installed in the ITk detector. A dedicated DCS system is being developed to facilitate the automated QC procedure. I will present the PP2 design during its prototype phase, along with its readout system and the plans for the QC of the pre-production PP2 series, which are being developed in Cracow.

Presenter: DUDEK, Maria Malgorzata (Polish Academy of Sciences (PL))

Session Classification: Young

Contribution ID: **47** Type: **not specified**

Towards automatizing Higgs decays in BSM models at one-loop in the decoupling renormalization scheme

Tuesday 14 January 2025 16:45 (15 minutes)

High-precision calculations of Higgs boson observables can be used to constrain models of the Beyond the Standard Model (BSM) physics. Motivated by the non-observation of light BSM particles at the LHC, in this talk I will discuss a renormalization scheme for precise predictions of Higgs boson decays in the presence of a moderatelly heavy BSM physics at the 1-loop level. I will cover the basics of the decoupling renormalization scheme and present the renormalization conditions for a generic model. I will also show application of the decoupling scheme in a concrete model to explore its effects. This calculation is a part of FlexibleSUSY spectrum-generator generator and will be automatically applied to any user defined BSM model in the future.

Presenter: LANG, Jonas (NCBJ)

Session Classification: Young

Contribution ID: **48** Type: **not specified**

Improvement of calibration of the timing detectors in the CMS-PPS experiment

Tuesday 14 January 2025 17:00 (15 minutes)

Presenter: OSTAFIN, Tomasz Dariusz (AGH University of Krakow (PL))

Session Classification: Young

Contribution ID: **49** Type: **not specified**

Charged particles tracking in heavy ion collisions for ATLAS in Run 4

Tuesday 14 January 2025 17:15 (15 minutes)

Presenter: MLYNARSKA, Luthien (AGH University of Krakow (PL))

Session Classification: Young

Contribution ID: **50** Type: **not specified**

New constraints on CPT symmetry violation in charm mesons

Thursday 16 January 2025 11:00 (15 minutes)

Presenter: KMIEC, Mateusz (National Centre for Nuclear Research (PL))

Session Classification: Young

Contribution ID: **51** Type: **not specified**

Single top plus Higgs production at the LHC

Thursday 16 January 2025 11:15 (15 minutes)

Presenter: ZHENG, Ya-Juan (Iwate University)

Session Classification: Young

Contribution ID: **52** Type: **not specified**

Novel GNN architectures for track reconstruction beyond HL-LHC

Thursday 16 January 2025 11:30 (15 minutes)

Presenter: GOMULKA, Wojciech (AGH University of Krakow (PL))

Session Classification: Young

Contribution ID: **53** Type: **not specified**

Top-Down Reconstruction algorithm and its application to a deep extensive air shower

Thursday 16 January 2025 11:45 (15 minutes)

Presenter: MOGARKAR, Megha (IFJ PAN)

Session Classification: Young

Contribution ID: **54** Type: **not specified**

TBA

Thursday 16 January 2025 12:00 (15 minutes)

Presenter: KOMUDA, Klara Emilia (University of Warsaw (PL))

Session Classification: Young

Contribution ID: **55** Type: **not specified**

Tau-pair invariant mass estimation using MLE and collinear approximation

Thursday 16 January 2025 12:15 (15 minutes)

Presenter: MATYSZKIEWICZ, Wiktor (University of Warsaw (PL))

Session Classification: Young

Contribution ID: **56** Type: **not specified**

LHC phenomenology with KrkNLO matching

Thursday 16 January 2025 14:00 (15 minutes)

Presenter: SARMAH, Pratixan (Jagiellonian University)

Session Classification: Young

Contribution ID: **57** Type: **not specified**

Measuring the Drell-Yan process at forward rapidity with the upgraded ALICE detector

Thursday 16 January 2025 14:15 (15 minutes)

Presenter: UPADHYAYA, Sahil (Polish Academy of Sciences (PL))

Session Classification: Young

Contribution ID: **58** Type: **not specified**

Initial state entanglement measurements through final state multiplicity distribution

Thursday 16 January 2025 14:30 (15 minutes)

Presenter: LOKOS, Sandor (Institute of Nuclear Physics Polish Academy of Sciences (PL))

Session Classification: Young

Contribution ID: **59** Type: **not specified**

Feasibility studies of light-by-light scattering in ALICE with FoCal

Thursday 16 January 2025 14:45 (15 minutes)

Presenter: ZAJAC, Kacper (Polish Academy of Sciences (PL))

Session Classification: Young

Contribution ID: **60** Type: **not specified**

Global Alignment of ATLAS Forward Proton Detectors

Thursday 16 January 2025 15:30 (15 minutes)

Presenter: MROZ, Tomasz Grzegorz (Polish Academy of Sciences (PL))

Session Classification: Young

Contribution ID: **61** Type: **not specified**

Production of neutrons and protons from nuclei excited in UPC

Thursday 16 January 2025 15:45 (15 minutes)

Presenter: JUCHA, Paweł (Institute of Nuclear Physics Polish Academy of Sciences)

Session Classification: Young

Contribution ID: **62** Type: **not specified**

Flavoured jets and how to define them

Wednesday 15 January 2025 09:30 (30 minutes)

Presenter: PONCELET, Rene (IFJ PAN Krakow)

Session Classification: QCD

Contribution ID: **63** Type: **not specified**

Opening

Wednesday 15 January 2025 14:00 (5 minutes)

Presenters: KACZMARSKA, Anna (Polish Academy of Sciences (PL)); JEZABEK, Marek (Institute of Nuclear Physics Polish Academy of Sciences (PL))

Session Classification: prof. Zalewski's session

Contribution ID: **64** Type: **not specified**

Entanglement entropy, Krylov complexity and Deep inelastic scattering data

Wednesday 15 January 2025 14:35 (30 minutes)

Recent progress in applying the dipole picture of QCD to calculate partonic entropy and its relation to measured hadron multiplicities is reviewed. Additionally, the relation of the dipole model to the framework of Krylov complexity is discussed.

Presenter: KUTAK, Krzysztof (Instytut Fizyki Jadrowej Polskiej Akademii Nauk)

Session Classification: prof. Zalewski's session

Contribution ID: **65** Type: **not specified**

Particle physics in Kraków

Wednesday 15 January 2025 17:45 (15 minutes)

Presenter: ZALEWSKI, Kacper (Jagiellonian University)

Session Classification: prof. Zalewski's session

Contribution ID: **66** Type: **not specified**

Comparison of the \piˆ\pmKˆ\pm femtoscopy in PbPb collisions at \sqrt{s_NN}=5.02 TeV modeled with (3+1)D hydrodynamics + THERMINATOR˜2 and iHKM

Thursday 16 January 2025 16:00 (15 minutes)

Presenter: CHAKRABORTY, Pritam (PL - Warsaw UT)

Session Classification: Young

Contribution ID: **67** Type: **not specified**

Search for Lepton Flavor Violating $B \to K\tau\ell$ (ℓ = e,μ) Decays at Belle

Thursday 16 January 2025 16:15 (15 minutes)

Presenter: UR REHMAN, Junaid (IFJ PAN)

Session Classification: Young

Contribution ID: **68** Type: **not specified**

Meeting of particle physics community with Mark Thomson - open to everyone

Monday 13 January 2025 18:00 (1 hour)

Session Classification: Special event

Contribution ID: **69** Type: **not specified**

Registration

Monday 13 January 2025 08:00 (1 hour)

Session Classification: Registration

Contribution ID: **70** Type: **not specified**

Two-Photon Physics as an Attempt to probe proton characteristics

Thursday 16 January 2025 16:30 (15 minutes)

Presenter: KRISHNA, Nikhil (IFJ PAN)

Session Classification: Young

Contribution ID: **71** Type: **not specified**

Dinner - Restauracja Galicyjska, Pijarska 9, 31-015 Kraków

Thursday 16 January 2025 19:00 (3 hours)

Restauracja Galicyjska, Pijarska 9, 31-015 Kraków
http://restauracja-galicyjska.pl/

Session Classification: Dinner