Lake Louise Winter Institute 2022

Report of Contributions

https://indico.global/e/470

Contribution ID: **271** Type: **not specified**

10 Years on - The Higgs Boson at the LHC

Monday 21 February 2022 08:30 (1 hour)

Recent results on Higgs boson physics by the CMS collaboration will be presented. Emphasis will be put on measurements and searches exploiting the full statistical power of the dataset, heavily using machine learning techniques, collected during run2 of the LHC. The 138 fbˆ-1 of integrated luminosity gathered provide access to previously unreachable levels of precision, both in the measurement of the physical properties of the Higgs boson as well as in the ability to use the Higgs boson as a portal to search for physics beyond the Standard Model of particle physics. I will discuss prospects for further improvements in the measurements in the forthcoming run of the LHC and how the upgrades to the detector for the HL-LHC will advance these measurements and searches

Summary

Presenter: RUSACK, Roger (University of Minnesota (US))

Session Classification: Monday

Contribution ID: **272** Type: **not specified**

Dark matter review

Monday 21 February 2022 18:15 (1 hour)

Summary

Presenter: VAN TILBURG, Ken

Session Classification: Monday

Contribution ID: **273** Type: **not specified**

Binary systems and gravitational waves

Tuesday 22 February 2022 11:00 (1 hour)

Presenter: ROTHSTEIN, Ira (CMU)

Session Classification: Tuesday

Contribution ID: **274** Type: **not specified**

Muon g-2 from lattice QCD

Tuesday 22 February 2022 20:50 (50 minutes)

Presenter: GÉRARDIN, Antoine

Session Classification: Tuesday

Contribution ID: **275** Type: **not specified**

Muon g-2 Experiment from Fermilab

Tuesday 22 February 2022 20:00 (50 minutes)

Summary

Presenter: BINNEY, Hannah

Session Classification: Tuesday

Contribution ID: **276** Type: **not specified**

Muon g-2 puzzle

Wednesday 23 February 2022 08:30 (1 hour)

Presenter: HOFERICHTER, Martin (University of Bern)

Session Classification: Wednesday

Contribution ID: **277** Type: **not specified**

Neutrino physics

Wednesday 23 February 2022 09:30 (1 hour)

Presenter: DUFFY, Kirsty

Session Classification: Wednesday

Contribution ID: **278** Type: **not specified**

Nuclear medium and QCD

Thursday 24 February 2022 16:45 (1 hour)

Presenter: HEN, Or

Session Classification: Thursday

Contribution ID: **279** Type: **not specified**

Higgs boson in the standard model and beyond

Thursday 24 February 2022 18:30 (1 hour)

Presenter: GORI, Stefania (UC Santa Cruz)

Session Classification: Thursday

Contribution ID: **280** Type: **not specified**

QCD at LHC

Friday 25 February 2022 08:30 (1 hour)

Presenter: CAOLA, Fabrizio

Session Classification: Friday

Contribution ID: **281** Type: **not specified**

Flavor physics

Friday 25 February 2022 10:30 (1 hour)

Presenter: ALTMANNSHOFER, Wolfgang (UC Santa Cruz)

Session Classification: Friday

Contribution ID: **282** Type: **not specified**

A decade of dark sector and light dark matter searches at B-factories

Tuesday 22 February 2022 10:00 (30 minutes)

Elucidating the nature of dark matter remains a central challenge in fundamental physics. A growing interest in light (sub-GeV) dark matter consisting of new particles coupling only feebly to ordinary matter has emerged over the last decade. Low-energy, high luminosity colliders experiments, such as BABAR, are ideally suited to probe these possibilities. In this talk, we will review the numerous searches for dark sectors and light dark matter performed at BABAR, and discuss future perspectives at B-factories together with their implications. These measurements demonstrate the importance of low-energy high Luminosity colliders in fully exploring dark matter and light BSM physics.

Summary

Presenter: ECHENARD, Bertrand (California Institute of Technology (US))

Session Classification: Tuesday

Contribution ID: **283** Type: **not specified**

Latest EW and radiative penguin results from Belle II

Friday 25 February 2022 18:00 (15 minutes)

Presenter: FILLINGER, Tristan

Session Classification: Friday

Contribution ID: **285** Type: **not specified**

Latest charm results from Belle II

Friday 25 February 2022 18:45 (15 minutes)

Presenter: POKHAREL, Saroj (The University of Mississippi)

Session Classification: Friday

Contribution ID: **286** Type: **not specified**

Latest dark sector and tau results from Belle II

Friday 25 February 2022 19:00 (15 minutes)

Presenter: WAKAI, Miho (University of British Columbia)

Session Classification: Friday

Contribution ID: **287** Type: **not specified**

Lepton Flavour Universality and the Lepton Flavour Violation in $\Upsilon(3S)$ decays at BABAR

Friday 25 February 2022 17:30 (15 minutes)

The $BABAR$ detector collected a sample of 122 million $\Upsilon(3S)$ mesons, corresponding to an integrated luminosity of 28 fb^{-1}, operating the PEP-II e^+e^- collider at a center-of-mass energy of about 10.355 GeV. This sample is the largest ever collected at that energy and provides unique opportunities to test several aspects of the Standard Model. We report on a precision measurement of the ratio $R_{\tau\mu} = BF(\Upsilon(3S) \to \tau\tau^-)/BF(\Upsilon(3S) \to \mu^+\mu^-)$. The result is in agreement with the Standard Model prediction and its uncertainty is almost an order of magnitude smaller than the only previous measurement reported by the CLEO collaboration. We also present a search for the Lepton Flavour Violating decays $\Upsilon(3S) \to e^\pm\mu^\mp$, unobservable in the SM, but predicted to be enhanced in several new physics extensions.

Summary

Presenter: AHMED, Hossain

Session Classification: Friday

Contribution ID: **288** Type: **not specified**

Measurement of PEP-II Beam Polarization with Tau Polarimetry

Friday 25 February 2022 19:15 (15 minutes)

Presenter: MILLER, Caleb

Session Classification: Friday

Contribution ID: **290** Type: **not specified**

ATLAS results on charmonium production and B_c production and decays

Friday 25 February 2022 18:30 (15 minutes)

Recent results from the proton-proton collision data taken by the ATLAS experiment on charmonium production and on 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.

Summary

Presenter: SEIDEL, Sally (University of New Mexico / ATLAS)

Session Classification: Friday

Contribution ID: **291** Type: **not specified**

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

Friday 25 February 2022 17:45 (15 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 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.

Summary

Presenter: JAKOUBEK, Tomas (Weizmann Institute of Science (IL))

Session Classification: Friday

Contribution ID: **292** Type: **not specified**

ADMX

Tuesday 22 February 2022 10:30 (15 minutes)

Presenter: BRAINE, Tom

Session Classification: Tuesday

Contribution ID: **293** Type: **not specified**

COSINE-100

Tuesday 22 February 2022 09:30 (15 minutes)

Presenter: THOMPSON, William (Yale University)

Session Classification: Tuesday

Contribution ID: **296** Type: **not specified**

DARWIN

Monday 21 February 2022 19:30 (15 minutes)

The primary goal of the proposed DARWIN observatory is to explore the entire experimentally accessible WIMP dark matter parameter space down to irreducible neutrino backgrounds. With its 40t active liquid xenon target, low-energy threshold, and ultra-low background conditions, DARWIN will have unprecedented sensitivity to spin-independent WIMP-nucleon cross-sections down to ~10^{-49} cm² at WIMP masses of 30 GeV/c². DARWIN will also be sensitive to other rare interactions, such as the neutrinoless double beta decay of ^{136}Xe, and will allow measuring low-energy solar neutrinos with great precision via elastic neutrino-electron-scattering. We report on the challenging DARWIN detector concept, its science channels, and the ongoing R&D efforts.

Summary

Presenter: BAUR, Daniel (Universität Freiburg)

Session Classification: Monday

Contribution ID: **297** Type: **not specified**

DEAP-3600

Monday 21 February 2022 19:45 (15 minutes)

Presenter: MIELNICHUK, Courtney

Session Classification: Monday

Contribution ID: **298** Type: **not specified**

LZ

Tuesday 22 February 2022 08:30 (15 minutes)

Presenter: ARTHURS, Maris (The University of Michigan)

Session Classification: Tuesday

Contribution ID: **299** Type: **not specified**

NEWS-G

Tuesday 22 February 2022 08:45 (15 minutes)

Summary

Presenter: KNIGHTS, Patrick Ryan (University of Birmingham (GB))

Session Classification: Tuesday

Contribution ID: **300** Type: **not specified**

Recent results from XENON1T and XENONnT status

Monday 21 February 2022 19:15 (15 minutes)

Summary

Presenter: ANTOCHI, Vasile Cristian (Stockholm University)

Session Classification: Monday

Contribution ID: **301** Type: **not specified**

Recent soft-physics results of ALICE

Thursday 24 February 2022 17:45 (15 minutes)

Presenter: VISLAVICIUS, Vytautas (University of Copenhagen (DK))

Session Classification: Thursday

Contribution ID: **303** Type: **not specified**

Recent Spin Measurements at PHENIX

Thursday 24 February 2022 18:00 (15 minutes)

Operated at the Relativistic Heavy Ion Collider at Brookhaven until beginning its recent upgrade into sPHENIX, the PHENIX experiment has collected a wealth of data from polarized proton collisions. Through a wide variety of observables, these data sets continue to offer insights into the spin structure of the proton: Transverse asymmetries probe the spin-momentum correlations of partons, while longitudinal asymmetries probe the polarization of those partons. Double spin asymmetries of various processes are sensitive to gluons at leading order. I will provide an overview of the detector, review recent results and ongoing analyses in longitudinal and transverse asymmetries, and discuss the impact these measurements have on our understanding of parton polarizations and correlations within the proton.

Summary

Presenter: CORLISS, Ross

Session Classification: Thursday

Contribution ID: **306** Type: **not specified**

NA62

Friday 25 February 2022 19:30 (15 minutes)

Presenter: ZAMKOVSKY, Michal (Universite Catholique de Louvain (UCL) (BE))

Session Classification: Friday

Contribution ID: **309** Type: **not specified**

Quantum computing approaches for simulating parton showers in high energy collisions

Friday 25 February 2022 09:30 (15 minutes)

The interpretation of measurements from high energy collisions at experiments like the Large Hadron Collider (LHC) relies heavily on the performance of full event generators, specifically their accuracy and speed in simulating complex multi-particle final states. With the rapid and continuous improvement in quantum computers, these devices present an exciting opportunity for high energy physics. Dedicated quantum algorithms are needed to exploit the potential that quantum computers can provide. In this talk, I will present general and extendable quantum computing algorithms for the simulation of the parton shower in a high energy collision. The algorithms utilise the quantum nature of the parton shower calculation, and the quantum device's ability to remain in a quantum state throughout the computation, to efficiently perform the simulation. Furthermore, it will be shown that reframing the parton shower in the quantum walk framework dramatically improves the performance of the parton shower simulation, increasing the number of shower steps that can be simulated, whilst reducing the required Quantum Volume on the device. These algorithms are the first step towards simulating a full and realistic high energy collision event on a quantum computer.

Summary

Presenter: WILLIAMS, Simon

Session Classification: Friday

Contribution ID: **311** Type: **not specified**

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

Friday 25 February 2022 09:45 (15 minutes)

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. 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.

Summary

Presenter: CARLSON, Ben (Westmont College)

Session Classification: Friday

Contribution ID: **312** Type: **not specified**

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

Thursday 24 February 2022 19:30 (15 minutes)

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 to solely explain 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.

Summary

Presenter: HAYES, Christopher Robyn (University of Michigan (US))

Session Classification: Thursday

Contribution ID: **313** Type: **not specified**

FASERnu

Thursday 24 February 2022 10:00 (15 minutes)

Presenter: HAYAKAWA, Daiki

Session Classification: Thursday

Contribution ID: **314** Type: **not specified**

FASER

Friday 25 February 2022 19:45 (15 minutes)

Presenter: FELLERS, Deion Elgin (University of Oregon (US))

Session Classification: Friday

Contribution ID: **315** Type: **not specified**

Precision Timing with the CMS MIP Timing Detector

Monday 21 February 2022 17:45 (15 minutes)

The Compact Muon Solenoid (CMS) detector at the CERN Large Hadron Collider (LHC) is undergoing an extensive Phase II upgrade program to prepare for the challenging conditions of the High-Luminosity LHC (HL-LHC). In particular, a new timing layer with hermetic coverage up to a pseudo-rapidity of |η|=3 will measure minimum ionizing particles (MIPs) with a time resolution of ˜30ps. This MIP Timing Detector (MTD) will consist of a central barrel region based on LYSO:Ce crystals read out with silicon photomultipliers and two end-caps instrumented with radiation-tolerant low-gain avalanche diodes. The precision time information from the MTD will reduce the effects of the high levels of pile-up expected at the HL-LHC and will bring new and unique capabilities to the CMS detector. The time information assigned to each track will enable the use of 4D reconstruction algorithms and will further discriminate interaction vertices within the same bunch crossing to recover the track purity of vertices in current LHC conditions. For instance, in the analysis of di-Higgs boson production, a timing resolution of ˜30-40 ps is expected to improve the effective luminosity by about 25% through gains in b-tagging and isolation efficiencies. We present motivations for precision timing at the HL-LHC and overview the MTD design, while also highlighting specific physics studies benefiting from the improved timing information.

Summary

Presenter: NEU, Christopher (University of Virginia (US))

Session Classification: Monday

Contribution ID: **316** Type: **not specified**

Performing precision measurements and new physics searches at the HL-LHC with the upgraded CMS Level-1 Trigger

Monday 21 February 2022 16:45 (15 minutes)

The High-Luminosity LHC will open an unprecedented window on the weak-scale nature of the universe, providing high-precision measurements of the standard model as well as searches for new physics beyond the standard model. Such precision measurements and searches require information-rich datasets with a statistical power that matches the high-luminosity provided by the Phase-2 upgrade of the LHC. Efficiently collecting those datasets will be a challenging task, given the harsh environment of 200 proton-proton interactions per LHC bunch crossing. For this purpose, CMS is designing an efficient data-processing hardware trigger (Level-1) that will include tracking information and high-granularity calorimeter information. The current conceptual system design is expected to take full advantage of FPGA and link technologies over the coming years, providing a high-performance, low-latency computing platform for large throughput and sophisticated data correlation across diverse sources. The envisaged L1 system will more closely replicate the full offline object reconstruction instead to perform a more sophisticated and optimized selection. Algorithms such as particle flow reconstruction can be implemented and complemented by standalone trigger object reconstruction. The expected performance and physics implications of such algorithms are studied using Monte Carlo samples with hıgh pile-up, simulating the harsh conditions of the HL-LHC. The trigger object requirements are not only driven by the need to maintain physics selection thresholds to match those of the Phase-1, the selection of exotic signatures including displaced objects must be provided to help expanding the physics reach of the experiment. The expected acceptance increase on selected benchmark signals obtained by the upgraded CMS Phase-2 Level-1 trigger will be summarized in this presentation.

Summary

Presenter: MOTTA, Jona (LLR, École Polytechnique (FR))

Session Classification: Monday

Contribution ID: **317** Type: **not specified**

Track Reconstruction at Level-1 in CMS for HL-LHC

Monday 21 February 2022 11:30 (15 minutes)

With the planned high-luminosity upgrade of the LHC increasing the number of simultaneous collisions per bunch crossing by at least a factor of four, the experiments at the LHC will need new handles to keep the trigger rate at manageable levels. To this end, the CMS detector plans to incorporate tracking information as part of its Level-1 trigger system for the phase 2 upgrade. We present here an all FPGA-based approach to track reconstruction which uses a road-search style track finding algorithm, combined with a Kalman Filter to select final track candidates and refine calculated track parameters. We first discuss the physics motivation for such a system and how it extends the physics reach of the CMS detector. We then give an overview of the algorithm and discuss how its implementation in Vivado's High Level Synthesis (HLS) language greatly simplifies the process of deploying the algorithm on FPGAs. We conclude by outlining the architecture of the full track-finding computing system and show how it is able to handle the high data throughput and fast triggering requirements of the HL-LHC runs.

Summary

Presenter: CRANSHAW, Derek James (Cornell University (US))

Session Classification: Monday

Contribution ID: **318** Type: **not specified**

Measurements of the Higgs boson properties and their interpretations with the ATLAS experiment

Monday 21 February 2022 09:30 (15 minutes)

With the full Run 2 pp collision dataset collected at 13 TeV, very detailed measurements of Higgs boson properties and its interactions can be performed using its decays into bosons and fermions, shining light over the electroweak symmetry breaking mechanism. This talk presents the latest measurements of the Higgs boson properties by the ATLAS experiment in various decay channels, including production mode cross sections, simplified template cross sections, differential and fiducial cross sections, as well as their combination and interpretations. Specific scenarios of physics beyond the Standard Model are tested, as well as a generic extension in the framework of the Standard Model Effective Field Theory.

Summary

Presenter: LUISE, Ilaria (Stony Brook University (US))

Session Classification: Monday

Contribution ID: **319** Type: **not specified**

Probing the nature of electroweak symmetry breaking with Higgs boson pair-production at ATLAS

Monday 21 February 2022 09:45 (15 minutes)

In the Standard Model, the ground state of the Higgs field is not found at zero but instead corresponds to one of the degenerate solutions minimising the Higgs potential. In turn, this spontaneous electroweak symmetry breaking provides a mechanism for the mass generation of nearly all fundamental particles. The Standard Model makes a definite prediction for the Higgs boson self-coupling and thereby the shape of the Higgs potential. Experimentally, both can be probed through the production of Higgs boson pairs (HH), a rare process that presently receives a lot of attention at the LHC. In this talk, the latest HH searches by the ATLAS experiment are reported, with emphasis on the results obtained with 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. Extrapolations of recent HH results towards the High Luminosity LHC upgrade are also discussed. Search results on new resonances decaying into pairs of Higgs bosons are also reported.

Summary

Presenter: SWIATLOWSKI, Maximilian J (TRIUMF (CA))

Session Classification: Monday

Contribution ID: **320** Type: **not specified**

Search for rare and lepton flavor violating decays of the Higgs boson with the ATLAS detector

Thursday 24 February 2022 19:45 (15 minutes)

The Standard Model predicts several rare Higgs boson decay channels, among which are the decays to a Z boson and a photon, to a low-mass lepton pair and a photon, and to a meson and photon. The observation of some of these decays could open the possibility of studying the CP and coupling properties of the Higgs boson in a complementary way to other analyses. In addition, lepton-flavor-violating decays of the observed Higgs boson are searched for, where on observation would be a clear sign of physics effects beyond the Standard Model. Several results for decays based on pp collision data collected at 13 TeV will be presented.

Summary

Presenter: PEZZULLO, Gianantonio (Yale University)

Session Classification: Thursday

Contribution ID: **321** Type: **not specified**

Searches for resonances decaying to pairs of heavy bosons in ATLAS

Monday 21 February 2022 10:00 (15 minutes)

Many new physics models predict the existence of Higgs-like particles decaying into two bosons (W, Z, photon, or Higgs bosons) making these important signatures in the search for new physics. Searches for 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.

Summary

Presenter: TSAI, Fang-Ying (Stony Brook University (US))

Session Classification: Monday

Contribution ID: **322** Type: **not specified**

Measurement of the charge asymmetry in highly boosted top-quark pair production in pp collision data collected by the CMS experiment

Monday 21 February 2022 11:00 (15 minutes)

Due to interference between particles involved in the production of top quark pairs in hadron collisions, top quarks are produced preferentially in the center of the LHC's collisions, while antitop quarks are produced preferentially at larger angles. This central–forward charge asymmetry can be altered by several BSM processes. In this report, we will discuss the measurement of the charge asymmetry as function of the invariant mass of tt¯ system in highly boosted top-quark pairs produced in pp collisions at a center of mass energy of = 13 TeV, using 137\fb of Run II CMS data. We concentrate on the lepton+jet decay channel, where one W decays to a charged lepton (electron or muon) and a neutrino, and the other decays to light jets. We employ special techniques to identify the non-isolated lepton and fat jets with substructure variables compatible with the hadronic decay of the top quark. Different combinations of tagged jets are used to separate boosted tt¯ events from background. Finally, we will discuss the introduction of unregularized unfolding via a Maximum Likelihood Fit applied to correct bin-by-bin smearing due to finite detector resolution, limited acceptance, and event selection to the fiducial phase space and the full phase-space.

Summary

Presenter: BECERRIL GONZALEZ, Hugo Alberto (University of Illinois at Chicago (US))

Session Classification: Monday

Contribution ID: **323** Type: **not specified**

Measurements of associated top quark production and searches for new top-quark phenomena with the ATLAS detector

Monday 21 February 2022 10:45 (15 minutes)

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 and search for new physics that might enhance extremely rare processes in the SM. Measurements of rare SM processes 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. A significant example of new phenomena are 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, 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. In addition, new searches for FCNCs with the ATLAS experiment are shown, 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.

Summary

Presenter: ASBAH, Nedaa Alexandra (Harvard University (US))

Session Classification: Monday

Contribution ID: **324** Type: **not specified**

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

Monday 21 February 2022 10:30 (15 minutes)

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 new measurements of the spin polarisation in single-top-quark production, of differential cross sections for top-quark pair production with high-momentum top quarks and of the energy asymmetry in top-quark pair events. Several measurements are interpreted within the Standard Model Effective Field Theory, yielding stringent bounds on Wilson coefficients.

Summary

Presenter: KEMPSTER, Jacob Julian (University of Birmingham (GB))

Session Classification: Monday

Contribution ID: **325** Type: **not specified**

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

Monday 21 February 2022 11:15 (15 minutes)

Various theories beyond the Standard Model predict new, long-lived particles with unique signatures which are difficult to reconstruct and for which estimating the background rates is also a challenge. Signatures from displaced and/or delayed 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.

Summary

Presenter: BISWAL, Jyoti Prakash (University of Alberta (CA))

Session Classification: Monday

Contribution ID: **326** Type: **not specified**

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

Friday 25 February 2022 11:30 (15 minutes)

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.

Summary

Presenter: HALEY, Joseph (Oklahoma State University (US))

Session Classification: Friday

Contribution ID: **327** Type: **not specified**

Searches for strong production of supersymmetric particles with the ATLAS detector

Monday 21 February 2022 17:15 (15 minutes)

Supersymmetry is one of the best motivated and studied Standard Model (SM) extensions, thanks to its elegant solutions to several aspects not addressed by the SM. Naturalness arguments for weak-scale supersymmetry allow supersymmetric partners of the gluons and third generation quarks with masses light enough to be produced at the LHC. 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 are presented in this talk, covering models where the R-parity is conserved.

Summary

Presenter: SANTRA, Arka (Weizmann Institute of Science (IL))

Session Classification: Monday

Contribution ID: **328** Type: **not specified**

Searches for R-parity violating Supersymmetry with the ATLAS Experiment

Monday 21 February 2022 17:30 (15 minutes)

R-parity violating (RPV) Supersymmetry (SUSY) is one of the least constrained SUSY scenarios, despite being well theoretically motivated. The ATLAS Experiment is exploiting the full-Run-2 dataset to carry out searches for RPV SUSY and close the remaining gaps, and in this talk we present on overview of the recent public results targeting this scenario.

Summary

Presenter: NGUYEN, Hoang Dai Nghia (Université de Montreal (CA))

Session Classification: Monday

Contribution ID: **329** Type: **not specified**

(n)EXO

Thursday 24 February 2022 11:15 (15 minutes)

Presenter: LENARDO, Brian (Stanford University)

Session Classification: Thursday

Contribution ID: **330** Type: **not specified**

ANNIE

Wednesday 23 February 2022 17:00 (15 minutes)

Presenter: PICKARD, Leon

Session Classification: Wednesday

Contribution ID: **331** Type: **not specified**

Search for ultra-high energy neutrinos at the Pierre Auger Observatory

Thursday 24 February 2022 09:30 (15 minutes)

Summary

Presenter: MAYOTTE , Eric

Session Classification: Thursday

Contribution ID: **332** Type: **not specified**

Borexino: recent results and outlook on the final data

Thursday 24 February 2022 08:30 (15 minutes)

Borexino is a large solar neutrino detector that has operated at the Laboratori Nazionali del Gran Sasso between 2007 and October 4, 2021. Neutrinos are detected via their interaction with a 300-ton liquid scintillator target, purified to achieve unprecedented levels of radio-purity. Borexino has detected most of the components of the solar neutrino spectrum. In particular, it has measured with refined precision the neutrinos from the entire pp fusion chain in the Sun using analysis tools that fully exploit our understanding of the detector. Most recently, Borexino has made the first measurement of solar CNO neutrinos, produced in a catalytic hydrogen fusion cycle enabled by the presence in the solar plasma of heavier elements, or "metals". This observation caps almost 15 years of data taking and provides experimental confirmation for the pioneering solar modeling by Hans Bethe dating back to the 1930s. This talk will summarize these results, present the recently-reported directional low-energy neutrino detection in scintillator, and discuss the reach of the final Borexino data.

Summary

Presenter: POCAR, Andrea (University of Massachusetts, Amherst)

Session Classification: Thursday

Contribution ID: **333** Type: **not specified**

CUORE

Thursday 24 February 2022 10:30 (15 minutes)

Presenter: MARINI, Laura

Session Classification: Thursday

Contribution ID: **334** Type: **not specified**

CUPID

Thursday 24 February 2022 10:45 (15 minutes)

Summary

Presenter: MARINI, Laura

Session Classification: Thursday

Contribution ID: **335** Type: **not specified**

DUNE

Wednesday 23 February 2022 18:30 (15 minutes)

Summary

Presenter: PICKERING, Luke (Royal Holloway, University of London)

Session Classification: Wednesday

Contribution ID: **336** Type: **not specified**

ESSnuSB

Thursday 24 February 2022 09:45 (15 minutes)

Presenter: DRACOS, Marcos (Centre National de la Recherche Scientifique (FR))

Session Classification: Thursday

Contribution ID: **337** Type: **not specified**

Hyper-Kamiokande

Wednesday 23 February 2022 19:15 (15 minutes)

Summary

Presenter: PROUSE, Nick (TRIUMF)

Session Classification: Wednesday

Contribution ID: **338** Type: **not specified**

Hyper-K IWCD

Wednesday 23 February 2022 19:30 (15 minutes)

Summary

Presenter: AKUTSU, Ryosuke

Session Classification: Wednesday

Contribution ID: **339** Type: **not specified**

Neutrino astrophysics with IceCube

Thursday 24 February 2022 08:45 (15 minutes)

Summary

Presenter: VANDENBROUCKE, Justin

Session Classification: Thursday

Contribution ID: **340** Type: **not specified**

Current and Future Neutrino Oscillation Measurements using IceCube DeepCore

Wednesday 23 February 2022 17:45 (15 minutes)

Summary

Presenter: MICALLEF, Jessie

Session Classification: Wednesday

Contribution ID: **341** Type: **not specified**

Status of the JUNO experiment

Wednesday 23 February 2022 19:00 (15 minutes)

Summary

Presenter: ROSKOVEC, Bedřich (Charles Univeristy, Prague)

Session Classification: Wednesday

Contribution ID: **342** Type: **not specified**

Katrin

Wednesday 23 February 2022 11:40 (15 minutes)

Presenter: ENOMOTO, Sanshiro (University of Washington)

Session Classification: Wednesday

Contribution ID: **343** Type: **not specified**

KM3NeT ARCA

Thursday 24 February 2022 09:00 (15 minutes)

Summary

Presenter: GOZZINI, Sara Rebecca

Session Classification: Thursday

Contribution ID: **344** Type: **not specified**

KM3NeT ORCA

Wednesday 23 February 2022 18:00 (15 minutes)

Summary

Presenter: GOZZINI, Sara Rebecca

Session Classification: Wednesday

Contribution ID: **345** Type: **not specified**

LEGEND

Thursday 24 February 2022 11:00 (15 minutes)

Presenter: SHAFIEE, Mehdi

Session Classification: Thursday

Contribution ID: **346** Type: **not specified**

MicroBoone

Wednesday 23 February 2022 10:45 (15 minutes)

Presenter: FOPPIANI, Nicolo

Session Classification: Wednesday

Contribution ID: **347** Type: **not specified**

Medium-Energy era results from MINERvA

Wednesday 23 February 2022 11:00 (25 minutes)

Summary

Presenter: PLOWS, John

Session Classification: Wednesday

Contribution ID: **348** Type: **not specified**

NOvA

Wednesday 23 February 2022 17:15 (15 minutes)

Presenter: JUDAH, Matt

Session Classification: Wednesday

Contribution ID: **349** Type: **not specified**

P-ONE

Thursday 24 February 2022 09:15 (15 minutes)

Every time researchers have pushed the energy boundary in particle physics we have found something new about our Universe. Recently, IceCube has demonstrated that Neutrino Telescopes can use neutrinos from the cosmos as excellent tools to continue this exploration. The Pacific Ocean Neutrino Explorer (P-ONE) is a proposed initiative to construct one of the largest neutrino telescopes deep in the northern Pacific Ocean off the coast of British Columbia. To overcome the challenges of a deep-sea installation, we have deployed two prototype mooring lines STRAW and STRAW-b in 2018 and 2020. These provide continuous monitoring of optical water properties at a potential detector site in the Pacific. In this talk I will cover the latest results from these prototype lines and plans to deploy P-ONE off the coast of Vancouver Island.

Summary

Presenter: DANNINGER, Matthias (Simon Fraser University (CA))

Session Classification: Thursday

Contribution ID: **350** Type: **not specified**

Project 8

Wednesday 23 February 2022 11:25 (15 minutes)

Presenter: VAN DE PONTSEELE, Wouter

Session Classification: Wednesday

Contribution ID: **351** Type: **not specified**

SNO+

Thursday 24 February 2022 11:30 (15 minutes)

Presenter: NOLAN, Lorna

Session Classification: Thursday

Contribution ID: **352** Type: **not specified**

T2K

Wednesday 23 February 2022 17:30 (15 minutes)

Summary

Presenter: BARROW, Daniel

Session Classification: Wednesday

Contribution ID: **353** Type: **not specified**

Search for new physics using top quark pairs produced in association with a boosted Z or Higgs boson in effective field theory

Monday 21 February 2022 17:00 (15 minutes)

A data sample containing top quark pairs produced in association with a boosted \PZ or Higgs boson is used to search for signs of new physics within the framework of effective field theory (EFT). The data correspond to an integrated luminosity of 138
$fbinv$ of proton-proton collisions produced at a center-of-mass energy of 13 TeV at the LHC and collected by the CMS experiment. Selected collision events contain a single lepton and hadronic jets, including two identified with the decay of bottom quarks, plus an additional large-radius jet with high transverse momentum (\pt) identified as a \PZ or Higgs boson candidate decaying to a bottom quark pair. Machine learning techniques are employed to discriminate \ttZ and \ttH events from background processes, dominated by \ttjets production. The signal strengths of boosted \ttZ and \ttH processes are measured, and upper limits are placed on the \ttZ and \ttH differential cross sections as functions of the \PZ or Higgs boson \pt. In addition, new physics effects are probed using a parameterization of the signal in terms of eight Wilson coefficients corresponding to EFT operators. The eight coefficients are fit simultaneously to the data. Limits on the values of the Wilson coefficients are presented, including five which strengthen constraints from measurements in other final states.

Summary

Presenter: CARAWAY, Bryan (Baylor University (US))

Session Classification: Monday

Contribution ID: **354** Type: **not specified**

New results on semileptonic B decays at Belle

Friday 25 February 2022 17:00 (15 minutes)

Presenter: MEIER, Frank (Duke University)

Session Classification: Friday

Contribution ID: **355** Type: **not specified**

Latest semileptonic results from Belle II

Friday 25 February 2022 17:15 (15 minutes)

Presenter: WAKELING, Hannah (Belle II Group at McGill University)

Session Classification: Friday

Contribution ID: **357** Type: **not specified**

DUNE near detector

Wednesday 23 February 2022 18:45 (15 minutes)

Presenter: CHERDACK, Daniel (Fermi National Accelerator Laboratory)

Session Classification: Wednesday

Contribution ID: **358** Type: **not specified**

MADMAX status

Tuesday 22 February 2022 10:45 (15 minutes)

Presenter: STROM, Derek

Session Classification: Tuesday

Contribution ID: **359** Type: **not specified**

SuperCDMS

Tuesday 22 February 2022 09:15 (15 minutes)

Presenter: CUSHMAN, Priscilla

Session Classification: Tuesday

Contribution ID: **360** Type: **not specified**

Vector boson production in association with jets

Friday 25 February 2022 10:00 (15 minutes)

Presenter: SAFONOV, Alexei (Texas A & M University (US))

Session Classification: Friday

Contribution ID: **361** Type: **not specified**

CRESST

Tuesday 22 February 2022 09:00 (15 minutes)

Presenter: MARINI, Laura

Session Classification: Tuesday

Contribution ID: **362** Type: **not specified**

Test

Summary

Presenters: PENIN, Alexander; MINCHENKO, Dmytro (University of Alberta); YANEZ GARZA, Juan Pablo; MCELROY, Thomas

Session Classification: Friday