Blois 2021: 32nd Rencontres de Blois on "Particle Physics and Cosmology"

Report of Abstracts

https://indico.cern.ch/e/997281

Abstract ID : **2**

Measurement of the very rare K+ to pi+ nu nubar decay

Content

The decay K+⟶π+ νν̄ , with a very precisely predicted branching ratio of less than 10-10, is among the best processes to reveal indirect effects of new physics.
The NA62 experiment at CERN SPS is designed to study the K+⟶π+ νν̄ decay and to measure its branching ratio using a decay-in-flight technique. NA62 took data in 2016, 2017 and 2018, reaching the sensitivity of the Standard Model for the K+⟶π+ νν̄ decay by the analysis of the 2016 and 2017 data, and providing the most precise measurement of the branching ratio to date by the analysis of the 2018 data. This measurement is also used to set limits on BR(K+⟶π+X), where X is a scalar or pseudo-scalar particle.
The final result of the K+⟶π+ νν̄ branching ratio measurement and its interpretation in terms of K+⟶π+ X decay from the analysis of the full 2016-2017-2018 data set is presented, and future plans and prospects reviewed.

Author's Name

Patrizia Cenci

Author's Institute

INFN Perugia (I)

Author's e-mail

patrizia.cenci@pg.infn.it

Abstract Title

Measurement of the very rare K+ to pi+ nu nubar decay

Subject

EW+Top+Higgs

Primary authors: CENCI, Patrizia (INFN Perugia (IT)); OTHER AUTHOR

Presenter: OTHER AUTHOR

Contribution Type: Oral

Comments:

The abstract was submitted by P. Cenci, chair of the NA62 Conference Committee. If it will be accepted as a talk, a speaker will be appointed as soon as possible.

Status: SUBMITTED

Submitted by **CENCI, Patrizia** on **Tuesday, 31 August 2021**

Abstract ID : **3**

New measurement of radiative decays at the NA62 Experiment at CERN

Content

The NA62 experiment at CERN reports new results from studies of radiative kaon decays K+ ⟶ pi0 e+ nu gamma (Ke3g), using a data sample recorded in 2017-2018. The sample comprises O(100k) Ke3g candidates with sub-percent background contaminations. Preliminary results with the most precise measurement of the Ke3g branching ratios and T-asymmetry measurement in the Ke3g decay, are presented.

Author's Name

Patrizia Cenci

Author's Institute

INFN Perugia (I)

Author's e-mail

patrizia.cenci@pg.infn.it

Abstract Title

New measurement of radiative decays at the NA62 Experiment at CERN

Subject

EW+Top+Higgs

Primary authors: CENCI, Patrizia (INFN Perugia (IT)); OTHER AUTHOR

Presenter: OTHER AUTHOR

Contribution Type: Oral

Comments:

The abstract was submitted by P. Cenci, chair of the NA62 Conference Committee. If it will be accepted as a talk, a speaker will be appointed as soon as possible.

Status: SUBMITTED

Submitted by **CENCI, Patrizia** on **Tuesday, 31 August 2021**

Abstract ID : **4**

Latest results from the NA62 experiment at CERN

Content

The decay $K^+ \to \pi^+\nu\bar{\nu}$, with a very precisely predicted branching ratio of less than 10–10, is among the best processes to reveal indirect effects of new physics. The NA62 experiment at CERN SPS is designed to study the $K^+ \to \pi^+\nu\bar{\nu}$ decay and to measure its branching ratio using a decay-in-flight technique. NA62 took data in 2016, 2017 and 2018, reaching the sensitivity of the Standard Model for the $K^+ \to \pi^+\nu\bar{\nu}$ decay by the analysis of the 2016 and 2017 data, and providing the most precise measurement of the branching ratio to date by the analysis of the 2018 data. The NA62 experiment is a powerful laboratory to make searches for extremely rare kaon decays other than the main decay $K^+ \to \pi^+\nu\bar{\nu}$: new recent results will be presented.

Author's Name

Gemma Tinti

Author's Institute

Frascati

Author's e-mail

gmtinti@lnf.infn.it, patrizia.cenci@pg.infn.it

Abstract Title

Latest results from the NA62 experiment at CERN

Subject

QCD+Flavour

Primary authors: CENCI, Patrizia (INFN Perugia (IT)); TINTI, Gemma (INFN e Laboratori Nazionali di Frascati (IT))

Presenter: TINTI, Gemma (INFN e Laboratori Nazionali di Frascati (IT))

Contribution Type: Oral

Comments:

The abstract was submitted by P. Cenci, chair of the NA62 Conference Committee. If it will be accepted as a talk, a speaker will be appointed as soon as possible.

Status: SUBMITTED

Submitted by **CENCI, Patrizia** on **Tuesday, 31 August 2021**

Abstract ID : **5**

Search for K+ decays to a lepton and invisible particles

Content

The NA62 experiment at CERN reports searches for K+ ⟶ e+N, K+⟶μ+N and K+⟶μ+νX decays, where N and X are massive invisible particles, using the 2016-2018 data set.
The N particle is assumed to be a heavy neutral lepton, and the results are expressed as upper limits of O(10−9) and O(10−8) of the neutrino mixing parameter |Ue4|2 and |Uμ4|2, improving on the earlier searches for heavy neutral lepton production and decays in the kinematically accessible mass range.
The X particle is considered a scalar or vector hidden sector mediator decaying to an invisible final state, and upper limits of the decay branching fraction for X masses in the range 10-370 MeV/c2 are reported for the first time, ranging from O(10−5) to O(10−7).
An improved upper limit of 1.0 10−6 is established at 90% CL on the K+⟶μ+νν branching fraction.

Author's Name

Patrizia Cenci

Author's Institute

INFN Perugia (I)

Author's e-mail

patrizia.cenci@pg.infn.it

Abstract Title

Search for K+ decays to a lepton and invisible particles

Subject

EW+Top+Higgs

Primary authors: CENCI, Patrizia (INFN Perugia (IT)); OTHER AUTHOR

Presenter: OTHER AUTHOR

Contribution Type: Oral

Comments:

The abstract was submitted by P. Cenci, chair of the NA62 Conference Committee. If it will be accepted as a talk, a speaker will be appointed as soon as possible.

Status: SUBMITTED

Submitted by **CENCI, Patrizia** on **Tuesday, 31 August 2021**

Abstract ID : **6**

FASERν and first neutrino interaction candidates at the LHC

Content

No neutrino produced at a particle collider has ever been directly detected. FASERν at the CERN LHC is designed to directly detect such neutrinos for the first time and study their cross sections at TeV energies, where no such measurements currently exist. The detector will be located 480 m downstream of the ATLAS interaction point. With FASERν, the three-flavor neutrino cross-sections will be measured in the currently unexplored energy range between 360 GeV and 5 TeV. From the other perspective, FASERν can measure forward neutrino production, and provide novel constraints on forward particle production.

In 2018 we performed a pilot run with the aims of detecting neutrino interactions for the first time at the LHC. We installed a 30-kg lead/tungsten emulsion detector and collected data of 12.2 fb^{-1}. We observe the first candidate vertices consistent with neutrino interactions at the LHC. A 2.7σ excess of neutrino-like signal above muon-induced backgrounds is measured. This milestone opens a new avenue for studying neutrinos at current and future high-energy colliders.

During Run-3 of the LHC starting from 2022, we will deploy an emulsion detector with a target mass of 1.1 tons, coupled with the FASER magnetic spectrometer. This would yield roughly 2,000 ν_e, 7,000 ν_μ, and 50 ν_τ interacting in the detector. Here we present the status and plan of FASERν, as well as the neutrino detection in the 2018 data.

Author's Name

Tomoko Ariga

Author's Institute

Kyushu University

Author's e-mail

tomoko.ariga@cern.ch

Abstract Title

FASERν and first neutrino interaction candidates at the LHC

Subject

Neutrinos

Primary authors: ARIGA, Tomoko (Kyushu University (JP)); COLLABORATION, FASER

Presenter: COLLABORATION, FASER

Contribution Type: Oral

Comments:

Here are our papers: https://doi.org/10.1140/epjc/s10052-020-7631-5 and a recent paper https://arxiv.org/abs/2105.06197.

Status: SUBMITTED

Submitted by **ARIGA, Tomoko** on **Friday, 3 September 2021**

Abstract ID : **7**

ANTARES & KM3NeT/ARCA: present and future of neutrino telescopes in the Mediterranean Sea

Content

The ANTARES neutrino telescope, located deep in the Mediterranean Sea off the coast of Toulon (France), has been taking data continuously since 2007, with the primary aim to detect astrophysical neutrinos in the TeV-PeV energy range.

The next-generation underwater neutrino telescope, KM3NeT, is currently under construction at two sites: ORCA near Toulon and ARCA close to Sicily (Italy). The latter will focus mainly on high-energy neutrino astronomy in the continuity of ANTARES. In its final configuration, ARCA will have one cubic kilometer instrumented volume with more than 100,000 3" PMTs distributed on 230 lines, leading to a large effective area, excellent pointing resolution and an unprecedented view of the Southern Sky.

In the context of multi-messenger astrophysics, the ANTARES data are used to search for neutrino emission from transient sources, as well as correlations with astrophysical catalogs. Furthermore, ANTARES covers various topics, ranging from dark matter searches to oscillation studies.

An overview of the latest results from ANTARES analyses will be presented, as well as the ARCA status and related science program.

Author's Name

Mathieu Lamoureux

Author's Institute

APC

Author's e-mail

mathieu.lamoureux@pd.infn.it

Abstract Title

ANTARES & KM3NeT/ARCA: present and future of neutrino telescopes in the Mediterranean Sea

Subject

Astro/Cosmo

Primary author: LAMOUREUX, Mathieu (Universita e INFN, Padova (IT))

Presenter: LAMOUREUX, Mathieu (Universita e INFN, Padova (IT))

Contribution Type: Oral

Comments:

on behalf of the ANTARES and KM3NeT collaborations

Status: SUBMITTED

Submitted by **LAMOUREUX, Mathieu** on **Friday, 3 September 2021**

Abstract ID : **8**

KM3NeT/ORCA: overview, first results and future prospects

Content

KM3NeT is a next generation neutrino telescope under construction in the Mediterranean Sea. Its low energy array ORCA (Oscillations Research with Cosmics in the Abyss) is designed to focus on the detection of atmospheric neutrinos with energies between 3 and 100 GeV. The main goal of the KMNeT/ORCA project is to determine the neutrino mass ordering and to measure atmospheric neutrino oscillation parameters. However, the detector is also capable of probing a wide range of beyond standard model physics such as neutrino non standard interactions, neutrino decay or search for dark matter . So far, six out of the final 115 detection units have been deployed and are taking data. A new de tector deployment campaign is planned for the following months thanks to which another 7 lines will be taking data by the end of the year. In this contribution a summary of the most recent results from the current six line configuration of the KM3NeT/ORCA detect or are presented together with updated predictions for the sensitivities to a variety of processes with the final configuration of the detector.

Author's Name

Jerzy Manczak

Author's Institute

Instituto de Física Corpuscular (IFIC) / Universidad de Valencia

Author's e-mail

jerzy.manczak@gmail.com

Abstract Title

KM3NeT/ORCA: overview, first results and future prospects

Subject

Neutrinos

Primary author: Mr MANCZAK, Jerzy (IFIC)

Presenter: Mr MANCZAK, Jerzy (IFIC)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **Mr MANCZAK, Jerzy** on **Friday, 3 September 2021**

Abstract ID : **9**

Di-lepton Rapidity Distribution in Drell-Yan Production at N3LO in QCD

Content

The CERN Large Hadron Collider is a precision machine to test the Standard Model and demands equally precise theoretical predictions. State-of-the-art theory calculations at next-to-next-to-next-to-leading order (N3LO) in perturbative QCD are only available for a limited set of processes and observables. We compute for the first time the differential di-lepton rapidity distribution for the Drell-Yan (DY) production mediated via a virtual photon at N3LO. It is also the first time that the qT-subtraction method is being applied at N3LO in a fully self-contained manner, and paves the way for precision predictions of more complex observables at N3LO accuracy.

In this talk, we will first introduce the motivation that we need such precise theoretical predictions for DY production. Second, we explain how we apply the qT-subtraction method to get the differential di-lepton rapidity distribution for the Drell-Yan (DY) production mediated via a virtual photon at N3LO. Finally, we give a summary and outlook.

Author's Name

Tongzhi Yang

Author's Institute

University of Zurich

Author's e-mail

tongzhi.yang@physik.uzh.ch

Abstract Title

Di-lepton Rapidity Distribution in Drell-Yan Production at N3LO in QCD

Subject

QCD+Flavour

Primary author: YANG, Tongzhi (Universität Zürich)

Co-authors: Dr CHEN, Xuan; Prof. GHERMANN, Thomas; Prof. GLOVER, Nigel; Prof. HUSS, Alexander; Prof. ZHU, Hua Xing

Presenter: YANG, Tongzhi (Universität Zürich)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **YANG, Tongzhi** on **Sunday, 5 September 2021**

Abstract ID : **10**

How does antimatter fall?: the GBAR experiment (CERN)

Content

One of the main questions of fundamental physics is the problem of the asymmetry matter/antimatter in the universe and the action of gravity on antimatter. Tests on antimatter gravity have currently a limited precision, with the sign of gravity acceleration not yet known experimentally. Ambitious projects are developed at CERN facilities to produce low energy antihydrogen with the aim of measuring the free fall of antihydrogen atoms. Among them, the GBAR experiment (*Gravitational Behaviour of Antihydrogen at Rest*) aims at measuring the gravity acceleration of antihydrogen atoms during a free fall in Earth's gravitational field. The simulation of the free-fall chamber includes the Monte-Carlo generation of trajectories and the statistical analysis. A precision of the measurement beyond the % level is confirmed by taking into account the experimental design. Moreover, we propose to improve the accuracy of the measurement by using the idea of quantum reflection drawn from experiments performed on ultracold neutrons. The quantum interference pattern obtained brings more information on the value of than the classical method, and then improves the accuracy of the experiment by approximately 3 orders of magnitude.

Author's Name

Olivier Rousselle

Author's Institute

Laboratoire Kastler Brossel (Sorbonne Université)

Author's e-mail

olivier.rousselle@cern.ch

Abstract Title

How does antimatter fall?: the GBAR experiment (CERN)

Subject

BSM+DM

Primary author: ROUSSELLE, Olivier (Laboratoire Kastler Brossel (FR))

Presenter: ROUSSELLE, Olivier (Laboratoire Kastler Brossel (FR))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **ROUSSELLE, Olivier** on **Monday, 6 September 2021**

Abstract ID : **11**

Fiducial Higgs and Drell-Yan distributions at N3LL'+NNLO with RadISH

Content

We present state-of-the-art predictions for the transverse momentum of the colour singlet in gluon-fusion Higgs production and in neutral Drell-Yan lepton-pair production, as well as the phistar observable in Drell Yan. We resum such observables at N3LL' accuracy in momentum space with the RadISH formalism, thus consistently including in our prediction all constant terms of relative order as^3 with respect to the Born. We supplement our results with a transverse-recoil prescription, accounting for dominant classes of subleading-power corrections in a fiducial setup. The resummed predictions are then matched with fixed-order differential spectra at NNLO accuracy and compared with 13 TeV LHC data relevant to the Higgs to di-photon channel, as well as to neutral Drell-Yan lepton-pair production.

Author's Name

Luca Rottoli

Author's Institute

University of Zurich

Author's e-mail

luca.rottoli@cern.ch

Abstract Title

Fiducial Higgs and Drell-Yan distributions at N3LL'+NNLO with RadISH

Subject

QCD+Flavour

Primary authors: RE, Emanuele (Unite Reseaux du CNRS (FR)); Dr ROTTOLI, Luca (Universitaet Zuerich (CH)); TORRIELLI, Paolo (Universita e INFN Torino (IT))

Presenter: Dr ROTTOLI, Luca (Universitaet Zuerich (CH))

Status: SUBMITTED

Submitted by **Dr ROTTOLI, Luca** on **Monday, 6 September 2021**

Abstract ID : **12**

The NIKA2 Sunyaev Zel'dovich Large Program: unveiling systematics in cluster mass estimation

Content

We present the NIKA2 Sunyaev Zel'dovich Large Program (LPSZ) that aims at studying 45 clusters of galaxies at intermediate and high redshift ($0.5 < z < 0.9$). A joint analysis of the thermal SZ (tSZ) effect at millimeter wavelength with the NIKA2 camera and in X-ray with XMM-Newton satellite permits the reconstruction of clusters' thermodynamical properties and hydrostatic masses. Here, we test the robustness of LPSZ hydrostatic mass estimates against systematic effects induced by the data processing or the modeling. We illustrate these systematic effects with a multi-probe analysis of the well known galaxy cluster CL J1226.9+3332, which is a massive and high redshift cluster that has already been observed at several wavelengths. In addition, using Cluster Lensing And Supernova survey with Hubble (CLASH) observations we obtain estimates of the lensing masses for a common sample with the LPSZ. From this we are able to compare the different mass estimates and test the impact of systematic effects on the hydrostatic to lensing cluster mass bias.

Author's Name

Miren Muñoz Echeverría

Author's Institute

Laboratoire de Physique Subatomique et Cosmologie

Author's e-mail

miren.munoz@lpsc.in2p3.fr

Abstract Title

The NIKA2 Sunyaev Zel'dovich Large Program: unveiling systematics in cluster mass estimation

Subject

Astro/Cosmo

Primary author: MUÑOZ ECHEVERRÍA, Miren (LPSC)

Presenter: MUÑOZ ECHEVERRÍA, Miren (LPSC)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **MUÑOZ ECHEVERRÍA, Miren** on **Wednesday, 8 September 2021**

Abstract ID : **13**

Mixed QCD-electroweak corrections to $pp \to l\nu_l + X$ at the LHC

Content

The production of lepton pairs via the Drell-Yan mechanism represents a paradigmatic process at hadron colliders.
Firstly, it is important for detector calibration and luminosity monitoring thanks to its high production rates and clean experimental signatures; secondly, it provides us with strong tests of perturbative QCD and SM predictions (i.e. precise determination of the W mass and of the weak-mixing angles); finally, it represents a relevant background for new physics searches.
Owing to these reasons, the inclusion of higher-order radiative corrections is mandatory in order to match the experimental accuracy reachable at the LHC. At this level of precision, the computation of *mixed QCD-EW corrections* becomes fundamental.

We report on the first complete computation of the mixed QCD-EW corrections to *charged-current Drell-Yan process.* For the first time, all the real and virtual contributions are consistently included without any approximation, except for the finite part of the two-loop virtual contribution, which is computed by using an "improved" version of the well-established *pole approximation technique.* The cancellation of infrared singularities is achieved by using a formulation of the q_T*-subtraction formalism* valid in presence of charged massive particles in the final state.

We demonstrate that our computation is reliable in both on-shell and off-shell regions, providing the first prediction of the mixed QCD-EW corrections in the entire region of the lepton transverse momentum. The reliability of the above mentioned method is also confirmed by a subsequent paper where mixed QCD-EW corrections are exactly computed for the neutral-current Drell-Yan process and compared to the "improved" pole approximation.

Author's Name

Chiara Savoini

Author's Institute

University of Zurich

Author's e-mail

csavoi@physik.uzh.ch

Abstract Title

Mixed QCD-electroweak corrections to $pp \to l\nu_l + X$ at the LHC

Subject

QCD+Flavour

Primary authors: BUONOCORE, Luca (University of Zurich); SAVOINI, Chiara (University of Zurich); GRAZZINI, Massimiliano (Universitaet Zuerich (CH)); KALLWEIT, Stefan (Universita & INFN, Milano-Bicocca (IT)); TRAMONTANO, Francesco (Universita e sezione INFN di Napoli (IT))

Presenter: SAVOINI, Chiara (University of Zurich)

Status: SUBMITTED

Submitted by **SAVOINI, Chiara** on **Sunday, 12 September 2021**

Abstract ID : **14**

Sensitivity of future e+e- colliders to processes of dark matter production with light mediator exchange

Content

High energy ⊠+⊠– colliders offer a unique possibility for the most general search for dark matter (DM) based on the mono-photon signature. As any ⊠+⊠– collision process may include hard initial-state photon radiation, analysis of the energy spectrum and angular distributions of observed photons can be used to search for hard processes with an invisible final state.

We consider the production of DM particles at the International Linear Collider (ILC) and Compact Linear Collider (CLIC) experiments via a mediator exchange. A dedicated procedure of merging the matrix element calculations with the lepton ISR structure function was developed to model the Standard Model background processes contributing to mono-photon signature with WHIZARD. Detector effects are taken into account within the DELPHES fast simulation framework. Limits on the light DM production cross section in a simplified model are set as a function of the mediator mass and width based on the expected two-dimensional distributions of the reconstructed mono-photon events.

Limits on the mediator couplings are then presented for a wide range of mediator masses and widths. For light mediators, for masses up to the centre-of-mass energy of the collider, coupling limits derived from the mono-photon analysis are more stringent than those expected from direct resonance searches in decay channels to SM particles.

Author's Name

Krzysztof Mekala

Author's Institute

University of Warsaw

Author's e-mail

k.mekala@student.uw.edu.pl

Abstract Title

Sensitivity of future e+e- colliders to processes of dark matter production with light mediator exchange

Subject

BSM+DM

Primary authors: Mr MEKALA, Krzysztof (University of Warsaw); ZARNECKI, Aleksander Filip

(University of Warsaw); KALINOWSKI, Jan Henryk (University of Warsaw (PL)); KOTLARSKI, Wojciech (TU - Dresden); SOPICKI, Pawel (University of Warsaw (PL))

Presenter: Mr MEKALA, Krzysztof (University of Warsaw)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **Mr MEKALA, Krzysztof** on **Monday, 13 September 2021**

Abstract ID : **15**

Heavy Neutrinos at Future Linear e+e- Colliders

Content

Neutrinos are probably the most mysterious particles of the Standard Model. The mass hierarchy and oscillations, as well as the nature of their antiparticles, are currently being studied in experiments around the world. Moreover, in many models of the New Physics, baryon asymmetry or dark matter density in the universe are explained by introducing new species of neutrinos. Among others, heavy neutrinos of the Dirac or Majorana nature were proposed to solve problems persistent in the Standard Model. Such neutrinos with masses above the EW scale could be produced at future linear e+e- colliders, like the Compact LInear Collider (CLIC) or the International Linear Collider (ILC).

We studied the possibility of observing production and decays of heavy neutrinos in qql final state at the ILC running at 500 GeV and 1 TeV and the CLIC running at 3 TeV. The analysis is based on the WHIZARD event generation and fast simulation of the detector response with DELPHES. Dirac and Majorana neutrinos with masses from 200 GeV to 3.2 TeV are considered. Estimated limits on the production cross sections and on the neutrino-lepton coupling are compared with the current limits coming from the LHC running at 13 TeV, as well as the expected future limits from hadron colliders. Impact of the gamma-induced backgrounds on the experimental sensitivity is also discussed. Obtained results are stricter than other limit estimates published so far.

Author's Name

Krzysztof Mekala

Author's Institute

University of Warsaw

Author's e-mail

k.mekala@student.uw.edu.pl

Abstract Title

Heavy Neutrinos at Future Linear e+e- Colliders

Subject

BSM+DM

Primary authors: Mr MEKALA, Krzysztof (University of Warsaw); ZARNECKI, Aleksander Filip (University of Warsaw); BRASS, Simon (DESY); REUTER, Jürgen (DESY Hamburg, Germany)

Presenter: Mr MEKALA, Krzysztof (University of Warsaw)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **Mr MEKALA, Krzysztof** on **Monday, 13 September 2021**

Abstract ID : **16**

Searching for new physics during gravitational waves propagation

Content

The direct detection of gravitational waves opened an unprecedented channel to probe fundamental physics. Proposed extensions of our current theories predict a dispersion of the gravitational waves during their propagation, distorting the signals observed by ground-based interferometers compared to their predictions from general relativity. In this talk, I present several analysis probing different alternative theories of gravitation. Using the multimessenger events consisting of gravitational waves and their electromagnetic counterpart, extra dimensions and scalar-tensor theories are constrained from the comparison of the luminosity distance inferred independently from both signals. Relying only on gravitational wave signals, a large class of proposed theories (e.g. massive gravity) predict a frequency-dependent dispersion of the gravitational waves breaking local CPT and/or Lorentz symmetry. Constraints on the corresponding effective field theories coefficients are obtained from the analysis of 31 events from the second LIGO-Virgo detections catalog.

Author's Name

Leïla Haegel

Author's Institute

Laboratoire APC

Author's e-mail

leila.haegel@apc.in2p3.fr

Abstract Title

Searches for spacetime symmetry breaking during gravitational waves propagation

Subject

Astro/Cosmo

Primary author: HAEGEL, Leïla (University of Balearic Islands)

Presenter: HAEGEL, Leïla (University of Balearic Islands)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **HAEGEL, Leïla** on **Tuesday, 14 September 2021**

Abstract ID : **17**

A_{FB} in the SMEFT: precision Z physics at the LHC

Content

We study the forward-backward asymmetry A_{FB} in $pp \to l^+l^-$ at the Z peak within the Standard Model Effective Field Theory (SMEFT). We find that this observable provides per mille level constraints on the vertex corrections of the Z boson to quarks, which close a flat direction in the electroweak precision SMEFT fit. Moreover, we show that current A_{FB} data is precise enough so that its inclusion in the fit improves significantly LEP bounds even in simple New Physics setups. This demonstrates that the LHC can compete with and complement LEP when it comes to precision measurements of the Z boson properties.

Author's Name

Víctor Bresó-Pla

Author's Institute

Instituto de Física Corpuscular (IFIC, mixed centre CSIC-UV)

Author's e-mail

vicbreso@ific.uv.es

Abstract Title

A_{FB} in the SMEFT: precision Z physics at the LHC

Subject

BSM+DM

Primary authors: BRESÓ-PLA, Víctor (Universitat de Valencia-IFIC); FALKOWSKI, Adam (LPT Orsay); GONZALEZ-ALONSO, Martin (Universidad de Valencia)

Presenter: BRESÓ-PLA, Víctor (Universitat de Valencia-IFIC)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **BRESÓ-PLA, Víctor** on **Wednesday, 15 September 2021**

Abstract ID : **18**

The Scattering and Neutrino Detector at the LHC

Content

SND@LHC is a compact and stand-alone experiment to perform measurements with neutrinos produced at the LHC in a hitherto unexplored pseudo-rapidity region of $7.2 < \eta < 8.6$, complementary to all the other experiments at the LHC. The experiment is to be located 480 m downstream of IP1 in the unused TI18 tunnel. The detector is composed of a hybrid system based on an 800 kg target mass of tungsten plates, interleaved with emulsion and electronic trackers, followed downstream by a calorimeter and a muon system. The configuration allows efficiently distinguishing between all three neutrino flavours, opening a unique opportunity to probe physics of heavy flavour production at the LHC in the region that is not accessible to ATLAS, CMS and LHCb. This region is of particular interest also for future circular colliders and for predictions of very high-energy atmospheric neutrinos. The detector concept is also well suited to searching for Feebly Interacting Particles via signatures of scattering in the detector target. The first phase aims at
operating the detector throughout LHC Run 3 to collect a total of 150 fb−1. The experiment was recently approved by the Research Board at CERN. A new era of collider neutrino physics is just starting.

Author's Name

Antonia Di Crescenzo

Author's Institute

CERN

Author's e-mail

antonia.di.crescenzo@cern.ch

Abstract Title

The Scattering and Neutrino Detector at the LHC

Subject

Neutrinos

Primary author: DI CRESCENZO, Antonia (CERN)

Presenter: DI CRESCENZO, Antonia (CERN)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **DI CRESCENZO, Antonia** on **Wednesday, 15 September 2021**

Abstract ID : **19**

The T2K Near Detector upgrade

Content

In view of the J-PARC program of upgrades of the beam intensity, the T2K collaboration is preparing towards an increase of the exposure aimed at establishing leptonic CP violation at 3 level for a significant fraction of the possible values. To reach this goal, an upgrade of the T2K near detector ND280 will be installed at J-PARC in 2022, with the aim of reducing the overall statistical and systematic uncertainties at the appropriate level of better than 4\%.

We have developed an innovative concept for this neutrino detection system, comprising the totally active Super-Fine-Grained-Detector (SuperFGD), two High Angle TPC (HA-TPC) and six TOF planes.
The SuperFGD, a highly segmented scintillator detector, acting as a fully active target for the neutrino interactions, is a novel device with dimensions of ~2x1.8x0.6 3 and a total mass of about 2 tons. It consists of about 2 millions of small scintillator cubes each of 1 3. The signal readout from each cube is provided by wavelength shifting fibers connected to MPPCs. The total number of channels will be ~60,000 and the cubes have already been produced and assembled in – layers. The HA-TPC will be used for 3D track reconstruction, momentum measurement and particle identification. These TPC, with overall dimensions of 2x2x0.8 m3, will be equipped with 32 resistive MicroMegas (ERAM). The thin field cage (3 cm thickness, 4% rad. length) will be realized with laminated panels of Aramid and honeycomb covered with a kapton foil with copper strips. The 34x42 cm2 resistive bulk Micromegas will use a 500 kOhm/square DLC foil to spread the charge over the pad plane, each pad being ~1 2. The electronics is based on the AFTER chips.

The time-of-flight (TOF) will consist of 6 planes with about 5 m2 surface area surrounding the SuperFGD and the TPCs. Each plane has been assembled with 2.2 m long cast plastic scintillator bars with light collected by arrays of large-area MPPCs from two ends.

Author's Name

Claudio Giganti

Author's Institute

LPNHE Paris

Author's e-mail

cgiganti@lpnhe.in2p3.fr

Abstract Title

The T2K Near Detector upgrade

Subject

Neutrinos

Primary author: GIGANTI, Claudio (LPNHE Paris (IN2P3/CNRS))

Presenter: GIGANTI, Claudio (LPNHE Paris (IN2P3/CNRS))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GIGANTI, Claudio** on **Wednesday, 15 September 2021**

Abstract ID : **20**

Physics Studies for T2K near detector ND280 upgrade

Content

Neutrino oscillation physics has now entered the precision era. In parallel with neeing larger detectors to collect more data with, future experiments further require a significant reduction of systematic uncertainties with respect to what is currently available. In the neutrino oscillation measurements from the T2K experiment the systematic uncertainties related to neutrino interaction cross sections are currently the most dominant. To reduce this uncertainty a much improved understanding of neutrino-nucleus interactions is required. In particular, it is crucial to better understand the nuclear effects which can alter the final state topology and kinematics of neutrino interactions in such a way which can bias neutrino energy reconstruction and therefore bias measurements of neutrino oscillations.

The upgraded ND280 near detector of T2K will directly confront our naivety of neutrino interactions using a new detector configuration with full polar angle acceptance and a much lower proton tracking threshold. Furthermore, neutron tagging capabilities in addition to precision timing information will allow the upgraded detector to estimate neutron kinematics from neutrino interactions. Such improvements permit access to a much larger kinematic phase space which correspondingly allows techniques such as the analysis of transverse kinematic imbalances (TKI) to offer remarkable constraints of the pertinent nuclear physics for T2K analyses.

In this talk we quantitatively demonstrate ND280's upgraded sensitivity to key nuclear effects such as removal energy and 2p2h. To this end, we present a fit of a parameterised interaction and flux model to simulated measurements of TKI and neutrino energy from the upgraded ND280.

Author's Name

Claudio Giganti

Author's Institute

LPNHE Paris

Author's e-mail

cgiganti@lpnhe.in2p3.fr

Abstract Title

Physics Studies for T2K near detector ND280 upgrade

Subject

Neutrinos

Primary author: GIGANTI, Claudio (LPNHE Paris (IN2P3/CNRS))

Presenter: GIGANTI, Claudio (LPNHE Paris (IN2P3/CNRS))

Contribution Type: Oral

Comments:

Talk based on the results contained in this paper: https://arxiv.org/pdf/2108.11779.pdf

Status: SUBMITTED

Submitted by **GIGANTI, Claudio** on **Wednesday, 15 September 2021**

Abstract ID : **21**

Searches for new phenomena in top quark final states

Content

The remarkably large integrated luminosity collected by the ATLAS detector at the highest proton-proton collision energy provided by LHC allows to probe the presence on new physics that might enhance extremely rare processes in the SM. A significant example of this is Flavour Changing Neutral Currents (FCNC): forbidden at tree level and highly suppressed at higher orders in the Standard Model (SM), FCNC processes can receive enhanced contributions in many extensions of the SM, so any measurable sign of such interactions is an indication of new physics. In this talk, searches for FCNCs with the ATLAS experiment are shown, including a new result on the FCNC coupling of the top quark to the Z boson using the full data taken during Run-2 of the LHC, as well as other searches for beyond-the-Standard-Model phenomena in top-quark final states.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Searches for new phenomena in top quark final states

Subject

EW+Top+Higgs

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Contribution Type: Oral

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **22**

Measurement of top-quark cross sections and properties with the ATLAS detector at the LHC

Content

The remarkably large integrated luminosity collected by the ATLAS detector at the highest proton-proton collision energy provided by LHC allows to use the large sample of top quark events to test theoretical predictions with unprecedented precision. Using data taken with the ATLAS detector at the LHC, recent measurements of total and differential top-quark cross sections as well properties of top-quark production are shown, including in particular a new measurement of the spin polarisation in single-top-quark production, and new measurements that promise to improve Monte Carlo predictions.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Measurement of top-quark cross sections and properties with the ATLAS detector at the LHC

Subject

EW+Top+Higgs

Primary author: COSTA, Maria Jose (IFIC (CSIC-UV) Valencia (ES))

Presenter: COSTA, Maria Jose (IFIC (CSIC-UV) Valencia (ES))

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **23**

Testing the Standard Model in boosted top quark production with the ATLAS experiment at the LHC

Content

Measurements in boosted top quark production test the Standard Model in a previously unexplored regime with a strongly enhanced sensitivity to high-scale new phenomena. Dedicated techniques have been developed to reconstruct and identify boosted top quarks. In this contribution, several new measurements of the ATLAS experiment are presented of the differential cross section and asymmetries in this extreme kinematic regime. The measurements are interpreted within the Standard Model Effective Field Theory, yielding stringent bounds on the Wilson coefficients of two-light-quark-two-quark operators.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Testing the Standard Model in boosted top quark production with the ATLAS experiment at the LHC

Subject

EW+Top+Higgs

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **24**

Measurements of the top quark processes in association with additional particles with the ATLAS detector

Content

The high center-of-mass energy of proton-proton collisions and the high integrated luminosities at the CERN Large Hadron Collider make it possible to study rare processes of the Standard Model (SM) with unprecedented precision. These measurements provide new tests of the SM predictions with the potential to unveil discrepancies with the SM predictions or provide important input for the improvement of theoretical calculations. In this talk, total and differential measurements of top-quark production in association with additional bosons are shown using data taken with the ATLAS experiment at a center-of-mass-energy of 13 TeV, as well as a recent result on the evidence for the very rare process of four-top-quark production, combining several channels.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Measurements of the top quark processes in association with additional particles with the ATLAS detector

Subject

EW+Top+Higgs

Primary author: DIEZ PARDOS, Carmen (Universitaet Siegen (DE))

Presenter: DIEZ PARDOS, Carmen (Universitaet Siegen (DE))

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **25**

Hard QCD measurements at ATLAS

Content

The production of photons, W/Z bosons and jets in proton-proton collisions at the LHC allows perturbative QCD to be probed in extreme regions of phase space. In this talk, we present recent precision measurements of diphoton production and Z-boson production in association with jets, using data collected by the ATLAS experiment at 13 TeV. For jet fragmentation, we present a measurement of the fragmentation properties of b-quark initiated jets, studied using charged B mesons. All of the measurements are corrected for detector effects and are compared to the predictions of state-of-the-art Monte Carlo event generators. We also present fits to determine parton distribution functions (PDFs) using hard QCD measurements from ATLAS at various sqrt(s) values together with HERA data.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Hard QCD measurements at ATLAS

Subject

QCD+Flavour

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **26**

Measurements of multi-boson production including vector-boson scattering at ATLAS

Content

Measurements of multiboson production at the LHC probe the electroweak gauge structure of the Standard Model for contributions from anomalous couplings. In this talk we present recent ATLAS results on the measurement of electroweak production of a Zgamma pair in association with two jets and the first observation of three W boson production. We also present the differential cross-section measurement of WW production in association with jets and the measurement of differential cross-sections of four-lepton events, containing two same-flavour, opposite-charge electron or muon pairs. Moreover, precise boson and diboson differential cross-section measurements are interpreted in a combined Effective Field Theory analysis, allowing to systematically probe gauge boson self-interactions.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Measurements of multi-boson production including vector-boson scattering at ATLAS

Subject

EW+Top+Higgs

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **27**

Searches for leptoquarks with the ATLAS detector

Content

Leptoquarks (LQ) are predicted by many new physics theories to describe the similarities between the lepton and quark sectors of the Standard Model and offer an attractive potential explanation for the lepton flavour anomalies observed at LHCb and flavour factories. The ATLAS experiment has a broad program of direct searches for leptoquarks, coupling to the first-, second- or third-generation particles. This talk will present the most recent 13 TeV results on the searches for leptoquarks and contact interactions with the ATLAS detector, covering flavour-diagonal and cross-generational final states.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Searches for leptoquarks with the ATLAS detector

Subject

BSM+DM

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **28**

Searches for new physics with leptons using the ATLAS detector

Content

Many theories beyond the Standard Model predict new phenomena, such as Z', W' bosons, or heavy leptons, in final states with isolated, high-pt leptons (e/mu/tau). Searches for new physics with such signatures, produced either resonantly or non-resonantly, are performed using the ATLAS experiment at the LHC. This includes a novel search that exploits the lepton-charge asymmetry in events with an electron and muon pair. Lepton flavor violation (LVF) is a striking signature of potential beyond the Standard Model physics. The search for LFV with the ATLAS detector focuses on the decay of the Z boson into different flavour leptons (e/mu/tau). The recent 13 TeV pp results will be reported.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Searches for new physics with leptons using the ATLAS detector

Subject

BSM+DM

Primary author: VANNICOLA, Damiano (Tel Aviv University)

Presenter: VANNICOLA, Damiano (Tel Aviv University)

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **29**

Searches for new phenomena in final states with 3rd generation quarks using the ATLAS detector

Content

Many theories beyond the Standard Model predict new phenomena, such as heavy vectors or scalar, and vector-like quarks, in final states containing bottom or top quarks. Such final states offer great potential to reduce the Standard Model background, although with significant challenges in reconstructing and identifying the decay products and modelling the remaining background. The recent 13 TeV pp results, along with the associated improvements in identification techniques, will be reported.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Searches for new phenomena in final states with 3rd generation quarks using the ATLAS detector

Subject

BSM+DM

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **30**

Searches for BSM physics using challenging and long-lived signatures with the ATLAS detector

Content

Various theories beyond the Standard Model predict unique signatures that are difficult to reconstruct and for which estimating the background rate is also a challenge. Signatures from displaced decays anywhere from the inner detector to the muon spectrometer, as well as those of new particles with fractional or multiple values of the charge of the electron or high mass stable charged particles are all examples of experimentally demanding signatures. The talk will focus on the most recent results using 13 TeV pp collision data collected by the ATLAS detector. Prospects for HL-LHC will also be shown.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Searches for BSM physics using challenging and long-lived signatures with the ATLAS detector

Subject

BSM+DM

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **31**

Searches for resonances decaying to boson pairs in ATLAS

Content

Many new physics models predict the existence of new particles decaying into two bosons (W, Z, photon, or Higgs bosons) making these important signatures in the search for new physics. Searches for γγ, Vγ, VV, and VH resonances have been performed in various final states. In some of these searches, jet substructure techniques are used to disentangle the hadronic decay products in highly boosted configurations. This talk summarises recent ATLAS searches with Run 2 data collected at the LHC and explains the experimental methods used, including vector- and Higgs-boson-tagging techniques.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Searches for resonances decaying to boson pairs in ATLAS

Subject

BSM+DM

Primary author: BELLOS, Panagiotis (University of Birmingham (GB))

Presenter: BELLOS, Panagiotis (University of Birmingham (GB))

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **32**

Search for exotic decays of the Higgs boson and additional scalar particles in ATLAS

Content

The discovery of the Higgs boson with the mass of about 125 GeV completed the particle content predicted by the Standard Model. Even though this model is well established and consistent with many measurements, it is not capable of solely explaining some observations. Many extensions of the Standard Model addressing such shortcomings introduce additional Higgs-like bosons which can be either neutral or charged. Exotic decays of the Higgs boson also provide a unique window for the discovery of new physics, as the Higgs boson may couple to hidden-sector states that do not interact under Standard Model gauge transformations. Also, models predicting exotic Higgs boson decays to pseudo-scalars can explain the g-2 and flavour-sector anomalies, and the galactic centre gamma-ray excess if the additional pseudo-scalar acts as the dark matter mediator. This talk presents recent searches for additional low- and high-mass Higgs bosons, as well as decays of the 125 GeV Higgs boson to new particles, using LHC collision data at 13 TeV collected by the ATLAS experiment in Run 2.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Search for exotic decays of the Higgs boson and additional scalar particles in ATLAS

Subject

EW+Top+Higgs

Primary author: ORLANDO, Nicola (Institut de Fisica d'Altes Energies (IFAE))

Presenter: ORLANDO, Nicola (Institut de Fisica d'Altes Energies (IFAE))

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **33**

Searches for Higgs boson pair production with the full LHC Run 2 dataset in ATLAS

Content

The latest results on the production of Higgs boson pairs (HH) in the ATLAS experiment are reported, with emphasis on searches based on the full LHC Run 2 dataset at 13 TeV. In the case of non-resonant HH searches, results are interpreted both in terms of sensitivity to the Standard Model and as limits on the Higgs boson self-coupling. Search results on new resonances decaying into pairs of Higgs bosons are also reported. Prospects of testing the Higgs boson self-coupling at the High Luminosity LHC (HL-LHC) will also be presented.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Searches for Higgs boson pair production with the full LHC Run 2 dataset in ATLAS

Subject

EW+Top+Higgs

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **34**

Searches for strong production of supersymmetric particles with the ATLAS detector

Content

Supersymmetry (SUSY) provides elegant solutions to several problems in the Standard Model, and searches for SUSY particles are an important component of the LHC physics program. Naturalness arguments for weak-scale supersymmetry favour supersymmetric partners of the gluons and third generation quarks with masses light enough to be produced at the LHC. This talk will present the latest results of searches conducted by the ATLAS experiment which target gluino and squark production, including stops and sbottoms, in a variety of decay modes. It covers both R-parity conserving models that predict dark matter candidates and R-parity violating models that typically lead to high-multiplicity final states without large missing transverse momentum.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Searches for strong production of supersymmetric particles with the ATLAS detector

Subject

BSM+DM

Primary author: ANDERS, John Kenneth (Universitaet Bern (CH))

Presenter: ANDERS, John Kenneth (Universitaet Bern (CH))

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **35**

Searches for electroweak production of supersymmetric particles with the ATLAS detector

Content

The direct production of electroweak SUSY particles, including sleptons, charginos, and neutralinos, is a particularly interesting area with connections to dark matter and the naturalness of the Higgs mass. The small production cross sections lead to challenges searches. This talk will highlight the most recent results of searches performed by the ATLAS experiment for supersymmetric particles produced via electroweak processes, including analyses targeting small mass splittings between SUSY particles. Models are targeted in both R-parity conserving as well as R-parity violating scenarios.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

Searches for electroweak production of supersymmetric particles with the ATLAS detector

Subject

BSM+DM

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **36**

ATLAS results on charmonium production and B_c production and decays

Content

Recent results from the proton-proton collision data taken by the ATLAS experiment on the charmonium production and on the B_c production and decays will be presented. The measurement of the associated production of the J/psi meson and a gauge boson, including the separation of single and double parton scattering components, will be discussed. The measurement of J/psi and psi(2S) differential cross sections will be reported as measured on the whole Run 2 dataset. The measurement of the differential ratios of the B_c+ and B+ production cross sections at 8 TeV will also be shown. New results on the B_c decays to J/psi Ds(*) final states obtained with the Run 2 data at 13 TeV will be detailed.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

ATLAS results on charmonium production and B_c production and decays

Subject

QCD+Flavour

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **37**

ATLAS measurements of CP violation and rare decays processes with beauty mesons

Content

The ATLAS experiment has performed measurements of B-meson rare decays proceeding via suppressed electroweak flavour changing neutral currents, and of mixing and CP violation in the neutral Bs meson system. This talk will focus on the latest results from the ATLAS collaboration, such as rare processes B0s ⟶ mu mu and B0 ⟶ mu mu, and CP violation in the B0s —> J/psi phi decays. In the latter, the Standard Model predicts the CP violating mixing phase, phi_s, to be very small and its SM value is very well constrained, while in many new physics models large phi_s values are expected. The latest measurements of phi_s and several other parameters describing the B0s —> J/psi phi decays will be reported.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

ATLAS measurements of CP violation and rare decays processes with beauty mesons

Subject

QCD+Flavour

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **38**

ATLAS results on J/psi p resonances in the Lambda_b -> J/psi p K decays

Content

A study of J/psi p resonances in the Lambda_b -> J/psi p K decays with large m(pK) invariant masses is presented by the ATLAS experiment at the LHC. The analysis is based on a combined sample of pp collision data at centre-of-mass energies of 7 TeV and 8 TeV corresponding to integrated luminosities of 4.9 fb-1 and 20.6 fb-1, respectively. Although the data prefer the model with two or more pentaquark states, the model without pentaquarks is not excluded. The pentaquark masses and widths obtained using the model with two pentaquarks are consistent with those from the LHCb experiment.

Author's Name

Osamu Jinnouchi

Author's Institute

Tokyo Institute of Technology

Author's e-mail

jinnouchi@phys.titech.ac.jp

Abstract Title

ATLAS results on J/psi p resonances in the Lambda_b -> J/psi p K decays

Subject

QCD+Flavour

Primary author: JINNOUCHI, Osamu

Presenter: JINNOUCHI, Osamu

Status: SUBMITTED

Submitted by **DUMARCHEZ, Jacques** on **Thursday, 16 September 2021**

Abstract ID : **39**

BINGO: Bi-Isotope 0ν2β Next Generation Observatory

Content

Neutrinoless double-beta decay (0νββ) is a hypothetical rare nuclear transition. Its observation would provide an important insight into the nature of neutrinos (Dirac or Majorana particle) demonstrating that the lepton number is not conserved. BINGO aims to set the technological and conceptual grounds for future bolometric 0νββ experiments. It is based on a dual heat-light readout, i.e. the main absorber embedding the double-beta decay isotope faced by a light detector. Dual heat-light readout helps to reject the α background component, thanks to the lower light output of α's compared to β/γ's. BINGO will study two of the most promising isotopes: 100Mo embedded in Li2MoO4 and 130Te embedded in TeO2. BINGO's proposed technology is aiming at reducing dramatically the background in the region of interest, thus boosting the discovery sensitivity of 0νββ. This can be achieved by fulfilling the following goals: (i) increasing the light detector sensitivity thanks to Neganov-Luke amplification; (ii) having a revolutionary detector assembly that will reduce the total surface radioactivity contribution; (iii) using an active shield, based on ZnWO4 or BGO scintillator with bolometric readout, to suppress the external gamma background. The proposed solutions will have a high impact on next-generation bolometric tonne-scale experiments, like CUPID.
In this contribution, we present the first results on the revolutionary assembly and on the bolometric veto.

Author's Name

Antoine Armatol

Author's Institute

CEA/IRFU DPhP

Author's e-mail

antoine.armatol@cea.fr

Abstract Title

BINGO: Bi-Isotope 0ν2β Next Generation Observatory

Subject

Neutrinos

Primary author: ARMATOL, Antoine (CEA IRFU/DPhP)

Presenter: ARMATOL, Antoine (CEA IRFU/DPhP)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **ARMATOL, Antoine** on **Friday, 17 September 2021**

Abstract ID : **40**

New features of the Rutherford Backscattering Spectroscopy Method in nanotechnologies with the use of powders

Content

Rutherford Backscattering Spectrometry (RBS) is an ion scattering technique used for compositional thin film that are less than 1μm thick analysis. During an RBS analysis, high-energy He2+ ions with energies in the region from several hundred kiloelectron-volts to 2 - 3 MeV are directed onto the sample and the energy distribution and yield of the backscattered He2+ ions at a given angle is measured. Since the backscattering cross-section for each element is known it is possible to obtain a quantitative compositional depth profile from the RBS spectrum obtained.
The capabilities of this method can be significantly expanded. In particular, the method can be used in powder nanotechnology to study elemental composition in microscopically small objects.
The application of methods based on Rutherford Backscattering Spectrometry is extremely interesting for adsorption energy devices, in particular, these methods can be used with maximum efficiency for various chemoelectronic converters.
A unique opportunity is to study the elemental surface of adsorbates on the surface phase separation in functional nanostructured layers.
For this reason, the preparation of planar-distributed chemoelectronic converters and the study of the elemental composition of adsorbates using the Rutherford Backscattering Spectrometry technique was the purpose for the investigation.
The tasks of this study included: development and optimization of the technology for producing planar chemoelectronic converters a functional layer in the form of rounded drops containing monodisperse nanosized (7.5 μm) particles of a solid solution of the ZrO2 system - 3 mol% Y2O3 (YSZ) in the PVA polymer matrix, study of the theoretical characteristics of the obtained chemoelectronic converters [1], study of the elemental composition of the obtained chemoelectronic converters using Rutherford Backscattering Spectrometry.
The atomic and chemical composition of these layers has been studied using nuclear and atomic methods.
The thickness of the oxide layers was found to be approximately the same for all implanted samples. These values were determined on the basis of Rutherford Backscattering Spectrometry and nuclear reactions (RBS/NR).

The study was performed in the scope of the H2020/MSCA/RISE/SSHARE number 871284 project, RO-JINR project No. 366 / 2021 item 82-83, RO-JINR grant No. 367 / 2021 item 27, and Poland-JINR Projects No. 168 / 2021 item 26.

Author's Name

Alisa Tatarinova

Author's Institute

JINR

Author's e-mail

w99_9@yahoo.com

Abstract Title

New features of the Rutherford Backscattering Spectroscopy Method in nanotechnologies with the use of powders

Subject

QCD+Flavour

Primary author: TATARINOVA, Alisa (JINR)

Presenter: TATARINOVA, Alisa (JINR)

Status: SUBMITTED

Submitted by **TATARINOVA, Alisa** on **Sunday, 19 September 2021**

Abstract ID : **41**

The ATLAS Upgrade Program

Content

After 9 years of successful operation in proton-proton collisions at sqrt(s) = 13 TeV, the ATLAS detector started in 2018 the preparations for an ambitious physics project, aiming the exploration of very rare processes and extreme phase spaces, an endeavor that will require a substantial increase in the amount of data taken. To accomplish this purpose, a comprehensive upgrade of the detector and associated systems was devised and planned to be carried out in two phases. The Phase-I upgrade program foresees new features for the muon detector, for the electromagnetic calorimeter trigger system and for all trigger and data acquisition chain. These upgrades are expected to be fully functional in 2021 and will enable ATLAS to carry on its physics program at a two fold increased luminosity. Upon reaching an integrated luminosity of 350 fb-1, the LHC will undergo a new upgrade, becoming then the High-Luminosity LHC (Hl_LHC). The HL-LHC will reach an instantaneous ultimate luminosity of 7.5x1034 cm-2s-1, which will enable the experiments to accumulate 4 ab-1 of integrated luminosity in about 10 years of operation. The challenges the ATLAS experiment will face during the HL-LHC stage are paramount, as it will have to cope with more than 200 simultaneous collisions per bunch crossing with many subsystems exposed to very high radiation levels. To preserve its performance, the ATLAS detector will require a major upgrade program, known as Phase-II upgrade program. During the Phase-II upgrade, a completely new all-silicon tracker with extended rapidity coverage will replace the current inner tracker detector; the calorimeters and muon systems will have their trigger and data acquisition systems fully redesigned, allowing the implementation of a free-running readout system. Finally, a new subsystem called High Granularity Timing Detector will aid the track-vertex association in the forward region by incorporating timing information to the reconstructed tracks. This presentation will summarize the expected performance of the aforementioned projects, as well as the new insights gained during the construction phase.

Author's Name

Marco Leite

Author's Institute

The ATLAS Collaboration

Author's e-mail

leite@cern.ch

Abstract Title

The ATLAS Upgrade Program

Subject

EW+Top+Higgs

Primary authors: LISBOA LEITE, Marco (Universidade de Sao Paulo (BR)); THE ATLAS COLLABORATION

Presenter: LISBOA LEITE, Marco (Universidade de Sao Paulo (BR))

Contribution Type: Oral

Comments:

This abstract is entered by the ATLAS Upgrade Speakers Committee representative. If the abstract is accepted, a speaker will be selected and the organization will be informed

Status: SUBMITTED

Submitted by **LISBOA LEITE, Marco** on **Monday, 20 September 2021**

Abstract ID : **42**

The Muon Puzzle in air showers and its connection to the LHC

Content

High-energy cosmic rays are observed indirectly by detecting the extensive air showers initiated in Earth's atmosphere. An air shower is a hadronic cascade, which feeds a muon component via decay. The muon number is a key observable to infer the mass composition of cosmic rays. The interpretation of these observations relies on accurate models of air shower physics, which is a challenge and an opportunity to test QCD under extreme conditions. Air shower simulations with state-of-the-art QCD models show a significant muon deficit with respect to measurements; this is called the Muon Puzzle. The origin of this discrepancy has been traced to the composition of secondary particles in hadronic interactions. The muon discrepancy starts at the TeV scale in the centre-of-mass frame, which suggests that the origin should be observable at the Large Hadron Collider. An effect that can potentially explain the puzzle has been observed at the LHC, but needs to be confirmed with forward facing experiments, and with future data on oxygen beams.

Author's Name

Hans Dembinski

Author's Institute

TU Dortmund

Author's e-mail

hans.dembinski@tu-dortmund.de

Abstract Title

The Muon Puzzle in air showers and its connection to the LHC

Subject

QCD+Flavour

Primary author: Dr DEMBINSKI, Hans Peter (TU Dortmund)

Presenter: Dr DEMBINSKI, Hans Peter (TU Dortmund)

Contribution Type: Oral

Comments:

Invited talk

Status: SUBMITTED

Submitted by **Dr DEMBINSKI, Hans Peter** on **Wednesday, 22 September 2021**

Abstract ID : **43**

Implications of B-physics anomalies for LFU violations in τ decays

Content

The evidence for Lepton Flavour Universality (LFU) violation in semileptonic B-decays has been rising over the past few years. Relying on generic effective field theory (EFT) results, it has been shown that models addressing the B-anomalies necessarily lead, at one-loop, to deviations from LFU in τ decays at the few per-mil level. Once a (renormalizable) UV model is specified, the leading-log EFT result receives finite corrections from the matching at the UV scale. We discuss such corrections in a motivated class of models for the B-anomalies, based on an extended $SU(4)\times SU(3)\times SU(2)\times U(1)$ gauge sector. In this scenario, we obtain precise predictions for the effective W-boson coupling to τ leptons in terms of the masses and couplings of the new heavy fields. We confirm a few per-mil deviation from the Standard Model expectation, within reach of future high-precision experiments.

Author's Name

Lukas Allwicher

Author's Institute

University of Zurich

Author's e-mail

lukas.allwicher@physik.uzh.ch

Abstract Title

Implications of B-physics anomalies for LFU violations in τ decays

Subject

BSM+DM

Primary author: ALLWICHER, Lukas (University of Zurich)

Co-authors: ISIDORI, Gino; SELIMOVIC, Nudzeim

Presenter: ALLWICHER, Lukas (University of Zurich)

Status: SUBMITTED

Submitted by **ALLWICHER, Lukas** on **Wednesday, 22 September 2021**

Abstract ID : **44**

The NP06/ENUBET project

Content

The ENUBET experiment, included in the CERN Neutrino Platform effort as NP06/ENUBET, is developing a new neutrino beam based on conventional techniques in which the flux and the flavor composition are known with unprecedented precision ($\mathcal{O}(1\%)$). Such a goal is accomplished monitoring the associated charged leptons produced in the decay region of the ENUBET facility. Positrons and muons from kaon decays are measured by a segmented calorimeter instrumenting the walls of the decay tunnel, while muon stations after the hadron dump can be used to monitor the neutrino component from pion decays. Furthermore, the narrow momentum width (<10%) of the beam provides a precise measurement ($\mathcal{O}(10\%)$) of the neutrino energy on an event by event basis, thanks to its correlation with the radial position of the interaction at the neutrino detector. ENUBET is therefore an ideal facility for a high precision neutrino cross-section measurement at the GeV Scale, that could enhance the discovery potential of the next-generation of long baseline experiments. It is also a powerful tool for testing the sterile neutrino hypothesis and to investigate possible non-standard interactions.

In this contribution the design of the beamline and of the monitoring instrumentation will be shown. A new improved design of the proton target and of the meson transfer line ensures a larger neutrino flux while preserving a purity in the lepton monitoring similar to the one previously achieved. A demonstrator of the instrumented decay tunnel is currently being built and will be exposed to particle beams at CERN in 2022 to prove the effectiveness of the approach. Progress on the full simulation of the ENUBET facility and of the lepton reconstruction, towards the full assessment of neutrino flux systematics, will be also reported, together with the physics potential of the ENUBET beam.

Author's Name

Fabio Pupilli

Author's Institute

INFN-Padova

Author's e-mail

fabio.pupilli@pd.infn.it

Abstract Title

The NP06/ENUBET project

Subject

Neutrinos

Primary author: PUPILLI, Fabio (Universita e INFN, Padova (IT))

Presenter: PUPILLI, Fabio (Universita e INFN, Padova (IT))

Contribution Type: Oral

Comments:

on behalf of the ENUBET collaboration, that will select in due time the speaker

Status: SUBMITTED

Submitted by **PUPILLI, Fabio** on **Wednesday, 22 September 2021**

Abstract ID : **45**

Status of QUBIC, the Q&U Bolometric Interferometer for Cosmology

Content

QUBIC is an experiment dedicated to the measurement of the B-mode polarization in the Cosmic Microwave Background (CMB) radiation. Primordial B-modes are a major signature from cosmic inflation that would have happened right after the Big Bang. The QUBIC instrument relies on an innovative technology: Bolometric Interferometry.

Measurement of the extremely weak B-mode signal requires exquisite control of systematic effects. This is an important advantage of bolometric interferometry thanks to self-calibration, a technique coming from interferometry, and to a specific optical design ensuring minimal cross-polarization.

A second challenge for this measurement is the mitigation of astrophysical foregrounds which contaminate the signal of the primordial universe. For this purpose, bolometric interferometry makes spectral imaging possible, i.e. the reconstruction, in post-processing, of sky maps in several frequency sub-bands even though the instrument integrates the signal in a wide band. Knowing that foregrounds have distinct emission spectra, spectral imaging is the key to eliminate these contaminants.

The QUBIC project recently completed the calibration and the validation of the instrument and it has been sent to Argentina. Observation of the sky will begin after another short calibration campaign in the laboratory. In this presentation, I will give an overview of the instrument status and forecasts for B-mode measurement.

Author's Name

Louise Mousset

Author's Institute

APC

Author's e-mail

mousset@apc.in2p3.fr

Abstract Title

Status of QUBIC, the Q&U Bolometric Interferometer for Cosmology

Subject

Astro/Cosmo

Primary author: MOUSSET, Louise (APC)

Presenter: MOUSSET, Louise (APC)

Contribution Type: Oral

Comments:

for the QUBIC collaboration.

Status: SUBMITTED

Submitted by **MOUSSET, Louise** on **Thursday, 23 September 2021**

Abstract ID : **46**

Highlights from heavy-flavour measurements in heavy-ion collisions with ALICE at the LHC

Content

The LHC heavy-ion physics program aims at investigating the properties of strongly-interacting matter in extreme conditions of temperature and energy density where the quark-gluon plasma (QGP) is formed. Heavy quarks (charm and beauty quarks), mostly produced via hard partonic scattering processes in the very early stage of the collisions, are efficient probes of the properties and dynamics of the QGP through its full evolution.
The ALICE detector uses its excellent tracking, vertexing and particle identification capabilities to reconstruct heavy-flavour hadrons and leptons from heavy-flavour hadron decays in a wide kinematic range.
A review of recent highlights of open heavy-flavour and quarkonium measurements, obtained in heavy-ion collisions with the ALICE detector at the LHC will be presented. Comparisons with theoretical model calculations will also be discussed.

Author's Name

Nicole BASTID for the ALICE Collaboration

Author's Institute

Laboratoire de Physique de Clermont

Author's e-mail

nicole.bastid@clermont.in2p3.fr

Abstract Title

Highlights from heavy-flavour measurements in heavy-ion collisions with ALICE at the LHC

Subject

QCD+Flavour

Primary author: BASTID, Nicole (Université Clermont Auvergne (FR))

Presenter: BASTID, Nicole (Université Clermont Auvergne (FR))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **BASTID, Nicole** on **Thursday, 23 September 2021**

Abstract ID : **47**

The final result of GERDA

Content

Hidden by their tiny mass, neutrinos may carry a profound secret with far-reaching consequences for both particle physics and cosmology. Given zero electric charge and no color, they may be Majorana particles - fermions which are their own anti-particles. Double beta decay offers a unique probe for this hypothesis. Finding *no neutrinos*, but solely two electrons sharing the full available decay energy, would prove lepton number non-conservation and unveil the Majorana character of neutrinos. The Germanium Detector Array (GERDA) experiment has searched for this decay, operating enriched high-purity germanium detectors in an instrumented low-background liquid argon environment at Laboratori Nazionali del Gran Sasso (LNGS) in Italy. In a total exposure of more than 100 kg yr, taken under record-low background conditions, *no signal was found*. The corresponding half-life limit is $1.8{\cdot}10^{26}$ yr at 90% C.L., and coincides with the median sensitivity for the null hypothesis. Under standard assumptions and given the most recent nuclear structure calculations for ^{76}Ge, the effective Majorana mass is constrained to <[79,180] meV. I will provide insight into major building blocks of this result, which is paving the way for future germanium double beta decay experiments.

Author's Name

Christoph Wiesinger

Author's Institute

Max Planck Institute for Physics, Technical University of Munich

Author's e-mail

cwies@mpp.mpg.de

Abstract Title

The final result of GERDA

Subject

Neutrinos

Primary author: WIESINGER, Christoph (MPP, TUM)

Presenter: WIESINGER, Christoph (MPP, TUM)

Contribution Type: Oral

Comments:

for the GERDA collaboration

Status: SUBMITTED

Submitted by **WIESINGER, Christoph** on **Thursday, 23 September 2021**

Abstract ID : **48**

The Large Enriched Germanium Experiment for Neutrinoless Double Beta Decay (\textsc{Legend})

Content

The observation of neutrinoless double beta ($0\nu\beta\beta$) decay would establish both the violation of lepton number conservation and the Majorana nature of the neutrino. It would also constrain the neutrino mass scale in the picture of light-neutrino exchange. A non-observation at a level below 10~meV for the effective Majorana neutrino mass $m_{\beta\beta}$ would exclude the inverted mass ordering. A discovery-capable experiment covering the parameter space of the inverted ordering requires a tonne-scale experiment with excellent energy resolution and extremely low background in the region of interest. The ^{76}Ge experiments \textsc{Gerda} and the Majorana Demonstrator, which both operated High-Purity Germanium detectors until 2020, lead the field in the achieved energy resolution and ultra-low background. Building on this success, the \textsc{Legend} collaboration pursues a tonne-scale ^{76}Ge experiment in a staged approach. The first 200~kg stage is under construction reusing the \textsc{Gerda} infrastructure at LNGS and will begin commissioning end of 2021. The projected half-life discovery potential of the proposed tonne-scale stage lies beyond 10^{28} years and will allow to explore the parameter space of the inverted neutrino mass ordering.

Author's Name

Valentina Biancacci

Author's Institute

Università degli Studi di Padova & INFN

Author's e-mail

valentina.biancacci@pd.infn.it

Abstract Title

The Large Enriched Germanium Experiment for Neutrinoless Double Beta Decay (Legend)

Subject

Neutrinos

Primary author: BIANCACCI, Valentina (Università di Padova & INFN)

Presenter: BIANCACCI, Valentina (Università di Padova & INFN)

Status: SUBMITTED

Submitted by **BIANCACCI, Valentina** on **Thursday, 23 September 2021**

Abstract ID : **49**

Cross sections measurement and search for exotic states at BESIII

Content

With the data samples collected above DDbar open charm threshold at BESIII, Born cross sections of electron positron annihilation into various final states have been measured, in order to search exotic charmonium-like states. Some recent results will be reported in this presentation including the following processes: e+ e- -> D*s+ DsJ-, e+ e- -> gamma chi_c0/1/2, e+ e- -> pi+ pi- psi(2S), observation of psi(3770) -> Lambda anti-Lambda.

Author's Name

Marco MAGGIORA

Author's Institute

INFN TORINO

Author's e-mail

marco.maggiora@unito.it

Abstract Title

Cross sections measurement and search for exotic states at BESIII

Subject

QCD+Flavour

Primary author: MAGGIORA, Marco (Universita e INFN Torino (IT))

Presenter: MAGGIORA, Marco (Universita e INFN Torino (IT))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **LIU, Beijiang** on **Friday, 24 September 2021**

Abstract ID : **50**

Hadronic charm decays at BESIII

Content

BESIII has collected 2.93 fb-1 of data at 3.773 GeV, 6.3 fb-1 of data between 4.18 and 4.23 GeV, and 4.4 fb-1 of data between 4.6 and 4.7 GeV, respectively. The data set collected at 3.773 GeV contains quantum-correlated D0D0bar pairs that allow access to the phase differences between amplitudes. We will report the measurements of strong phase differences in D0(-bar) decays, such as K_S/L pi+ pi-, K_S/L K+ K-, K- pi+ pi0 and K- pi+ pi+ pi-, which are key to constraining the future gamma/phi3 measurements at LHCb and Belle II. In addition, we will present the measurements of the absolute branching fraction or amplitude analysis of hadronic decays of D+, D0, Ds+ and Lambda_c+.

Author's Name

Alex Gilman

Author's Institute

Oxford

Author's e-mail

alex.gilman@physics.ox.ac.uk

Abstract Title

Hadronic charm decays at BESIII

Subject

QCD+Flavour

Primary author: GILMAN, Alex

Presenter: GILMAN, Alex

Status: SUBMITTED

Submitted by **LIU, Beijiang** on **Friday, 24 September 2021**

Abstract ID : **51**

Light hyperon physics at BESIII

Content

The BESIII experiment at the electron positron collider BEPCII in Beijing is successfully operating since 2008 and has collected large data samples in the tau-mass region, including the world's largest data samples at the J/psi and psi(2S) resonances. The recent observations of hyperon polarizations at BESIII opens a new window for testing CP violation, as it allows for simultaneous production and detection of hyperon and anti-hyperon pair two body weak decays. The CP-symmetry tests can be performed in processes like e.g. J/psi —> Lambda Lambdabar, J/psi —> Sigma Sigmabar and J/psi —> Xi Xibar. For the Xi —> Lambda pi decay it is possible to perform three independent CP tests and determine the strong phase and weak phase difference. In this presentation an outline of the methods and recent results achieved at BESIII will be highlighted.

Author's Name

Varvara Batozskaya

Author's Institute

NCBJ

Author's e-mail

varvara.batozskaya@ncbj.gov.pl

Abstract Title

Light hyperon physics at BESIII

Subject

QCD+Flavour

Primary author: BATOZSKAYA, Varvara (National Centre for Nuclear Research (PL))

Presenter: BATOZSKAYA, Varvara (National Centre for Nuclear Research (PL))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **LIU, Beijiang** on **Friday, 24 September 2021**

Abstract ID : **52**

Status and physics prospects of the JUNO detector

Content

The Jiangmen Underground Neutrino Observatory (JUNO) is a next generation multipurpose liquid scintillator detector being built in China. It is composed by 20 kton of high purity liquid scintillator, read-out by a dual system: the LPMT (Large PMT) system (18000 20-inch photomultipliers) and the SPMT (Small PMT) one (25600 3-inch photomultipliers). The experiment is submerged in a water pool shielding acting as a water Cherenkov detector which, along with a top tracker above it, will allow to control the background due to cosmic rays. The JUNO detector design is optimised towards the determination of the neutrino mass ordering by reaching an unprecedented energy resolution and a low background. This is done by measuring the electron antineutrino spectrum produced by two nuclear power plants located at a distance of about 50 km from the detector. In addition to the determination of the neutrino mass ordering, JUNO will address a wide range of topics in neutrino physics: the sub-percent measurement of three oscillation parameters from reactor neutrino oscillations, the detection of solar, atmospheric and supernova neutrinos as well as the search for physics beyond the Standard Model. This talk presents the detector design and construction status of JUNO, as well as the physics reach of the experiment, which is expected to start taking data in 2023.

Author's Name

Marta Colomer Molla

Author's Institute

IIHE (ULB)

Author's e-mail

marta.colomer@ulb.be

Abstract Title

Status and physics prospects of the JUNO detector

Subject

Neutrinos

Primary author: COLOMER, marta (km3net)

Presenter: COLOMER, marta (km3net)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **COLOMER, marta** on **Friday, 24 September 2021**

Abstract ID : **53**

Flavor alignment of New Physics in light of the $(g-2)_\mu$ anomaly

Content

We investigate the flavor alignment conditions that New Physics (NP) models need to satisfy in order to address the $(g-2)_\mu$ anomaly and, at the same time, be consistent with the tight bounds from $\mu \to e\gamma$ and other rare flavor-violating processes. We investigate the problem in general terms within the SMEFT, analyzing the RGE evolution of all the relevant operators. We show that semi-leptonic four-fermion operators, which are natural candidates to address the $(g-2)_\mu$ anomaly, need to be tightly aligned to the Yukawa couplings in flavor space. While this tuning can be achieved in specific NP constructions, it is problematic in a wide class of models with broken flavor symmetries, such as those proposed to address both charged- and neutral-current B anomalies. We quantify this tension both in general terms, and in the context of explicit NP constructions.

Author's Name

Felix Wilsch

Author's Institute

University of Zurich

Author's e-mail

felix.wilsch@physik.uzh.ch

Abstract Title

Flavor alignment of New Physics in light of the $(g-2)_\mu$ anomaly

Subject

QCD+Flavour

Primary author: Mr WILSCH, Felix (University of Zurich)

Co-authors: Prof. ISIDORI, Gino (University of Zurich); Ms PAGÈS, Julie (University of Zurich)

Presenter: Mr WILSCH, Felix (University of Zurich)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **WILSCH, Felix** on **Friday, 24 September 2021**

Abstract ID : **54**

A 5D model for B anomalies and flavour

Content

Since the Standard Model (SM) was completed, the flavour problem, i.e. the look for an explanation for the hierarchical structure of the masses and mixings of the SM fermions, has remained as one of the biggest mysteries in Particle Physics. Although this hierarchy could have an origin at a very high energy scale impossible to test in experiments in the near future, the appearance of B-anomalies in the last years suggests a different road to address this problem. These deviations in the observed decays of the bottom quark seem to hint new physics at the multi-TeV scale that couples stronger to the third family and, therefore, violates the flavour symmetry of the SM. This suggests a possible connection with the flavour problem: the generation of the Yukawa couplings in the SM for the three families could be associated to three different energy scales, causing the hierarchy. The third-family Yukawas would have their origin in this new multi-TeV scale, and the second-and-first-family Yukawas in sequentially heavier scales.

Guided by these considerations, we propose a 5D model that tries to address all these problems at once, explaining the B-anomalies, the hierarchical structure of flavour in the SM and, partially, the hierarchy problem of the Higgs mass (up to the first-family scale at $\sim 10^5$TeV).

Author's Name

Javier M. Lizana

Author's Institute

University of Zurich

Author's e-mail

jlizana@physik.uzh.ch

Abstract Title

A 5D model for B anomalies and flavour

Subject

BSM+DM

Primary author: LIZANA, Javier M. (University of Zurich)

Presenter: LIZANA, Javier M. (University of Zurich)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **LIZANA, Javier M.** on **Friday, 24 September 2021**

Abstract ID : **55**

Indirect dark matter searches with the MAGIC telescopes

Content

MAGIC is a system of two Cherenkov telescopes located on the Canary island of La Palma, at the Roque de Los Muchachos Observatory. In this contribution, recent results in searches for dark matter with MAGIC will be reviewed, covering a large sample of targets and a wide range of possible dark matter masses. In particular, the results presented will include the search for decaying dark matter in the Galactic halo, the search for line-like annihilation signals in the Galactic Centre and the search for annihilating dark matter in dwarf spheroidal galaxies.

Author's Name

Daniel Kerszberg

Author's Institute

IFAE-BIST

Author's e-mail

dkerszberg@ifae.es

Abstract Title

Indirect dark matter searches with the MAGIC telescopes

Subject

BSM+DM

Primary author: KERSZBERG, Daniel (IFAE - Institute for High Energy Physics)

Presenter: KERSZBERG, Daniel (IFAE - Institute for High Energy Physics)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **KERSZBERG, Daniel** on **Friday, 24 September 2021**

Abstract ID : **56**

Atmospheric Neutrino Oscillation Measurements with IceCube DeepCore

Content

The DeepCore sub-array of the IceCube neutrino telescope detects large numbers of atmospheric neutrinos at energies as low as 5 GeV, allowing for observations of neutrino oscillations via muon neutrino disappearance. A new sample of atmospheric neutrino events from 8 years of DeepCore data with improved event selection and reconstruction methods has been developed that will be the basis for several highly sensitive analyses of neutrino oscillation parameters. This talk presents a standard 3-flavor oscillation measurement using a sub-selection of this new event sample, consisting of highly pure muon neutrino events. In addition, the sensitivity that will be achieved with the full sample is presented.

Author's Name

Alexander Trettin

Author's Institute

Deutsches Elektronensynchrotron DESY Zeuthen

Author's e-mail

alexander.trettin@desy.de

Abstract Title

Atmospheric Neutrino Oscillation Measurements with IceCube DeepCore

Subject

Neutrinos

Primary author: TRETTIN, Alexander (Deutsches Elektronen-Synchrotron DESY)

Presenter: TRETTIN, Alexander (Deutsches Elektronen-Synchrotron DESY)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **TRETTIN, Alexander** on **Friday, 24 September 2021**

Abstract ID : **57**

Effective comparison of neutrino-mass models

Content

The low-energy predictions of different new-physics models are most conveniently compared within the formalism of effective field theory. To illustrate the benefits of this approach, we derive the Wilson coefficients for a set of representative neutrino-mass models. We then show that it becomes straightforward to identify the most relevant experimental constraints, to analyse the allowed parameter space of each model, and to discriminate between them.

Author's Name

Michele Frigerio

Author's Institute

Laboratoire Charles Coulomb, CNRS, Montpellier

Author's e-mail

michele.frigerio@umontpellier.fr

Abstract Title

Effective comparison of neutrino-mass models

Subject

BSM+DM

Primary author: FRIGERIO, Michele (Laboratoire Charles Coulomb, CNRS)

Presenter: FRIGERIO, Michele (Laboratoire Charles Coulomb, CNRS)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **FRIGERIO, Michele** on **Sunday, 26 September 2021**

Abstract ID : **58**

The ASTRI Mini-Array at the Observatorio del Teide

Content

The ASTRI Mini-Array (ASTRI-MA) is an international ground-based project for gamma-ray astronomy led by the Italian National Institute of Astrophysics (INAF) with the participation of the Instituto de Astrofisica de Canarias, la Fundación Galileo Galilei, the University of Sao Paulo (Brazil), and the North-West University (South Africa) and other Italian universities. The array of nine Imaging Atmospheric Cherenkov Telescopes (IACTs) is going to be installed at the Teide Observatory, at Tenerife (Spain). The main aim of the project is observing the Very High Energy gamma-ray sky in the range of a few TeV up to 100 TeV and beyond at high flux sensitivity and, at the same time, very good angular and energy resolutions. The array will become operational within the next few years. The nine aplanatic Cherenkov telescopes of 4 m and double mirror configuration diameter are equipped with cameras based on silicon photo-multipliers to cover a large field-of-view (~10 deg in diameter) developed by INAF. The overall set of technologies used for the ASTRI mini-array were previously tested on the ASTRI-Horn telescope, an almost identical prototype developed by INAF operating on the slopes of Mt. Etna (Sicily, Italy).The ASTRI-MA will allow us to perform deep observations of the galactic and extragalactic sources, providing a fully functional complement to both present and next-generation gamma-ray observatories in the Northern Hemisphere such as MAGIC, VERITAS, LHAASO, HAWC and CTAO-N. In this contribution the project status, the science potential and the potential synergies with other VHE facilities of the ASTRI Mini-Array will be reviewed.

Author's Name

Stefano Germani

Author's Institute

Università degli Studi di Perugia

Author's e-mail

stefano.germani@unipg.it

Abstract Title

The ASTRI Mini-Array at the Observatorio del Teide

Subject

Astro/Cosmo

Primary authors: GERMANI, Stefano (Perugia University); ASTRI COLLABORATION

Presenter: GERMANI, Stefano (Perugia University)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GERMANI, Stefano** on **Monday, 27 September 2021**

Abstract ID : **59**

From XENON1T to XENONnT: Latest Results and First Light

Content

For more than a decade, the XENON Collaboration has been designing and operating a family of liquid xenon-filled detectors with the primary aim of catching Dark Matter Weakly Interacting Massive Particles (WIMPs). Although the path to discovery is still open, the successive XENON detectors always placed the most stringent limits to the WIMP interaction cross section with ordinary matter, in particular thanks to their highly controlled radioactive environment. Despite being first optimised for this kind of search, the very low background achieved by the XENON1T experiment made it sensitive to other sectors in new physics (light Dark Matter, solar axions, etc.) and a variety of processes involving neutrinos (double electron capture, solar neutrinos, etc.).
In this talk, the latest results obtained with the XENON1T experiment will be discussed and the starting performance of its heir XENONnT–currently taking science data–will be reviewed.

Author's Name

Erwann Masson

Author's Institute

IJCLab & LPNHE (CNRS)

Author's e-mail

masson@lal.in2p3.fr

Abstract Title

From XENON1T to XENONnT: Latest Results and First Light

Subject

BSM+DM

Primary author: Dr MASSON, Erwann (IJCLab & LPNHE (CNRS))

Presenter: Dr MASSON, Erwann (IJCLab & LPNHE (CNRS))

Contribution Type: Oral

Comments:

On behalf of the XENON Collaboration

Status: SUBMITTED

Submitted by **Dr MASSON, Erwann** on **Monday, 27 September 2021**

Abstract ID : **60**

Direct Dark Matter search with the CRESST-III Experiment

Content

CRESST (Cryogenic Rare Event Search with Superconducting Thermometers) is a direct dark matter search experiment located at the Gran Sasso Underground Laboratory (Italy) that uses scintillating cryogenic calorimeters as target material for elastic DM-nucleus scattering. The current phase of the experiment, CRESST-III, is optimized for low-energy nuclear recoil detection. It has reached an unprecedented value of 30 eV for nuclear recoil energy thresholds on a $CaWO_4$ target, allowing the exploration of low-mass dark matter candidates down to 0.16 GeV/c². The sensitivity is currently limited by a rising event rate (from threshold up to few hundreds of eV) from a so-far unknown origin.

Currently dedicated measurements with upgraded detectors — including different target materials — are being performed at the Gran Sasso Underground Laboratory, with the goal of investigating and identifying the origin of the event excess.

In this contribution, the current stage of the CRESST-III experiment, together with the most recent dark matter results, will be presented.

Author's Name

Tobias Ortmann

Author's Institute

Technical University of Munich

Author's e-mail

tobias.ortmann@tum.de

Abstract Title

Direct Dark Matter search with the CRESST-III Experiment

Subject

BSM+DM

Primary author: ORTMANN, Tobias (TU München)

Presenter: ORTMANN, Tobias (TU München)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **ORTMANN, Tobias** on **Wednesday, 29 September 2021**

Abstract ID : **61**

Fast estimation of small p-values with nested sampling

Content

We propose a novel method for computing p-values based on nested sampling (NS) applied to the sampling space rather than the parameter space of the problem, in contrast to its usage in Bayesian computation. The computational cost of NS scales as $\log^2 1/p$, which compares favorably to the $1/p$ scaling for Monte Carlo (MC) simulations. For significances greater than about 4σ in both a toy problem and a simplified resonance search, we show that NS requires orders of magnitude fewer simulations than ordinary MC estimates.

Author's Name

Andrew Fowlie

Author's Institute

Nanjing Normal University

Author's e-mail

andrew.j.fowlie@njnu.edu.cn

Abstract Title

Fast estimation of small p-values with nested sampling

Subject

EW+Top+Higgs

Primary authors: FOWLIE, Andrew (Nanjing Normal University); HANDLEY, Will (University of Cambridge); HOOF, Sebastian (Georg-August-Universität Göttingen)

Presenter: FOWLIE, Andrew (Nanjing Normal University)

Contribution Type: Oral

Comments:

Powerful new method relevant to the discovery of new phenomena throughout HEP

Status: SUBMITTED

Submitted by **Dr FOWLIE, Andrew** on **Thursday, 30 September 2021**

Abstract ID : **62**

QCD, electroweak physics, and searches for exotic signatures in the forward region at LHCb

Content

The LHCb experiment is a single-arm spectrometer designed for the study of heavy flavour physics at the LHC, but also an excellent general purpose experiment for the study of quantum chromodynamics in the forward region. The forward acceptance make the LHCb data particular interesting for many applications in astroparticle physics, which are dominated by forward hadron production. We present four analyses that investigate aspects of strong interactions in pp, pPb, and PbPb collisions from 5.02 TeV to 13 TeV.

Author's Name

Hans Dembinski

Author's Institute

TU Dortmund

Author's e-mail

hans.dembinski@tu-dortmund.de

Abstract Title

QCD, electroweak physics, and searches for exotic signatures in the forward region at LHCb

Subject

QCD+Flavour

Primary author: Dr DEMBINSKI, Hans Peter (TU Dortmund)

Presenter: Dr DEMBINSKI, Hans Peter (TU Dortmund)

Contribution Type: Oral

Comments:

on behalf of the LHCb Collaboration

Status: SUBMITTED

Submitted by **Dr DEMBINSKI, Hans Peter** on **Friday, 1 October 2021**

Abstract ID : **63**

Observing the universe in very-high-energy gamma rays: highlights from the MAGIC telescopes

Content

MAGIC is a stereoscopic system of two Imaging Atmospheric Cherenkov Telescopes (IACT), located at the Observatorio Roque de los Muchachos, at a height of 2200 m above sea level, on the Canary island of La Palma.
The instrument, equipped with reflectors of 17 m diameter, is sensitive to gamma rays in an energy range spanning from tens of GeV to tens of TeV.
Since its conception, one of the MAGIC key science projects has been the follow up of gamma ray bursts (GRBs), the sources with the brightest (transient) electromagnetic emission in the universe.
I will report on recent observations of these sources by MAGIC, since the first milestone detection of TeV gamma rays from GRB190114C.
I will discuss the astrophysical implication of very-high-energy (VHE, E > 100 GeV) emission from GRBs along with results on fundamental physics that can be derived from the same observations.
I will also present other topics of relevance in the quest for cosmic particle accelerators and describe the interaction of MAGIC with other high-energy astrophysical facilities in the multi-messenger era.

Author's Name

Cosimo Nigro

Author's Institute

Institut de Física d'Altes Energies (IFAE)

Author's e-mail

cosimo.nigro@ifae.es

Abstract Title

Observing the universe in very-high-energy gamma rays: highlights from the MAGIC telescopes

Subject

Astro/Cosmo

Primary author: NIGRO, Cosimo (Institut de Física d'Altes Energies (IFAE))

Presenter: NIGRO, Cosimo (Institut de Física d'Altes Energies (IFAE))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **NIGRO, Cosimo** on **Friday, 1 October 2021**

Abstract ID : **64**

Latest results from Belle II

Content

Latest results from Belle II

Author's Name

Tadeas Bilka

Author's Institute

Charles Univ., Prague

Author's e-mail

tadeas.bilka@gmail.com

Abstract Title

Latest results from Belle II

Subject

QCD+Flavour

Primary author: BILKA, Tadeas (Charles University (CZ))

Presenter: BILKA, Tadeas (Charles University (CZ))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **65**

Dark sector searches at Belle II

Content

Dark sector searches at Belle II

Author's Name

Sascha Dreyer

Author's Institute

DESY

Author's e-mail

sascha.dreyer@desy.de

Abstract Title

Dark sector searches at Belle II

Subject

BSM+DM

Primary author: DREYER, Sascha Simon (Deutsches Elektronen-Synchrotron DESY)

Presenter: DREYER, Sascha Simon (Deutsches Elektronen-Synchrotron DESY)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **66**

Mixing and CPV in beauty and charm at LHCb

Content

Mixing and CPV in beauty and charm at LHCb

Author's Name

Andrea Merli

Author's Institute

Milano

Author's e-mail

andrea.merli@cern.ch

Abstract Title

Mixing and CPV in beauty and charm at LHCb

Subject

QCD+Flavour

Primary author: MERLI, Andrea (Università degli Studi e INFN Milano (IT))

Presenter: MERLI, Andrea (Università degli Studi e INFN Milano (IT))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **67**

Lepton flavour universality tests and related measurements at LHCb

Content

Lepton flavour universality tests and related measurements at LHCb

Author's Name

Julian Lomba Castro

Author's Institute

Santiago de Compostela

Author's e-mail

julian.lomba.castro@cern.ch

Abstract Title

Lepton flavour universality tests and related measurements at LHCb

Subject

QCD+Flavour

Primary author: LOMBA CASTRO, Julian (Universidade de Santiago de Compostela (ES))

Presenter: LOMBA CASTRO, Julian (Universidade de Santiago de Compostela (ES))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **68**

The ALICE experiment upgrade

Content

The results collected so far by the ALICE experiment have represented an important step forward in our understanding of theQuark Gluon Plasma (QGP). However, the full characterisation of the properties of the QGP requires high-precision measurements of light and heavy flavour, quarkonium, jet and (real and virtual) photon production over a wide momentum range. In order to achieve these goals, the ALICE Collaboration has implemented a major upgrade of the experimental apparatus, aimed to the improvement of the track reconstruction performance and to the increase of the event readout rate up to 50 kHz for Pb–Pb collisions in continuous readout mode. To this aim, among other activities, two new arrays of detectors have been installed in ALICE, both based on state-of-the art Monolithic Active Pixel sensor. The old Inner Tracking System has been completely replaced by a new tracker made of seven pixel layers, and a Muon Forward Tracker has been added in front of the Muon Spectrometer. The main physics issues that will be opened to exploration with the upgraded experimental apparatus will be shown, together with an overview of the characteristics of the ITS and MFT detectors.

Author's Name

Alessandro Ferretti

Author's Institute

Turin

Author's e-mail

ferretti@to.infn.it

Abstract Title

ALICE upgrades

Subject

QCD+Flavour

Primary author: FERRETTI, Alessandro (Universita e INFN Torino (IT))

Presenter: FERRETTI, Alessandro (Universita e INFN Torino (IT))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **69**

Leptophilic New Physics

Content

Leptophilic New Physics

Author's Name

Fiona Kirk

Author's Institute

PSI

Author's e-mail

fiona.kirk@psi.ch

Abstract Title

Leptophilic New Physics

Subject

QCD+Flavour

Primary author: KIRK, Fiona (University of Zurich, PSI)

Presenter: KIRK, Fiona (University of Zurich, PSI)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **70**

Top quark properties in CMS

Content

Top quark properties in CMS

Author's Name

Javier Brochero

Author's Institute

Universidad de Cantabria

Author's e-mail

javier.brochero.cifuentes@cern.ch

Abstract Title

Top quark properties in CMS

Subject

EW+Top+Higgs

Primary author: BROCHERO, Javier (Universidad de Cantabria and CSIC (ES))

Presenter: BROCHERO, Javier (Universidad de Cantabria and CSIC (ES))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **71**

Searches with boosted objects in CMS

Content

Searches with boosted objects in CMS

Author's Name

Ksenia de Leo

Author's Institute

University of Hamburg

Author's e-mail

ksenia.de.leo@uni-hamburg.de

Abstract Title

Searches with boosted objects in CMS

Subject

BSM+DM

Primary author: DE LEO, Ksenia (Hamburg University)

Presenter: DE LEO, Ksenia (Hamburg University)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **72**

Rare top quark production in CMS: ttZ, ttW, ttgamma, tZ, tgamma, and tttt production

Content

Rare top quark production in CMS: ttZ, ttW, ttgamma, tZ, tgamma, and tttt production

Author's Name

David Walter

Author's Institute

DESY

Author's e-mail

david.walter@desy.de

Abstract Title

Rare top quark production in CMS: ttZ, ttW, ttgamma, tZ, tgamma, and tttt production

Subject

EW+Top+Higgs

Primary author: WALTER, David (Deutsches Elektronen-Synchrotron (DE))

Presenter: WALTER, David (Deutsches Elektronen-Synchrotron (DE))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **73**

Top quark cross sections in CMS

Content

Top quark cross sections in CMS

Author's Name

Nicolas Pierre Chanon

Author's Institute

IPN, IN2P3-CNRS, UCB Lyon 1

Author's e-mail

nicolas.pierre.chanon@cern.ch

Abstract Title

Top quark cross sections in CMS

Subject

EW+Top+Higgs

Primary author: CHANON, Nicolas Pierre (Centre National de la Recherche Scientifique (FR))

Presenter: CHANON, Nicolas Pierre (Centre National de la Recherche Scientifique (FR))

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **74**

Selected results on VBS and VBF processes from CMS

Content

Selected results on VBS and VBF processes from CMS

Author's Name

Mattias Lizzo

Author's Institute

Univ. di Firenze e Sez. dell'INFN

Author's e-mail

mattia.lizzo@cern.ch

Abstract Title

Selected results on VBS and VBF processes from CMS

Subject

EW+Top+Higgs

Primary author: LIZZO, Mattia (Universita e INFN, Firenze (IT))

Presenter: LIZZO, Mattia (Universita e INFN, Firenze (IT))

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **75**

Selected highlights from dark matter searches with CMS

Content

Selected highlights from dark matter searches with CMS

Author's Name

Reham Aly

Author's Institute

Univ. di Bari e Sez. dell'INFN

Author's e-mail

reham.aly@cern.ch

Abstract Title

Selected highlights from dark matter searches with CMS

Subject

BSM+DM

Primary author: ALY, Reham (Bari University - Italy)

Presenter: ALY, Reham (Bari University - Italy)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **76**

Selected SUSY results from CMS

Content

Selected SUSY results from CMS

Author's Name

Andra Trapote Fernandez

Author's Institute

Universidad de Oviedo

Author's e-mail

trapoteandrea@uniovi.es

Abstract Title

Selected SUSY results from CMS

Subject

BSM+DM

Primary author: TRAPOTE FERNANDEZ, Andrea (Universidad de Oviedo (ES))

Presenter: TRAPOTE FERNANDEZ, Andrea (Universidad de Oviedo (ES))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **77**

Measurements of Higgs boson properties at CMS

Content

Measurements of Higgs boson properties at CMS

Author's Name

Valeria Botta

Author's Institute

RWTH, I. Physik. Inst.

Author's e-mail

botta@physik.rwth-aachen.de

Abstract Title

Measurements of Higgs boson properties at CMS

Subject

EW+Top+Higgs

Primary author: BOTTA, Valeria (RWTH Aachen University (DE))

Presenter: BOTTA, Valeria (RWTH Aachen University (DE))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **78**

EW precision measurements in single boson production at CMS

Content

EW precision measurements in single boson production at CMS

Author's Name

Kenneth David Long

Author's Institute

CERN

Author's e-mail

kenneth.long@cern.ch

Abstract Title

EW precision measurements in single boson production at CMS

Subject

EW+Top+Higgs

Primary author: LONG, Kenneth (CERN)

Presenter: LONG, Kenneth (CERN)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **79**

EW precision measurements in diboson production at CMS

Content

EW precision measurements in diboson production at CMS

Author's Name

Pietro Vischia

Author's Institute

Univ. Catholique de Louvain

Author's e-mail

pietro.vischia@gmail.com

Abstract Title

EW precision measurements in diboson production at CMS

Subject

EW+Top+Higgs

Primary author: VISCHIA, Pietro (Universite Catholique de Louvain (UCL) (BE))

Presenter: VISCHIA, Pietro (Universite Catholique de Louvain (UCL) (BE))

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **80**

coherent elastic neutrino-nucleus scattering (CEvNS)

Content

coherent elastic neutrino-nucleus scattering (CEvNS)

Author's Name

Carlo Giunti

Author's Institute

INFN Turino and U. of Turin

Author's e-mail

carlo.giunti@to.infn.it

Abstract Title

coherent elastic neutrino-nucleus scattering (CEvNS)

Subject

Neutrinos

Primary author: GIUNTI, Carlo (INFN)

Presenter: GIUNTI, Carlo (INFN)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Sunday, 3 October 2021**

Abstract ID : **81**

DarkSide-20k and the Future Liquid Argon Dark Matter Program

Content

DarkSide run since mid-2015 a 50-kg-active-mass dual-phase Liquid Argon Time Projection Chamber (TPC), filled with low radioactivity argon from an underground source and produced world-class results for both the low mass ($M_{WIMP} < 10GeV/c^2$) and high mass ($M_{WIMP} > 100GeV/c^2$) direct detection search for dark matter.

The next stage of the DarkSide program will be a new generation experiment involving a global collaboration from all the current Argon based experiments. DarkSide-20k is designed as a 20-tonne fiducial mass dual-phase Liquid Argon TPC with SiPM based cryogenic photosensors and is expected to be free of any instrumental background for exposure of >100 tonne x year. Like its predecessor, DarkSide-20k will be housed at the INFN Gran Sasso (LNGS) underground laboratory, and it is expected to attain a WIMP-nucleon cross-section exclusion sensitivity of $7.4 \times 10^{-48}\, cm^2$ for a WIMP mass of $1TeV/c^2$ in a 200 t yr run. DarkSide-20k will be installed inside a membrane cryostat containing more than 700 t of liquid Argon and be surrounded by an active neutron veto based on a Gd-loaded acrylic shell. The talk will give the latest updates of the ongoing R\&D and prototype tests validating the detector design

Author's Name

Masayuki Wada

Author's Institute

AstroCeNT, Nicolaus Copernicus Astronomical Center

Author's e-mail

masayuki@camk.edu.pl

Abstract Title

DarkSide-20k and the Future Liquid Argon Dark Matter Program

Subject

BSM+DM

Primary author: WADA, Masayuki

Presenter: WADA, Masayuki

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Tuesday, 5 October 2021**

Abstract ID : **82**

Results of the Relic Axion Dark-Matter Exploratory Setup

Content

We present the results of the Relic Axion Dark-Matter Exploratory Setup (RADES), a detector which is part of the CERN Axion Solar Telescope (CAST), searching for axion dark matter in the 34.67μeV mass range. The RADES detector represents an approach to higher masses for axion haloscope searches, and has improved the previous strongest limit on the axion-photon coupling set by CAST, over the mass range of [34.6378,34.6771] μeV.

Author's Name

Cristian Cogollos

Author's Institute

CERN

Author's e-mail

cristian.cogollos@cern.ch

Abstract Title

Rades

Subject

BSM+DM

Primary author: COGOLLOS, Cristian (ICCUB)

Presenter: COGOLLOS, Cristian (ICCUB)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Friday, 8 October 2021**

Abstract ID : **83**

Indirect Dark-Matter Searches in Very-High-Energy Gamma Rays with VERITAS

Content

In the current cosmological paradigm, Dark Matter (DM) constitutes a large portion (about 27 %) of the mass and energy content of the Universe. One DM candidate, the Weakly Interacting Massive Particle (WIMP), can potentially have a mass in the range from 50 GeV to greater than 10 TeV. Self-annihilation and/or decay of WIMPs may produce various secondary particles, producing very-high-energy gamma rays (VHE; above 100 GeV). The Very Energetic Radiation Imaging Telescope Array System (VERITAS) is a ground-based VHE telescope array designed for detecting gamma-rays in the energy range from 100 GeV up to 10 TeV. Part of the VERITAS scientific program is to search for indirect DM signals from astrophysical objects which are expected to have high-density DM regions, such as dwarf spheroidal galaxies (dSphs) and the Milky Way galactic center. In this talk, we present our extensive observation results and new methods for constraining the WIMP annihilation cross section.

Author's Name

Donggeun Tak

Author's Institute

DESY

Author's e-mail

donggeun.tak@desy.de

Abstract Title

Indirect Dark-Matter Searches in Very-High-Energy Gamma Rays with VERITAS

Subject

BSM+DM

Primary author: TAK, Donggeun (DESY)

Presenter: TAK, Donggeun (DESY)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Friday, 8 October 2021**

Abstract ID : **84**

Results of T2K

Content

Results of T2K

Author's Name

Adrian Blanchet

Author's Institute

LPNHE

Author's e-mail

ablanche@lpnhe.in2p3.fr

Abstract Title

Results of T2K

Subject

Neutrinos

Primary author: BLANCHET, Adrian (LPNHE)

Presenter: BLANCHET, Adrian (LPNHE)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Friday, 8 October 2021**

Abstract ID : **85**

Dark matter searches with the IceCube Neutrino Telescope

Content

IceCube is a neutrino detector situated at the South Pole. Among the science goals of the collaboration, the search for dark matter with neutrinos is recognized as a unique way to prove its existence. For a variety of models, neutrinos are involved in dark matter interactions, thus, the study of neutrino fluxes could indicate the presence of dark matter. Searches in IceCube have been mainly focused on the observation of regions where an over-density of dark matter is expected, such as the Galactic centre, clusters of galaxies, and local sources such as the Sun and the centre of the Earth. IceCube has set limits on the main measurable dark matter quantities, such as the WIMP self-annihilation cross-section and the spin-dependent and -independent WIMP-nucleon cross-section. These limits are, in some cases, world-leading. This talk aims at presenting the most recent results in IceCube and the most recent developments in this field.

Author's Name

Giovanni Renzi

Author's Institute

IIHE - Université Libre de Bruxelles

Author's e-mail

giovanni.renzi@icecube.wisc.edu

Abstract Title

Dark matter searches with the IceCube Neutrino Telescope

Subject

BSM+DM

Primary author: RENZI, Giovanni

Presenter: RENZI, Giovanni

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Saturday, 9 October 2021**

Abstract ID : **86**

Recent results from the Pierre Auger Observatory

Content

The Surface Detector (SD) of the Pierre Auger Observatory consists of 1664 Water Cherenkov detectors covering 3000 km². With more than 15 years of operation, the Pierre Auger Observatory provides the worlds largest statistics on ultra-high-energy cosmic rays. Moreover, by employing 27 Fluorescence telescopes to cross-calibrate the SD, a detailed program to monitor the atmosphere and measure its properties, the energy of the primary particle is determined with less than 15% systematic uncertainty. Enhancements ofthe Observatory (nested arrays and underground muon detectors) provide the possibility of measuring the characteristics of cosmic rays to low energies. The large statistics and the very good precision of the measurements allow us to determine new features in the energy spectrum, a dipole in the arrival directions, a dependence of the mass composition on the sky position, discrepancies between theoretical models of particle production in air-showers and data and more. We will present results on the energy spectrum, mass composition and arrival direction of comic rays in a wide energy range (0.1 EeV to above 100 EeV). The status of the AugerPrime upgrade of the Observatory and its expected performance will also be briefly mentioned.

Author's Name

Ioana Maris

Author's Institute

ULB

Author's e-mail

Ioana.Maris@ulb.be

Abstract Title

Recent results from the Pierre Auger Observatory

Subject

Astro/Cosmo

Primary author: MARIS, Ioana (Université Libre de Bruxelles)

Presenter: MARIS, Ioana (Université Libre de Bruxelles)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Saturday, 9 October 2021**

Abstract ID : **87**

Survey Validation of DESI

Content

The DESI survey will measure with high precision the baryon acoustic feature imprinted on the large-scale structure of the Universe, as well as the distortions of galaxy clustering due to redshift-space effects. To achieve these goals, the survey will make spectroscopic observations of four distinct classes of extragalactic sources – nearby bright galaxies, luminous red galaxies, star-forming emission line galaxies, and quasars.

In order to test the different target selection approaches and to optimize the exposure time for each target class before beginning five years of DESI operations, DESI has performed a Survey Validation from Dec. 20 to April 21. We present the results obtained with this survey validation of DESI.

Author's Name

Christophe Yeche

Author's Institute

IRFU, Saclay

Author's e-mail

christophe.yeche@cea.fr

Abstract Title

Survey Validation of DESI

Subject

Astro/Cosmo

Primary author: YECHE, Christophe (CEA-Saclay)

Presenter: YECHE, Christophe (CEA-Saclay)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Monday, 11 October 2021**

Abstract ID : **88**

Dark Matter Searches with the High Altitude Water Cherenkov Observatory

Content

The search for Dark Matter (DM) is closely tied to precision measurements of very-high-energy Galactic and extra-galactic emission from point and diffuse sources. The High Altitude Water Cherenkov (HAWC) Observatory has been performing an unbiased survey of the Northern sky at energies above ~300 GeV since becoming fully operational in 2015. HAWC's wide field-of-view enables indirect searches for Weakly Interacting Massive Particle (WIMP) DM mass ~100 TeV from diverse targets including galaxy clusters, dwarf spheroidal galaxies, the galactic halo and the Sun. Beyond the WIMP, HAWC's sensitivity to transient bursts of gamma rays provides a window into the early universe through searches for evaporating Primordial Black holes. I will present an overview of DM searches with HAWC and present some of the world's strongest constraints on indirect DM searches at the TeV scale.

Author's Name

Dan Salazar-Gallegos

Author's Institute

Michigan State University

Author's e-mail

salaza82@msu.edu

Abstract Title

Dark Matter Searches with the High Altitude Water Cherenkov Observatory

Subject

BSM+DM

Primary author: SALAZAR-GALLEGOS, Daniel Nicholas

Presenter: SALAZAR-GALLEGOS, Daniel Nicholas

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Monday, 11 October 2021**

Abstract ID : **89**

Heavy flavour spectroscopy at LHCb

Content

Heavy flavour spectroscopy at LHCb

Author's Name

Sara Mitchell

Author's Institute

Edinburgh

Author's e-mail

s1872836@sms.ed.ac.uk

Abstract Title

Heavy flavour spectroscopy at LHCb

Subject

QCD+Flavour

Primary author: MITCHELL, Sara Elizabeth (Edinburgh)

Presenter: MITCHELL, Sara Elizabeth (Edinburgh)

Contribution Type: Oral

Status: SUBMITTED

Submitted by **GROJEAN, Christophe** on **Monday, 11 October 2021**