The 41st International Symposium on Physics in Collision

Report of Contributions

https://indico.cern.ch/e/pic2022

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

Welcome from TSU

Tuesday, 6 September 2022 10:00 (10 minutes)

Session Classification: Session 1

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

PIC2022 organization

Tuesday, 6 September 2022 10:10 (10 minutes)

Session Classification: Session 1

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

Heavy Ion Physics

Tuesday, 6 September 2022 10:20 (40 minutes)

Presenter: Prof. KABANA, Sonja

Session Classification: Session 1

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

Review of the Higgs boson quantum numbers

Tuesday, 6 September 2022 11:30 (30 minutes)

Presenter: TEUSCHER, Richard

Session Classification: Session 2

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

Review on Higgs boson couplings

Tuesday, 6 September 2022 12:00 (40 minutes)

Presenter: CHEN, Mingshui

Session Classification: Session 2

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

W-mas from LHC

Tuesday, 6 September 2022 14:30 (40 minutes)

Presenter: GIULI, Francesco

Session Classification: Session 3

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

Triple and quartic gauge boson couplings

Tuesday, 6 September 2022 15:10 (40 minutes)

Presenter: ROLAND, Christophe Pol A

Session Classification: Session 3

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

top quark mass and couplings

Tuesday, 6 September 2022 16:20 (30 minutes)

Presenter: CARDILLO, Fabio

Session Classification: Session 4

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

top quark production

Tuesday, 6 September 2022 16:50 (30 minutes)

Presenter: BROCHERO, Javier

Session Classification: Session 4

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

Charm mixing, CPV, Rare Decays

Wednesday, 7 September 2022 09:00 (40 minutes)

Presenter: KODASSERY, Prasanth Krishnan

Session Classification: Session 5

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

Charm Decays

Wednesday, 7 September 2022 09:40 (40 minutes)

Presenter: Prof. MA, Hailong

Session Classification: Session 5

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

B Physics and CKM Matrix

Wednesday, 7 September 2022 10:40 (40 minutes)

Presenter: PAKHLOV, Pavel

Session Classification: Session 6

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

B Physics: Anomalies

Wednesday, 7 September 2022 11:20 (40 minutes)

Presenter: BARSUK, Sergey

Session Classification: Session 6

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

Heavy Spectroscopy

Wednesday, 7 September 2022 12:00 (40 minutes)

Presenter: Prof. LYU, Xiao-Rui

Session Classification: Session 6

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

BSM: search for additional Higgs bosons

Wednesday, 7 September 2022 14:30 (30 minutes)

Presenter: KAADZE, Keti

Session Classification: Session 7

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

SUSY+Exotics heavy state searches

Wednesday, 7 September 2022 15:00 (40 minutes)

Presenter: XU, Da

Session Classification: Session 7

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

Long baseline accelerator neutrino experiments

Thursday, 8 September 2022 09:30 (40 minutes)

Presenter: KUDENKO, Yury

Session Classification: Session 9

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

CEvNS (Coherent Elastic Neutrino-Nucleus Scattering)

Thursday, 8 September 2022 10:10 (30 minutes)

Presenter: Dr WONGJIRAD, Taritree

Session Classification: Session 9

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

Solar neutrinos

Thursday, 8 September 2022 11:10 (40 minutes)

Presenter: PELICCI, Luca

Session Classification: Session 10

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

Searches for DSNB neutrinos and prospect for detecting CCSN neutrinos

Thursday, 8 September 2022 11:50 (40 minutes)

Presenter: MARTI, Lluis

Session Classification: Session 10

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

Searches for neutrino-less double beta decay

Thursday, 8 September 2022 14:30 (40 minutes)

Presenter: GARFAGNINI, Alberto

Session Classification: Session 11

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

Reactor neutrino experiments with km-scale baseline

Thursday, 8 September 2022 15:10 (40 minutes)

Presenter: NAUMOV, Dimitry

Session Classification: Session 11

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

Cosmic ray physics

Thursday, 8 September 2022 16:50 (40 minutes)

Presenter: Prof. MARIS, Ioana

Session Classification: Session 12

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

High energy neutrino and multi-message searches

Thursday, 8 September 2022 16:10 (40 minutes)

Presenter: Prof. TJUS, Julia

Session Classification: Session 12

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

VHE-gamma sources

Thursday, 8 September 2022 17:30 (40 minutes)

Presenter: Dr CONG, Li

Session Classification: Session 12

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

GW O3 Results

Friday, 9 September 2022 10:00 (40 minutes)

Presenter: PICCINNI, Ornella Juliana

Session Classification: Session 13

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

Review on Axions

Friday, 9 September 2022 10:40 (30 minutes)

Presenter: Dr BRAGGIO, Caterina

Session Classification: Session 14

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

Search for Axion-like particles

Friday, 9 September 2022 11:10 (30 minutes)

Presenter: KARANTH, Swathi

Session Classification: Session 14

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

PIC2023

Friday, 9 September 2022 11:40 (20 minutes)

Presenter: KABANA, Sonja

Session Classification: Session 14

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

Light dark/hidden sector search

Tuesday, 6 September 2022 17:20 (30 minutes)

Presenter: TROJANOWSKI, Sebastian

Session Classification: Session 4

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

High Precision Muon Reconstruction Performance with ATLAS at LHC

Wednesday, 7 September 2022 16:00 (5 minutes)

Muon reconstruction performance plays a crucial role in the precision and sensitivity of the Large Hadron Collider (LHC) data analysis of the ATLAS experiment. The 139 fb-1 of proton-proton collision data collected during the LHC Run-2 poses both a challenge and opportunity for the detector performance. Using di-muon resonances we are able to calibrate to sub per-mil accuracy the detector response for electrons and muons.This talk will present recently released results significantly improving the measurement of muon reconstruction, identification and calibration performance with innovative techniques. New analysis techniques are exploited which involve multivariate analyses for rejecting background hadrons from prompt leptons from the hard interactions as well as innovative in-situ corrections on data that reduce biases in muon momenta induced from residual detector displacements. These techniques are fundamental for improving the reach of measurements and searches involving leptons, such as Higgs decays to dileptons and ZZ or high precision measurements of fundamental constants of the SM such as the Higgs and W masses or the Weinberg's weak mixing angle.

Presenter: YAN, Siyuan

Session Classification: Lightning talk session

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

Tests of Standard Model with beauty meson rare decay processes and CP-violation measurements at ATLAS

Wednesday, 7 September 2022 16:05 (5 minutes)

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 B0s meson system. This poster will focus on the latest results from the ATLAS collaboration, such as rare processes B0s⟶μμ and B0d⟶μμ, and CP violation in B0s⟶J/ψ ϕ decays, where the CP-violation phase ϕs can be measured together with the B0s lifetime properties.

Presenter: NOVOTNY, Lukas

Session Classification: Lightning talk session

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

Measurement of electroweak Z(nunu)y production and limits on anomalous quartic gauge couplings in pp collisions at sqrt(s)=13 TeV with the ATLAS detector

The electroweak production of Z(nunu)y in association with two jets is studied in a regime with a photon of high transverse momentum above 150 GeV using proton-proton collisions at centre-of-mass energy of 13 TeV at the Large Hadron Collider. The analysis uses a data sample with an integrated luminosity of 139 fb-1 collected by the ATLAS detector during the 2015-2018 LHC data taking period. This process is an important probe of the electroweak symmetry breaking mechanism in the Standard Model and is sensitive to quartic gauge boson couplings via vector-boson scattering. The fiducial Z(nunu)y cross section for electroweak production is measured to be 0.77+0.34/-0.30 fb and is consistent with the Standard Model prediction. Evidence for the electroweak Z(nunu)y production is found with an observed significance of 3.2 sigma in the background-only hypothesis, compared with an expected significance of 3.7 sigma. The combination of this result with the previously published ATLAS observation of electroweak Z(nunu)y production yields in an observed (expected) signal significance of 6.3 sigma (6.6 sigma). Limits on anomalous quartic gauge boson couplings are obtained in the framework of effective field theory with dimension-eight operators.

Presenter: KUROVA, Anastasia

Session Classification: Lightning talk session

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

Response of the ATLAS Tile Calorimeter at Test Beams using Phase II upgrade readout

Wednesday, 7 September 2022 16:10 (5 minutes)

The Large Hadron Collider (LHC) Phase II upgrade aims to increase the accelerator luminosity by a factor of 5-10. Due to the expected higher radiation levels and the aging of the current electronics, a new readout system of the ATLAS experiment hadronic calorimeter (TileCal) is needed. A prototype of the upgrade TileCal electronics has been tested using the beam from the Super Proton Synchrotron (SPS) accelerator at CERN.

Data were collected with beams of muons, electrons and hadrons at various incident energies and impact angles. The muons data allow to study the dependence of the response on the incident point and angle in the cell. The electron data are used to determine the linearity of the electron energy measurement. The hadron data will allow to tune the calorimeter response to pions and kaons modelling to improve the reconstruction of the jet energies. The results of the ongoing data analysis will be presented in the poster.

Primary authors: ZAKAREISHVILI, Tamar (Ivane Javakhishvili Tbilisi State University (GE)); FALTOVA, Jana (Charles University (CZ))

Presenter: ZAKAREISHVILI, Tamar (Ivane Javakhishvili Tbilisi State University (GE))

Session Classification: Lightning talk session

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

Response of the ATLAS Tile Calorimeter to single isolated charged hadrons

Wednesday, 7 September 2022 16:15 (5 minutes)

The response of the ATLAS hadronic Tile Calorimeter to single isolated charged hadrons is probed analysing of LHC proton-proton collisions data at √s = 13 TeV collected in 2017 and corresponding to an integrated luminosity of 144.9 pb-1. The calorimeter response is determined as the ratio of the energy deposited in the calorimeter (E) divided by the momentum measured in the ATLAS Inner Detector (p). The average of E/p measured in data is 0.5896 ± 0.0001 (stat), compared to an expected value of 0.593 ± 0.001 (stat) obtained using Pythia8 simulated multijet events. A good agreement between experimental and simulated results is observed confirming the goodness of the calorimeter energy calibration at the EM scale.

Primary authors: DURGLISHVILI, Archil (Ivane Javakhishvili Tbilisi State University (GE)); FALTOVA, Jana (Charles University (CZ))

Presenter: DURGLISHVILI, Archil (Ivane Javakhishvili Tbilisi State University (GE))

Session Classification: Lightning talk session

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

Physics Prospects of the JUNO Experiment

Wednesday, 7 September 2022 16:20 (5 minutes)

The Jiangmen Underground Neutrino Observatory (JUNO) is a 20 kton liquid scintillator detector with the main goal to determine the neutrino mass ordering (NMO). JUNO construction in southern China,in an underground laboratory with 650 m rock overburden, is expected to be completed by the end of 2023.
Thanks to high scintillation light yield, high transparency, 78% optical coverage and large photon detection efficiency, JUNO will achieve an unprecedented energy resolution of 3% at 1MeV. This challenging design is required in order to achieve a 3σ sensitivity to neutrino mass ordering within 6 years measurements of reactor antineutrinos, with 53 km baseline. JUNO is the only experiment that will tackle the NMO using the neutrino oscillation in vacuum, complementary to other experiments exploiting the matter effects on oscillation of atmospheric and accelerator neutrinos.
The precision measurements of the oscillation pattern, JUNO will determine the neutrino oscillation parameters Δm^2_{12}, θ_{12}, Δm^2_{13} with sub-percent precision. Furthermore, JUNO has a vast potential for other fields in (astro-)particle physics, with energies ranging from sub-MeV to several GeV, covering solar, geo, supernova, and atmospheric neutrinos, as well as the potential to search for rare processes and physics beyond the standard model. This poster gives an overview of the JUNO experiment with a focus on its physics potential on the various topics described above.

Primary author: RIFAI, Mariam

Presenter: RIFAI, Mariam

Session Classification: Lightning talk session

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

Ultrahigh Vacuum Developments for the Einstein Telescope

Wednesday, 7 September 2022 16:25 (5 minutes)

The Einstein Telescope, the European Gravitational Detector of the next generation, will need the largest ultrahigh vacuum system ever build. I will present some of the development towards this system.

Primary author: Prof. STAHL, Achim (Rheinisch Westfaelische Tech. Hoch. (DE))

Presenter: Prof. STAHL, Achim (Rheinisch Westfaelische Tech. Hoch. (DE))

Session Classification: Lightning talk session

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

Broad Band Waveguide to Coaxial Transition for HOM Suppression in RF Cavities for Future Synchrotron Light Sources

Wednesday, 7 September 2022 16:30 (5 minutes)

In the modern storage ring light sources, exploiting multi-bunch beams, the longitudinal and transverse coupled bunch instabilities are predominantly driven by higher order modes (HOM) of the accelerator RF cavities. In order to suppress the HOM to a harmless level, we propose using a modified broadband waveguide to coaxial line transitions placed on the cavity body, similar to those used for the DAΦNE collider RF cavities. Such a solution has a simple design that avoids the application of the ferrite materials under the ultra-high vacuum and dissipates the HOM power on the external loadings. Different from DAΦNE with a single cavity per ring, where the damping waveguides are placed laterally on the cavity body, we consider the possibility of allocating the waveguides vertically. Since the modern synchrotron light sources require using more RF cavities to compensate for the synchrotron radiation losses, such a solution helps to save the occupied space when placing the cavities in a row next to each other. This paper describes the design optimization process and discusses the obtained results concerning the effectiveness of the HOM suppression and minimization of the impact of the transitions on the fundamental mode parameters.

Primary author: BILANISHVILI, SHALVA

Presenter: BILANISHVILI, SHALVA

Session Classification: Lightning talk session

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

Extraction of the reactor neutrino spectral distortion in the Double Chooz experiment

Wednesday, 7 September 2022 16:35 (5 minutes)

Double Chooz was a reactor neutrino disappearance experiment operating between 2011 and 2018. Its primary purpose was precisely measuring the neutrino mixing angle θ_{13}. The experimental setup consisted of two identical liquid scintillator detectors at average baselines of about 400 m and 1 km to two nuclear reactor cores in Chooz, France. The neutrinos were detected by measuring the inverse beta decay (IBD) signature, which consists of a prompt positron annihilation and a delayed neutron capture signal. The simultaneous measurement of the neutrino energy spectra with two detectors is used in a Poisson-based likelihood fit to obtain the neutrino mixing angle θ_{13}. Deviations to the reactor neutrino model prediction are incorporated by considering systematic differences in both detector data sets. This technique can extract the infamous spectral distortion observed by all reactor neutrino experiments. This poster explains the extraction method and shows the deviations from the reactor neutrino prediction.

Primary author: NOT SUPPLIED, Philipp Soldin

Co-authors: STAHL, Achim (Rheinisch Westfaelische Tech. Hoch. (DE)); WIEBUSCH, Christopher (Rheinisch Westfaelische Tech. Hoch. (DE))

Presenter: NOT SUPPLIED, Philipp Soldin

Session Classification: Lightning talk session

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

Current status and prospects in the field of solar neutrinos

Energy production in our Sun, carried out through the fusion of hydrogen to helium, is accounted for by two distinct processes: the proton-proton (pp) chain and the carbon- nitrogen-oxygen (CNO) cycle. Both sequences of reactions involve the production of several electron flavor neutrinos, the so-called solar neutrinos. Over the last decades, their detection has brought to light a useful connection between elementary particle physics and astrophysics. Along with the measurement of atmospheric neutrinos, solar neutrinos provided the experimental proof of the neutrino flavor oscillation, and thus the evidence of physics beyond the Standard Model, which represents a milestone in modern particle physics. Furthermore, being produced in the fusion reactions occurring in the core of the Sun, solar neutrinos have contributed to broadening our understanding of the internal mechanisms of stars. Although thoroughly studied, solar neutrino physics still represents a rich field of research since we have reached the era of precision measurements. In this talk, an overview of the most recent results in this field, along with the most important physics implications, will be presented. Particular focus will be dedicated to the recent results achieved by the Borexino experiment, regarding the comprehensive spectroscopy of neutrinos emitted in the pp chain and the experimental confirmation of the occurrence of CNO cycle. Moreover, SuperKamiokande results on the precision measurement of boron-8 neutrinos and its implication on oscillation physics will be described. In conclusion, a summary of the open questions and prospects in the solar neutrino field will be discussed.

Primary author: PELICCI, Luca (Forschungszentrum Jülich and Aachen University)

Presenter: PELICCI, Luca (Forschungszentrum Jülich and Aachen University)

Session Classification: Lightning talk session

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

Partition Pooling for Convolutional Graph Network Applications in Particle Physics

Wednesday, 7 September 2022 16:45 (5 minutes)

Convolutional Graph Networks (CGN) can be used for effective parameter estimations and event classification based on sensor-level data. However, if applied to the static sensor arrangement of modern particle detectors, the CGN performance can be limited by the considerable number of sensors. A scheme analogous to conventional pooling on images that uses graph partitioning to create pooling kernels is presented. With partition pooling, successful image recognition architectures can be adopted to graph neural network applications in particle physics. These architectures often rely on dimensionality reduction via pooling, which also helps to reduce computational costs. The latter allows for deeper networks and more extensive hyperparameter optimizations. A CGN, including partition pooling, is compared with a similar network without pooling performing vertex reconstructions in an idealized neutrino detector. The pooling improves the performance and makes the network less susceptible to overfitting. Due to the lower computational resource requirements, it is feasible to construct a deeper network, which further improves the performance.

Primary author: BACHLECHNER, Markus

Co-authors: STAHL, Achim (Rheinisch Westfaelische Tech. Hoch. (DE)); WIEBUSCH, Christopher (Rheinisch Westfaelische Tech. Hoch. (DE)); SOLDIN, Philipp (RWTH Aachen University); BIRKENFELD, Thilo (RWTH Aachen University)

Presenter: BACHLECHNER, Markus

Session Classification: Lightning talk session

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

The KM3NeT Project

Wednesday, 7 September 2022 16:50 (5 minutes)

Abstract. KM3NeT is a research infrastructure housing the next generation of Cherenkov neutrino telescopes. It consists of two detectors with similar technology currently under construction in the Mediterranean Sea: ARCA (off-shore Sicily, Italy) and ORCA (off-shore Toulon, France) dedicated to Astroparticle and Oscillation Research with Cosmics in the Abyss, respectively. ARCA will instrument 1 Gton of seawater, with the primary goal of detecting high energy cosmic neutrinos from distant astrophysical sources with energies between tens of GeV and PeV., while ORCA has a denser instrumentation in a smaller volume of few Mtons. ORCA will detect atmospheric neutrinos in the 1 - 100 GeV energy range, studying neutrino properties. In this poster we present the KM3NeT project, current status and expected performances on measurements of the neutrino oscillation parameters, the mass ordering, the diffuse neutrino flux and the search for supernovae.

Primary author: KISTAURI, Giorgi (Tbilisi State University)

Co-authors: PAPALASHVILI, Gogita (Tbilisi State University); SHANIDZE, Rezo

Presenter: KISTAURI, Giorgi (Tbilisi State University)

Session Classification: Lightning talk session

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

Recent results from the KM3NeT Experiment

Wednesday, 7 September 2022 16:55 (5 minutes)

KM3NeT is a European research infrastructure project currently under construction at two locations in the Mediterranean Sea. The project aims to detect the neutrinos in the energy range from a few GeV up to a few PeV with two detectors: ORCA (Oscillation Research with Cosmics in the Abyss) for low energy neutrinos and ARCA (Astroparticle Research with Cosmics in the Abyss) for high energy neutrinos. ORCA detector is optimised for neutrino physics, whereas ARCA is designed for neutrino astronomy. This poster describes recent results from the KM3NeT experiment obtained with six deployed detection units of ARCA and ORCA, respectively. Although these configurations represent a small fraction of final ORCA (115 detection units) and ARCA (2x115 detection units) telescopes, promising results have been obtained for neutrino oscillations and neutrino astronomy.

Primary authors: PAPALASHVILI, Gogita (HEPI, TSU); KISTAURI, Giorgi; SHANIDZE, revaz

Presenter: PAPALASHVILI, Gogita (HEPI, TSU)

Session Classification: Lightning talk session