WIN2019 The 27th International Workshop on Weak Interactions and Neutrinos.

domenica 2 giugno 2019 - sabato 8 giugno 2019

Bari

Raccolta degli abstract

Contents

Astroparticle Physics and Cosmology / **1**

On the interpretation of astrophysical neutrinos

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The discovery of a diffuse flux of high energy neutrinos, provided by the IceCube neutrino telescope in 2012, has opened a new era in the field of astroparticle physics and neutrino astronomy. Nowadays the statistics is large enough to have a good measurement of the muon neutrino flux and a sufficient knowledge of the all-flavor flux, but the main mystery still remains: what is the origin of these neutrinos? Different methods can be used to search an answer to this very important question.

The first method is a purely particle physics approach, consisting of the analysis of the flavor composition of the detected events. Although the flavor composition seemed to be already well known, a careful analysis of the most recent data shows surprising results.

The second method consists in a multi-messenger approach and it is more related to astrophysics. The brightest sources in the γ-ray sky above 100 GeV are blazars, so it is natural to expect that these sources are also neutrino emitters. On the other hand the absence of correlations between the arrival direction of neutrinos and the position of known blazars strongly constrains this scenario, unless neutrinos are produced by faint blazars. An alternative, but natural possibility, is that neutrinos are produced by hadronic accelerators (like Starburst Galaxies) from the interaction between accelerated protons and the gas. The Galactic plane of our Galaxy could also provide a contribution to the neutrino flux; a small but not negligible contribution.

In my talk I will cover these aspects, in order to give an overview of the possible interpretations of the diffuse flux of high energy neutrinos.

Collaboration name:

Neutrino / **2**

Final results of the CUPID-0 Phase I experiment

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A convincing observation of neutrino-less double beta decay (0νDBD) relies on the possibility of operating high-energy resolution detectors in background-free conditions.
Scintillating cryogenic calorimeters are one of the most promising tools to fulfill the requirements for a next-generation experiment. Several steps have been taken to demonstrate the maturity of this technique, starting form the successful experience of CUPID-0.
The CUPID-0 experiment collected 10 kg*y of exposure, running 26 Zn^{82}Se crystals during two years of continuous detector operation. The complete rejection of the dominant alpha background was demonstrated, measuring the lowest counting rate in the region of interest for this technique. Furthermore, the most stringent limit on the Se-82 0νDBD was established.
In this contribution we present the final results of CUPID-0 Phase I, including a detailed model of the background and the measurement of the 2νDBD half-life.

Collaboration name:

Neutrino / **3**

The SHiP experiment at CERN

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The SHiP Collaboration has proposed a general-purpose experimental facility operating in beam dump mode at the CERN SPS accelerator with the aim of searching for light, long-lived exotic particles of Hidden Sector models. The SHiP experiment incorporates a muon shield based on magnetic sweeping and two complementary apparatuses. The detector immediately downstream of the muon shield is optimised both for recoil signatures of light dark matter scattering and for tau neutrino physics, and consists of a spectrometer magnet housing a layered detector system with heavy target plates, emulsion film technology and electronic high precision tracking. The second detector system aims at measuring the visible decays of hidden sector particles to both fully reconstructible final states and to partially reconstructible final states with neutrinos, in a nearly background free environment. The detector consists of a 50 m long decay volume under vacuum followed by a spectrometer and particle identification with a rectangular acceptance of 5 m in width and 10 m in height. Using the high-intensity beam of 400 GeV protons, the experiment is capable of integrating 2×10^{20} protons in five years, which allows probing dark photons, dark scalars and pseudo-scalars, and heavy neutrinos with GeV-scale masses at sensitivities that exceed those of existing and projected experiments. The sensitivity to heavy neutrinos will allow for the first time to probe, in the mass range between the kaon and the charm meson mass, a coupling range for which baryogenesis and active neutrino masses can be explained. The sensitivity to light dark matter reaches well below the elastic scalar Dark Matter relic density limits in the range from a few MeV/c^2 up to 200 MeV/c^2. The tau neutrino deep-inelastic scattering cross-sections will be measured with a statistics a thousand times larger than currently available, with the extraction of the F_4 and F_5 structure functions, never measured so far, and allow for new tests of lepton non-universality with sensitivity to BSM physics. Following the review of the Technical Proposal, the CERN SPS Committee recommended in 2016 that the experiment and the beam dump facility studies proceed to a Comprehensive Design Study phase. These studies have resulted in a mature proposal submitted to the European Strategy for Particle Physics Update.

Collaboration name:

SHiP Collaboration

Neutrino / **4**

Results from the CUORE experiment

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The Cryogenic Underground Observatory for Rare Events (CUORE) is the first bolometric experiment searching for neutrinoless double beta decay (0νββ) that has been able to reach the one-ton scale. The detector consists of an array of 988 TeO2 crystals arranged in a compact cylindrical structure of 19 towers. The construction of the experiment was completed in August 2016 with the installation of all towers in the cryostat. Following a cooldown, diagnostic, and optimization campaign, routine data-taking began in spring 2017. In this talk, we present the 0νββ results of CUORE from examining a total TeO2 exposure of 86.3 kg·yr, characterized by an average energy resolution of 7.7 keV FWHM and a background in the region of interest of 0.014 counts/(keV·kg·yr). In this physics run, CUORE placed the current best lower limit on the 130Te 0νββ half-life of > 1.3 × 10^25 yr (90% C.L.). We then discuss the additional improvements in the detector performance achieved in 2018, the latest evaluation of the CUORE background budget, and we finally present the most precise measurement of the 130Te 2νββ half-life to date.

Collaboration name:

CUORE

Neutrino / **5**

Study of TeV neutrinos in the FASER experiment at the LHC

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FASER is a new experiment at the LHC aiming to search for light, weakly-interacting new particles, complementing other experiments. A particle detector will be located 480 m downstream of the ATLAS interaction point. In addition to searches for new particles, we also aim to study high-energy neutrinos of all flavors, as there is a huge flux of neutrinos at this location. To date, muon neutrino cross-section data exist up to 350 GeV with accelerator-based neutrino beams, but we still miss data at the TeV energy scale. At the LHC-FASER, the neutrino cross-sections will be measured in the currently unexplored energy range between 350 GeV and 6 TeV. In particular, tau neutrinos will be measured at the highest energy ever. Furthermore, the channels associated with heavy quark (charm and beauty) production could be studied. As a feasibility study, a test run was performed in 2018 at the proposed detector location with a 30-kg lead/tungsten emulsion-based neutrino detector. Data of 12.5 fb^{-1} was collected and about 30 neutrino interactions are expected to be recorded in the detector. For Run 3 of the LHC (2021-2023), we are planning to deploy an emulsion detector with a target mass of 1 ton, coupled with the FASER magnetic spectrometer, which would yield >10,000 muon neutrinos and about 50 tau neutrinos interacting in the detector. Analysis of the 2018 test run, as well as the prospects for future runs, will be presented.

Collaboration name:

The FASER Collaboration

Neutrino / **6**

Physics prospects of JUNO

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The Jiangmen Underground Neutrino Observatory (JUNO) is the first multi-kton liquid scintillator detector to come on scene in 2021. It will have 20 kt target mass and an overburden of 1900 m.w.e. It is currently under construction near Kaiping in the Guangdong province in southern China, at a strategic baseline of 53 km from two nuclear power plants. The main physics goal is to determine the neutrino mass ordering within six years of run time with a significance of 3-4 sigma. The

energy resolution is designed to be better than 3% @ 1 MeV and the non-linearity of the energy scale must be known with better than 1% precision. This excellent detector performance, combined with large volume, further broadens the JUNO potential both in neutrino, as well as in astro-particle physics. JUNO can improve the precision on solar oscillation parameters and the atmospheric mass splitting below 1% and allows for the study of geoneutrinos, solar neutrinos, and neutrinos from core-collapse supernovae. Furthermore, it has the potential to search for dark matter, diffuse supernova background and sterile neutrinos, proton-decay, and non-standard interactions. This talk will give an overview on the JUNO physics potential.

Collaboration name:

JUNO

Poster session / 7

Study of tau-neutrino production at the CERN SPS

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DsTau is a project which has been proposed at the CERN SPS to study tau-neutrino production aiming at providing important data for future ν_τ studies. A precise measurement of the ν_τ cross section would enable a search for new physics effects in ν_τ CC interactions. It also has practical importance for the next generation experiments for neutrino oscillation studies and astrophysical ν_τ observations. The practical way of producing a ν_τ beam is by the sequential decay of D_s mesons produced in high-energy proton interactions. However, there is no experimental measurement of the D_s differential production cross section in fixed target experiments using proton beams, which leads to a large systematic uncertainty on the ν_τ flux estimation. The DsTau project aims to reduce the systematic uncertainty in the current ν_τ cross section measurement to 10% or below, by measuring the D_s differential production cross section (especially longitudinal dependence). For this purpose, emulsion detectors with spatial resolution of 50 nm will be used allowing the detection of $D_s \to \tau \to X$ double kinks in a few mm range. During the physics run, 2.3×10^8 proton interactions will be collected in the tungsten target, and 1000 $D_s \to \tau$ decays are expected to be detected. Results from the pilot run in 2018 will be presented together with a prospect for physics runs in 2021 and 2022.

Collaboration name:

The DsTau Collaboration

Poster session / 8

Design and Status of the JUNO Experiment

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The Jiangmen Underground Neutrino Observatory (JUNO) is a large liquid scintillator detector under construction that will study antineutrinos from nuclear reactors at a baseline of around 53 km. The main detector will be located at a depth of 700m and will consist of 20 ktons of liquid scintillator in a 35.4 meter diameter acrylic sphere instrumented by 18,000 20-inch and 25,000 3-inch photomultiplier tubes. The liquid scintillator target will be surrounded by a large water cosmic-ray detector, and will be equipped with four complementary calibration systems. This design is tailored to reach an extremely high light yield (1200 PE/MeV), crucial to achieving the unprecedented energy resolution of 3% at 1 MeV. JUNO's program will be strengthened by a monitoring detector called TAO that will be placed at a very short baseline from one of the nuclear reactors and which will have an even better energy resolution. In this talk I will highlight the key aspects of JUNO's design and will report the status of the project.

Collaboration name:

JUNO (Jiangmen Underground Neutrino Observatory)

Poster session / 9

Probing New Physics with Germanium Detectors having sub-keV Sensitivity

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Evidence of finite neutrino masses and cosmological dark matter both imply the necessity of physics beyond Standard Model, and triggered intensive and diverse theoretical and experimental research programs. Germanium ionization detectors with their low threshold and excellent energy resolution are particularly suited to pursue such studies where the final state measurables are nuclear recoils or atomic transitions. The TEXONO Collaboration has been performing studies on low-energy neutrino (ν) physics at the Kuo-Sheng Neutrino Laboratory (KSNL) in Taiwan [1] and, as participant to the CDEX program, light WIMP (χ) searches in the China Jinping Underground Laboratory (CJPL) in China [2] with Ge-ionization detectors, supported by theoretical studies on atomic effects to ν/χ interactions [3]. We will present an overview of the research efforts, with highlights on the new direct constraints on millicharged particles [4] and light-χ searches [5].

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Collaboration name:

TEXONO

Flavor and Precision Physics / 10

The Belle II experiment: early physics and prospect

Autore: Manfred Berger[1]

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The Belle II experiment at the SuperKEKB energy-asymmetric e^+e^- collider is a substantial upgrade of the B factory facility at the Japanese KEK laboratory. The design luminosity of the machine is 8×10^{35} cm^{-2}s^{-1} and the Belle II experiment aims to record 50 ab^{-1} of data, a factor of 50 more than its predecessor. With this data set, Belle II will be able to measure the Cabibbo-Kobayashi-Maskawa (CKM) matrix, the matrix elements and their phases, with unprecedented precision and explore flavor physics with B and charmed mesons, and τ leptons. Belle II has also a unique capability to search for low mass dark matter and low mass mediators. We also expect exciting results in quarkonium physics with Belle II. From February to July of this year, the machine has completed a commissioning run, achieved a peak luminosity of 5.5×10^{33} cm^{-2}s^{-1}, and Belle II has recorded a data sample of about 0.5 fb^{-1}. Regular operations start in March 2019. In this presentation, we will review the status of the Belle II detector, the results of the commissioning run and the near-term prospects for physics at Belle II.

Collaboration name:

Belle II

Astroparticle Physics and Cosmology / 11

Directional Dark Matter Search with Nuclear Emulsion

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A variety of experiments have been developed over the past decades, aiming to detect Weakly Interactive Massive Particles (WIMPs) via their scattering in a detector medium. The sensitivity of these experiments has improved with a tremendous speed due to a constant development of the detectors and analysis methods. Detectors that are able to reconstruct the direction of the nucleus recoiling against the scattering WIMP are opening a new frontier to possibly extend Dark Matter searches beyond the neutrino background. Exploiting directionality would also give a proof of the galactic origin of dark matter making it possible to have a clear and unambiguous signal to background separation. The NEWSdm experiment, based on nuclear emulsions, is proposed to measure the direction of WIMP-induced nuclear recoils. We discuss the potentiality, both in terms of exclusion limits and potential discovery, of a directional experiment based on the use of a solid target made by newly developed nuclear emulsions and read-out systems reaching sub-micrometric resolution. We also report results of the test exposure conducted in Gran Sasso last year.

Collaboration name:

NEWSdm Collaboration

Neutrino / 12

Global fit to ν_μ disappearance data with sterile neutrinos

Autore: Christoph Andreas Ternes[1]; Carlo Giunti[2]; Stefano Gariazzo[2]

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[2] *TO*

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In this talk I present a global fit to ν_μ disappearance data in the context of 3 + 1 neutrino oscillations. I explain the analysis method for the experiments with most impact in the global picture, namely MINOS/MINOS+, DeepCore and Antares, before presenting the results of the combined fit. To finish I discuss the implications of our results to the global 3 + 1 picture.

Collaboration name:

Poster session / 13

Measurement of the neutron capture cross section on argon with ACED

Autore: Luca Pagani[1]

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Liquid argon is becoming a popular medium for particle detection, with applications ranging from low-background dark matter searches to high-energy neutrino detection.
Because neutrons represent both an important source of background (e.g., for dark matter experiments) and a product of signal events (e.g., neutrino-induced spallation neutrons), a good understanding of their interactions in argon is a requirement for precision physics measurements.
Despite being one of the most basic quantities needed to describe low-energy neutron transport, the thermal neutron capture cross section on argon remained poorly understood, with the existing activation measurements showing significant disagreements.
The Argon Capture Experiment at DANCE (ACED) collaboration has performed a differential measurement of the $^{40}\mathrm{Ar}(n,\gamma)^{41}\mathrm{Ar}$ cross section using a Time-Of-Flight neutron beam and the Detector for Advanced Neutron Capture Experiments (DANCE), a $\sim 4\pi$ gamma spectrometer at Los Alamos National Laboratory.
A fit to the differential cross section from $0.015 - 0.15$eV, assuming a $1/v$ energy dependence, yields $\sigma^{2200} = 673 \pm 26$ (stat.) $\pm$ 59(sys.)mb.

Collaboration name:

ACED Collaboration

Neutrino / 14

Status of the search for neutrinoless double-beta decay with GERDA

Autore: Alexey Lubashevskiy[1]

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The GERDA experiment searches for the neutrinoless double-beta decay using high purity germanium detectors enriched in ^{76}Ge, simultaneously used as source and detector. The observation of such a process would demonstrate the presence of a Majorana term in the neutrino mass and prove that lepton number is not conserved. The experimental setup is located at the LNGS underground laboratory of INFN in Italy. The detectors are operated in liquid argon, which cools the detectors and shields them against radiation. Superior background rejection by pulse shape discrimination and usage of liquid argon active veto allowed to reach the desired background level of 10^{-3} counts/(keV·kg·yr). Such background index allows GERDA to be a "background free experiment" up to design exposure of 100 kg·yr. The details of the background reduction techniques will be presented. In 2018, germanium detectors of a new type and new fiber shrouds for liquid argon veto were installed in GERDA. The results on the performance of the upgraded experimental setup will be discussed together with the latest results from GERDA.

Collaboration name:

GERDA

Poster session / 15

Status of investigations of neutrino properties with the vGEN spectrometer at Kalinin Nuclear Power Plant

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The vGEN project is aimed to study neutrino scattering at the close vicinity of the reactor core of Kalinin Nuclear Power Plant. The main interests are connected with the detection of coherent elastic neutrino-nucleus scattering (CEvNS) and magnetic moment of neutrino. A magnetic moment is the fundamental parameter of the neutrino and its investigation may lead to results beyond the standard concepts of elementary particle physics and astrophysics. CEvNS is a process predicted by the Standard Model, but has not been observed for reactor neutrino yet. The detection of this process would be an important test of the Standard Model. Such observation can also help for the search for non-standard neutrino interactions, sterile neutrinos and other investigations. The experimental setup is constructed under the reactor #3 of KNPP at the distance of 10 m from center of the core. In this way, we obtain an enormous antineutrino flux of more than $5{\cdot}10^{13}\nu$ /(cm^2·s). A special lifting mechanism allows to move spectrometer away from the reactor core changing the neutrino flux and thus suppressing main systematic errors caused by possible long-term instability and knowledge of neutrino flux. To detect signal from neutrino scattering we use low-threshold germanium detectors surrounded by passive and active shielding. Current status of the experiment will be presented at the conference.

Collaboration name:

vGEN

Astroparticle Physics and Cosmology / 16

Relic neutrinos: clustering and consequences for direct detection

Autore: Stefano Gariazzo[1]

[1] *IFIC*

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The Cosmic Neutrino Background is a prediction of the standard cosmological model, but it has been never observed directly. Experiments with the aim of detecting relic CNB neutrinos are under development. For such experiments, the expected event rate depends on the local number density of relic neutrinos. Since massive neutrinos can be attracted by the gravitational potential of our galaxy and cluster locally, a local overdensity of relic neutrinos should exist at Earth. We report the status of our knowledge of neutrino clustering and the consequences for future direct detection experiments.

Collaboration name:

Neutrino / **17**

The ENUBET project

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The knowledge of initial flux, energy and flavor of current neutrino beams is currently the main limitation for a precise measurement of neutrino cross sections. The ENUBET ERC project (2016-2021) is studying a facility based on a narrow band neutrino beam capable of constraining the neutrino fluxes normalization through the monitoring of the associated charged leptons in an instrumented decay tunnel. In particular, the identification of large-angle positrons from K_{e3} decays at single particle level can potentially reduce the ν_e flux uncertainty at the level of 1%. This setup would allow for an unprecedented measurement of the ν_e cross section at the GeV scale. Such an experimental input would be highly beneficial to reduce the budget of systematic uncertainties in the next long baseline oscillation projects (i.e HyperK-DUNE). Furthermore, in narrow-band beams, the transverse position of the neutrino interaction at the detector can be exploited to determine a priori with significant precision the neutrino energy spectrum without relying on the final state reconstruction.

This contribution will present the advances in the design and simulation of the hadronic beam line. Special emphasis will be given to a static focusing system of secondary mesons validated in 2018 that, unlike the other studied horn-based solution, can be coupled to a slow extraction proton scheme. The consequent reduction of particle rates and pile-up effects makes the determination of the ν_μ flux through a direct monitoring of muons after the hadron dump viable, and paves the way to a time-tagged neutrino beam. Time-coincidences among the lepton at the source and the neutrino at the detector would enable an unprecedented purity and the possibility to reconstruct the neutrino kinematics at source on an event by event basis. We will also present the performance of positron tagger prototypes tested at CERN beamlines in 2017-2018, a full simulation of the positron reconstruction chain and the expected physics reach of ENUBET.

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Collaboration name:

ENUBET Collaboration

Poster session / 18

Atmospheric neutrino spectrum reconstruction with JUNO

Autore: Giulio Settanta[1]

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The atmospheric neutrino flux represents a continuous source that can be exploited to infer properties about Cosmic Rays and neutrino oscillation physics. The JUNO observatory, a 20 kt liquid scintillator currently under construction in China, will be able to detect the atmospheric flux, given the large fiducial volume and the excellent energy resolution. In this study, a sample of Monte Carlo events has been used to evaluate the JUNO performances. The different time evolution of light inside the detector allows to discriminate the flavor of the primary neutrinos. A probabilistic unfolding method has been built, in order to infer the primary neutrino energy spectrum by looking at the detector output.

Collaboration name:

Jiangmen Underground Neutrino Observatory (JUNO)

Astroparticle Physics and Cosmology / 19

Dark Matter searches with Neutrino Telescopes

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I will review the actual status of Dark Matter search with Neutrino Telescopes

Collaboration name:

Neutrino / 20

Lepton flavour mixing in gauged SO(3)

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We discuss SO(3) as the origin of finite family symmetries such as A4, S4 and A5 in the SUSY framework for the first time. We propose a supersymmetric gauged SO(3)xU(1) flavour model. This model goes through two-step symmetry breaking, first from SO(3) to A4 and then from A4 to residual Z2 and Z3. The model is consistent with current oscillation data and predicts sum rules of mixing parameters. The cosmological domain wall problem, a well-known problem for discrete symmetry breaking, is resolved in the model. Furthermore, the model predicts three degenerate gauge bosons and another Z'with specifically cLFV interactions, which worths further phenomenological studies.

Collaboration name:

Flavor and Precision Physics / 21

Precision study of inclusive $\bar{B} \to X_d \ell^+ \ell^+$ decays

Autore: Enrico Lunghi[1]; Jack Jenkins[None]; Keri Vos[2]; Qin Qin[3]; Tobias Huber[4]; Tobias Hurth[5]

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We calculate multi-parton contributions to the inclusive $\bar{B} \to X_d \ell^+ \ell^+$ decay, which turn out to be considerable but were never considered before. We also investigate the log-enhanced QED corrections and the resonance effects induced by the up-loop amplitudes, in additional to the charm-loop ones that also appear in the b to s transition. After that, employing the other NNLO QCD, NLO QED and power corrections available in the literature, we give the Standard Model predictions of kinds of observables in $\bar{B} \to X_d \ell^+ \ell^+$, including the branching ratio, the forward-backward asymmetry and the CP asymmetry. A preliminary phenomenological update for $\bar{B} \to X_s \ell^+ \ell^+$ will also be given.

Collaboration name:

Neutrino / 22

ESSnuSB project

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ESSnuSB is a design study for an experiment which will attempt to measure CP violation in lepton sector by observing neutrino oscillations at the second muon neutrino to electron neutrino oscillation maximum. The very intense neutrino beam will be generated by uniquely powerful (5 MW average) ESS linear proton accelerator, which is currently under construction near Lund, Sweden. The experiment will feature near detectors located close to the beam source, and a half megatonne water Cherenkov far detector. The signal of CP violation at the second oscillation maximum is expected to be three times of that on the first one, which significantly increases the ratio between the signal and the systematic uncertainty, and thereby the physical reach of the project. This talk will shortly describe the ESSnuSB project, concluding with a brief report on the ongoing activities in evaluating the detector performance.

Collaboration name:

ESSnuSB

Poster session / **23**

Four new lepton-mixing textures

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We present four new types of constraints on the lepton mass matrices that can be derived through adequate symmetries imposed on renormalizable models. The models are based on the type-I seesaw mechanism and have three right-handed neutrinos. Each texture leads to a Majorana neutrino mass matrix with only five independent rephasing-invariant parameters to predict nine observables. The predictive power of the models has been studied for various neutrino mass observables and for the CP-violating phase delta, especially taking into account the correlations between delta and the mixing angle theta_23. Each model has three versions, depending on the identification of the charged leptons. We have found that, out of the 24 possibilities, five models agree with the phenomenological data at the 1 sigma level when the neutrino-mass ordering is normal, and two models agree with the data for an inverted ordering.

Collaboration name:

Neutrino / **24**

The PTOLEMY experiment, a path from a dream to a challenging project

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A paper wrote by the speaker together with two colleagues on 2007 restarted the discussion on the topic of relic neutrino detection after many year of silence on the subject. In the paper a process that makes possible the detection of neutrinos of vanishing energy was discussed and its cross sections with beta unstable elements have been evaluated. After this paper it took 10 years to get to conceive a proposal on a possible experiment.
Today the PTOLEMY collaboration is developing an R&D program aiming at showing the feasibility to detect Cosmological Relic Neutrinos.
In the talks the highlights of the phenomenology paper will be presented, and then a detailed discussion on the detector will go trough all steps required for the
measurement. The PTOLEMY collaboration is working also on a new principle of the electrostatic selection of electrons in the desired energy range.
The filter, whose details have been presented in a recent publication of the collaboration, will be discussed extensively.

Collaboration name:

PTOLEMY

Poster session / 25

The JUNO Large PMT Readout Electronics

Autore: Filippo Marini[1]

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One of the many challenges neutrino physics is facing is it's mass hierarchy determination. The Jiangmen Underground Neutrino Observatory (JUNO) is determined on answering to this question by detecting reactor neutrinos generated from nuclear power plants at a medium baseline, around 50 km, featuring an unprecedent energy resolution of 3% @ 1 MeV thanks to a 20 kton of LAB liquid scintillator detector surrounded by 18'000 20 inches Photo Multiplier Tubes (PMT), all immersed in a water pool about 600 m underground.
To achieve such demanding requirements the data readout electronics foresees an energy resolution of 0.1 photoelectron and a timing resolution and synchronization of 16 ns (up to 1 ns through offline analysis). These features are made possible thanks to the Global Control unit (GCU): a custom board that will be placed underwater and contained in a water-tight box together with three High Voltage Units (HVU). Each box will be connected to three PMTs.
The core of the GCU board is a Field Programmable Gate Array (FPGA) which guarantees the capability of data storage and transfer, data analyzing and several peripherals controlling, as well as functioning as an interface to three Analog to Digital Units (ADU), that continuously digitize the PMT signal analogue stream. The digital signal and trigger informations are forwarded to the dry electronics by means of 100 m Ethernet cable.
The front-end inaccessibility after installation highlights the importance to design high reliability hardware and to adopt strategies for recovering from stalling situations due to bugged or corrupted firmware.
The proposed talk introduces a detailed overview of the JUNO Large PMT readout electronics, its main functionalities and the requirements needed.

Collaboration name:

JUNO

Electroweak Interactions and Higgs physics / 26

Electroweak Interaction in SU(2)X U(1) Left-Right Symmetrical Model

Autore: Andrew Koshelkin[1]

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The $SU(2) \bigotimes U(1)$ gauge model unifying
the electromagnetic and weak interactions, which is initially free of the auxiliary self-interaction scalar field, is developed. We narrow the initial symmetry up to $SU_L(2) \bigotimes U_R(1)$ by eliminating the right neutrinos current from the Lagrangian by means of the bosonization of this current into the $SU(2)$ current of the charged scalar field that leads to the $SU_L(2) \bigotimes U_R(1)$ gauge invariant Lagrangian containing the arbitrary $SU(2)$ invariant charged scalar field. The interaction of such a field with leptons and gauge fields provides them with the required masses, and mixes the lepton families under spontaneous breaking the symmetry of the scalar field. The obtained Pontecorvo-Maki-Nakagawa-Sakata matrix elements is entirely governed by both the coupling constant of leptons with the scalar field and the parameters of the spontaneously arisen vacuum.

Collaboration name:

Poster session / 27

Decay tunnel instrumentation for the ENUBET neutrino beam

Autore: Laura Pasqualini[1]

[1] *INFN Bologna*

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Future neutrino experiments require measurements of absolute neutrino cross section at the GeV scale with a precision of 1% which nowadays is limited by the uncertainties on neutrino fluxes. The aim of the ENUBET project is to measure the neutrino flux by monitoring positrons from $K^+ \rightarrow \nu_e\ e^+\ \pi^0$ decays on an event by event basis. For this purpose a calorimeter system to instrument the decay tunnel of a narrow band neutrino beam has been proposed. The technology is based on modules of Fe/Scintillators shashlik calorimeters longitudinally segmented and readout by Silicon PhotoMultipliers to separate $e^+/\pi^\pm/\mu$ with 17%/$\sqrt{E}$ energy resolution. The system includes also a photon veto made of plastic scintillator tiles to tag positrons coming from kaon decays discarding events with e^+e^- pairs produced in photon conversion from π^0. Performances of calorimeter and photon veto prototypes will be reported together with simulation studies of the beam line.

Collaboration name:

ENUBET

Astroparticle Physics and Cosmology / 28

Recent physics results from DarkSide-50

Autore: Luca Pagani[1]

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DarkSide uses dual-phase Liquid Argon Time Projection Chambers (TPC) to search for WIMP dark matter.
The talk will present the latest result from the current experiment, DarkSide-50, which has been running since mid-2015 and uses a 50-kg-active-mass TPC filled with argon from an underground source.
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, based on a 20-tonne fiducial mass TPC with SiPM based photosensors, is designed to have a background well below that from coherent scattering of solar and atmospheric neutrinos.
Like its predecessor, DarkSide-20k will be housed at the Gran Sasso (LNGS) underground laboratory, and it is expected to attain a WIMP-nucleon cross section of 0^{-47}\,cm^2 for a WIMP mass of 1\,TeV/c^2 in a 5-year run.

Collaboration name:

DarkSide Collaboration

Neutrino / **29**

Sterile neutrino searches with the ICARUS detector

Autore: Christian Farnese[1]

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The ICARUS collaboration employed the 760-ton T600 detector in a successful three-year physics run at the underground LNGS laboratories studying neutrino oscillations with the CNGS neutrino beam from CERN, and searching for atmospheric neutrino interactions. ICARUS performed a sensitive search for LSND-like anomalous ν_e appearance in the CNGS beam, which contributed to the constraints the allowed parameters to a narrow region around 1 eV^2, where all the experimental results can be coherently accommodated at 90% C.L. After a significant overhauling at CERN, the T600 detector has now been placed in its experimental hall at Fermilab where installation activities are in progress. It will be soon exposed to the Booster Neutrino Beam to search for sterile neutrino within the Short Baseline Neutrino (SBN) program, devoted to definitively clarify the open questions of the presently observed neutrino anomalies. The proposed contribution will address ICARUS achievements, its status and plans for the new run at Fermilab and the ongoing developments of the analysis tools needed to fulfill its physics program.

Collaboration name:

ICARUS

Astroparticle Physics and Cosmology / **30**

Measurement of pp-chain Solar Neutrinos with Borexino

Autore: Oemer Penek[1]

[1] *Forschungszentrum Jülich*

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The Borexino detector, located at the Laboratori Nazionali del Gran Sasso in Italy, is a liquid scintillator detector with a primary goal to measure low-energy neutrinos created in the core of the Sun. In comparison to photons which need around hundred thousand years to reach the surface of the Sun, solar neutrinos are able to reach the earth around eight minutes after their creation. Thus, the solar neutrino measurement opens the window to understand the properties of the Sun, namely the fusion mechanisms (*pp*-chain and CNO cycle) or the metallicity problem, and generally to test the predictions of the standard solar model. Furthermore, it is possible to study neutrino oscillation parameters and search for non-standard interactions through the deviations from the Mikheyev-Smirnov-Wolfenstein-Large-Mixing-Angle scenario (MSW-LMA). To increase the sensitivity for *pep* and CNO neutrinos, the multivariate fit technique has been developed, which takes into account additional information of the radial and pulse shape distributions of events. The talk gives an introduction to the solar neutrino physics and discusses the recently published results for the *pp*, *pep*, ^{7}Be and ^{8}B neutrino rates as well as the perspective to measure the neutrinos from the CNO cycle. This talk is presented in the name of the Borexino Collaboration.

Collaboration name:

Borexino

Neutrino / **31**

CONUS - Detecting elastic neutrino nucleus scattering in the fully coherent regime with reactor neutrinos

Autore: Thomas Rink[1]

[1] *MPIK*

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The discovery of coherent elastic neutrino nucleus scattering (CEνNS) by the COHERENT experiment set the stage for new investigations within and beyond the standard model's neutrino sector. However, its detection in the fully coherent regime at low neutrino energies is still pending since the associated low nuclear recoils are experimentally challenging in terms of detection threshold and background reduction. The CONUS experiment aims for the detection of CEνNS at a 17.1m-distance to the powerful reactor core of the commercial nuclear power plant in Brokdorf, Germany. The experiment, being operational since April 2018, takes advantage of the latest generation of ultra-low threshold and high-purity Germanium detectors with noise thresholds around 300 eV as well as an advanced shield design. A first dataset of 1 month reactor OFF time and 6 months reactor ON time has been evaluated, while data collection for the second physics run is ongoing. This talk gives an overview of the latest results and developments of the CONUS experiment, like investigations of reactor-correlated backgrounds and planned upgrades for future data taking periods.

Collaboration name:

CONUS

Neutrino / **32**

The NEXT experiment for neutrinoless double beta decay searches

Autore: Brais Palmeiro Pazos[1]

[1] *IFIC*

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The Neutrino Experiment with a Xenon TPC (NEXT) searches for the neutrinoless double beta decay of 136Xe using a high pressure xenon gas time projection chamber. This detector technology has several key advantages, including excellent energy resolution, powerful event classification based on track topology, and favorable mass scalability. It also offers the tantalising possibility of tagging the daughter ion produced in the decay. The current stage of the experiment, NEXT-White, has been been taking data at the Laboratorio Subterráneo de Canfranc (LSC) in Spain since late 2016. In this talk, we will review recent results from NEXT-White after the first year of low-background operations with both 136Xe-depleted and 136Xe-enriched xenon. Results from dedicated calibration runs to study detector performance will also be shown. Finally, we will conclude by discussing the experiment's prospects, starting from the NEXT-100 detector to be commissioned in 2020.

Collaboration name:

NEXT Collaboration

Neutrino / **33**

The ANNIE experiment

Autore: Michael Nieslony[1]

[1] *Mainz University*

Autore corrispondente: mnieslon@uni-mainz.de

The Accelerator Neutrino Neutron Interaction Experiment (ANNIE) is a Gadolinium doped water Cherenkov detector located in the Booster Neutrino Beam at Fermilab with the primary goal of measuring the final state neutron multiplicity of neutrino-nucleus interactions. The measurement of the neutron yield as a function of the outgoing lepton kinematics will be useful to constrain systematic uncertainties and reduce biases for the reconstruction of neutrino scattering events in future long-baseline oscillation and cross-section experiments. In addition, the results will provide important insight into the governing processes behind neutrino-nucleus scattering and will enhance the background rejection power for future efforts in neutrino physics such as detecting the Diffuse Supernova Background and looking for possible rare baryon-number-violating processes like proton decay. ANNIE will make use of pioneering photodetectors called Large Area Picosecond Photodetectors (LAPPDs) with 50 picosecond time resolution to enhance its reconstruction capabilities and demonstrate the feasibility of this technology as a new tool in high energy physics. ANNIE Phase 2 taking first physics data will start in May 2019.

Collaboration name:

ANNIE

Neutrino / **34**

Harvesting the data from the COHERENT experiment

Autore: Carlo Giunti[1]; Matteo Cadeddu[2]

[1] *INFN Torino*

[2] *CA*

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The experimental observation of the coherent elastic neutrino-nucleus scattering (CEνNS) opened up a new window to explore different sectors from nuclear to neutrino physics, passing through electroweak parameters determination. Indeed, from the analysis of the data provided by COHERENT experiment, we determined for the first time the average neutron rms radius of ^{133}Cs and ^{127}I, obtaining the practically model-independent value $R_n = 5.5^{+0.9}_{-1.1}$ fm. Moreover, CEνNS represents a powerful probe of neutrino properties, allowing in particular to set bounds on the neutrino charge radii. We show that the time information of the COHERENT data permits to restrict the allowed ranges of the neutrino charge radii, especially that of ν_μ. We also obtained for the first time bounds on the neutrino transition charge radii, which would be a sign of physics beyond the Standard Model (SM). Finally, I will show that using the previous mentioned average neutron rms radius of ^{133}Cs and ^{127}I, we are able to remove the long-standing $1.5\,\sigma$ tension between the SM prediction and the weak mixing angle measurement from the atomic parity violation (APV) in caesium. The updated APV result becomes $\sin^2\vartheta_{\rm W} = 0.239^{+0.006}_{-0.007}$, to be compared with the SM prediction at low momentum transfer, $\sin^2\vartheta_{\rm W}^{\rm SM} = 0.23857(5)$. Moreover, from a combination of APV and COHERENT measurements a meaningful value of the caesium neutron skin, the difference between the neutron and proton distribution radii, is obtained $\Delta R_{np} = 0.62 \pm 0.31\,$fm, showing for the first time a $2\,\sigma$ deviation from zero.

Collaboration name:

Neutrino / 35

The MicroBooNE Experiment

Autore: Joseph Zennamo[1]; MicroBooNE Collaboration[None]

[1] *Fermilab*

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MicroBooNE is an 85 ton active-mass liquid argon time projection chamber located in the Booster Neutrino Beam at Fermilab, at a baseline of 470 m. The primary aims of MicroBooNE are to investigate the low-energy excess observed by the MiniBooNE experiment and to make precision measurements of neutrino interactions on argon. In addition, important lessons are being learned about the performance and behavior of a large liquid-argon detector, and considerable developments have been made to the reconstruction and pattern-recognition algorithms needed to analyze the data. This talk will give an overview of the MicroBooNE experiment, present highlights of our recent results, and provide a significant update on progress towards a low-energy excess result.

Collaboration name:

MicroBooNE

Poster session / 36

Status of the MicroBooNE Low-energy Excess Search

Autore: MicroBooNE Collaboration[None]

The primary goal of MicroBooNE is to address the origin of the excess of low energy electromagnetic-like events observed by MiniBooNE. This talk will present MicroBooNE's progress towards a low-energy excess result, including the status of targeted searches for both single-photon-like and electron-like events.

Collaboration name:

MicroBooNE

Neutrino / 37

Recent Cross-section Measurements from MicroBooNE

Autore: Joel Mousseau[1]

[1] *Michigan U.*

Autore corrispondente: joelam@fnal.gov

MicroBooNE is a liquid argon time projection chamber in the Booster Neutrino Beam at Fermilab. The large event rate and 3 mm wire spacing of the detector provide high-statistics, precise-resolution imaging of neutrino interactions leading to low-threshold, high-efficiency event reconstruction with full angular coverage. As such, this is an ideal place to probe neutrino-argon interactions in the hundreds-of-MeV to few-GeV energy range, and to study the impact of nuclear effects through detailed measurements of hadronic final states. This talk will present recent measurements of neutrino interactions in MicroBooNE, including inclusive charged-current interactions, neutral-pion production, and measurements of low-energy protons.

Collaboration name:

MicroBooNE

Poster session / 38

Detector Physics with MicroBooNE

Autore: MicroBooNE Collaboration[None]

With many current and future neutrino experiments relying on Liquid Argon Time Projection Chamber (LArTPC) technology, characterizing the performance of these detectors is critical. The MicroBooNE experiment is capable of performing numerous measurements to better understand the technology. These include identification and filtering of excess TPC noise, signal calibration, recombination, and measurements of drift electron attenuation. MicroBooNE, residing on the surface, can also provide important information about cosmic ray induced space charge in the TPC volume and the subsequent deformations to the electric field. This talk will provide a detailed overview of the subtleties of understanding LArTPC technology and developing calibration techniques towards extracting physics measurements.

Collaboration name:

MicroBooNE

Neutrino / 39

Exploring light sterile neutrinos at LBL experiments

Autore: Antonio Palazzo[1]

[1] *BA*

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One of the hottest topics in present-day neutrino physics is provided by the hints of sterile species coming from the short-baseline (SBL) anomalies. Waiting for a definitive (dis-)confirmation of these indications by future SBL experiments, other complementary avenues can be explored in the hunt of such elusive particles. An important opportunity is that offered by the long-baseline (LBL) experiments which, as I will show, are sensitive to the new sources of CP-violation involved in the 4-flavor scheme. I will point out that the experiments NOvA and T2K already provide the first indications on one of the new CP-phases. I will also describe how the future LBL experiments DUNE, T2HK and ESSnuSB will be able to pin down the new CPV sector.

Collaboration name:

Flavor and Precision Physics / 40

Search for physics beyond the Standard Model in the decays of neutral B mesons with ATLAS

Autore: Sandro Palestini[1]

[1] *CERN*

Autore corrispondente: sandro.palestini@cern.ch

Rare decays and processes involving interference with flavour-oscillation amplitudes are suitable for searches of New Physics. LHC has provided large samples of B hadrons, and remarkable increases in sensitivities have been achieved in the decays B_s^0, $B^0 \to \mu^+\mu^-$ and in the search of CP violation in $B_s^0 \to J/\psi\,\phi$. New, accurate results obtained with the ATLAS detector will be discussed, and compared to other measurements and predictions.

Collaboration name:

ATLAS Collaboration

Poster session / 41

ORCA sensitivity to neutrino decay

Autore: Pablo Fernández de Salas[1]

[1] *Oskar Klein Centre for Cosmoparticle Physics, Stockholm University*

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The upcoming generation of neutrino telescopes is going to push the knowledge of neutrino physics to the limit, sheding light on several scenarios beyond the Standard Model as well as improving current precision to standard neutrino physics. In particular, in this talk I will present a sensitivity study to neutrino decay of the forthcoming KM3NeT-ORCA experiment. In some theories beyond the Standard Model neutrinos are allowed to decay, a process that can affect neutrino oscillations. Given the long baselines travelled by atmospheric neutrinos and the level of precision that will be reached by ORCA, this neutrino telescope will improve current bounds on neutrino decay coming from oscillation experiments. In addition I will comment on the effect of a possible neutrino decay on the sensitivity of ORCA to the atmospheric oscillation parameters, as well as to the neutrino mass ordering.

Collaboration name:

Neutrino / **42**

Science and Status of the Deep Underground Neutrino Experiment (DUNE)

Autore: Thomas Kutter[1]

[1] *LSU*

Autore corrispondente: kutter@phys.lsu.edu

The Deep Underground Neutrino Experiment (DUNE) has a broad physics program, which includes measuring the CP violating phase, determining the neutrino mass hierarchy and performing precision tests of the three-flavor paradigm in long-baseline neutrino oscillations by means of making measurements of neutrino oscillation parameters. Other science goals are the detection of neutrinos from core-collapse supernovae and a search for nucleon decay.
The experiment will employ a high-power broadband neutrino beam from Fermilab, which will pass through a high precision near detector and be directed towards the 1300 km distant Sanford Underground Research Facility (SURF) in Lead, South Dakota. The underground laboratory will house four liquid argon (LAr) time projection chambers, each with a fiducial mass of 10 kt of LAr.
We present an overview of the DUNE experiment, its status including that of two large scale LAr prototypes at CERN, and the experiment's physics potential.

Collaboration name:

DUNE

Neutrino / **43**

General neutrino interactions from an effective field theory perspective

Autore: Ingolf Bischer[1]; Werner Rodejohann[1]

[1] *MPIK*

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We discuss the concept and detection prospects of general neutrino interactions (GNI) as a well-motivated generalisation of the widely-studied non-standard interactions (NSI), both encompassing effects of new physics at energies below the electroweak scale. If GNI (tensor, (pseudo)scalar, and (axial) vector interactions) arise from heavy new physics, they should be related to effective field theory (EFT) operators that respect the Standard Model (SM) gauge symmetry, much like NSI are frequently addressed in the context of SMEFT. The minimal extension of SMEFT towards admitting GNI is introducing right-handed SM-singlet neutrinos. In this case nearly all general interactions with quarks and charged leptons can originate from dimension-six four-fermion operators. This motivates searching for experimental signatures beyond NSI, for instance in neutrino-electron scattering, beta decay and coherent elastic neutrino nucleus scattering, that may inform us about UV extensions of the SM and the Dirac or Majorana nature of neutrinos.

Collaboration name:

Flavor and Precision Physics / **44**

Latest results on rare Kaon decays from the NA48/2 experiment at CERN

Autore: Cristina Biino[1]

[1] *INFN Torino*

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The NA48/2 experiment at CERN reports the first observation of the K± ⟶ π± π0 e+ e− decay from an exposure of 1.7×10^11 charged kaon decays recorded in 2003–2004. A sample of 4919 candidates with 4.9% background contamination allows the determination of the branching ratio in the full kinematic region. The study of the kinematic space shows evidence for a structure dependent contribution in agreement with predictions based on chiral perturbation theory. Several P- and CP-violating asymmetries are also evaluated.
The most precise measurement of the charged kaon semi-leptonic form factors obtained by NA48/2 with 4.4 million Ke3 and 2.3 million Kmu3 events collected in 2004 will also be presented.

Collaboration name:

NA48/2 Collaboration

Flavor and Precision Physics / **45**

Latest results from NA62

Autore: Riccardo Lollini[1]

[1] *INFN Perugia*

Autore corrispondente: riccardo.lollini@pg.infn.it

The NA62 experiment at CERN SPS was designed to measure BR(K+ -> pi+ nu nu-bar) with in-flight decays, a novel technique for this channel. NA62 took its first physics data in 2016, reaching the sensitivity to the decay at the Standard Model BR. The experiment collected 10 times more statistics in 2017 and a similar amount of data is expected from the 2018 run.
The result on K+ to pi+ nu nu-bar from the full 2016 data set and the latest extrapolation and background evaluation from the 2017 data set will be presented. Prospects for improvements to be achieved with the full data set will also be discussed.
A large sample of charged kaon decays into final states with multiple charged particles was also collected in 2016-2018. The sensitivity to a number of Lepton Flavour and Lepton Number violating K+ decays provided by this data set is an order of magnitude beyond the current state of the art. The latest results of the search for K+ ⟶ π- l+ l+ (l=mu, e) decays and prospect for the search of K+ ⟶ π- mu+ e+ and K+ ⟶ π+ mu- e+ processes will be presented.

Collaboration name:

NA62 Collaboration

Flavor and Precision Physics / 46

Heavy Flavor Spectroscopy at CMS

Autore: Cesar Mondragon[1]

[1] *CINVESTAV*

Autore corrispondente: cesarmh18@gmail.com

We report new results in heavy flavor spectroscopy, using pp collision data collected by the CMS experiment at the LHC, including the observation of two excited Bc states and the study of the B->J/Psi Lambda p decay. The first analysis is based on an event sample corresponding to a luminosity of 143 fb^-1 at sqrt(s)=13 TeV. The Bc excited states are observed in the Bc pipi invariant mass spectrum, with the ground state reconstructed through its decay to J/Psi pi. The second analysis uses a data set of 19.6 fb^-1 collected at sqrt(s)=8 TeV. The Branching Ratio of this decay is measured with respect to BR(B+ -> J/Psi K*) and the invariant mass distributions of the J/Psi Lambda, J/Psi p and Lambda p systems are investigated

Collaboration name:

CMS

Flavor and Precision Physics / 47

Search for tau->3mu decays at CMS

Autore: Rosamaria Venditti[1]

[1] *INFN Bari*

Autore corrispondente: rosamaria.venditti@ba.infn.it

The results of a search for charged lepton flavor violating decays tau->3mu, using pp collisions at sqrt(s)=13 TeV at LHC, are presented. This analysis uses the data collected by CMS in 2016, corresponsing to a luminosity of 33 fb^-1, and exploits tau leptons produced in W boson, D and B mesons decays.

Collaboration name:

CMS

Poster session / 48

Jet fragmentation in J/Psi mesons

Autore: Collaboration CMS[None]

Autore corrispondente: stosi@cern.ch

The differential distributions of jet fragmentation probability as a function of jet energy for a fixed J/psi energy fraction z are compared to a theoretical model based on the fragmenting jet function (FJF) approach. The analysis is based on pp collisions at sqrt(s) = 8 TeV, corresponding to an integrated luminosity of 19.1 fb−1. These data distingush clearly between different nonrelativistic quantum

chromodynamics (NRQCD) long distance matrix element (LDME) parameter sets and also between different NRQCD terms.

Collaboration name:

CMS

Poster session / 49

Upsilon production vs charged particles multiplicity

Autore: Collaboration CMS[None]

Autore corrispondente: stosi@cern.ch

The ratios of the production cross sections of the Upsilon(nS) mesons are studied using a sample of pp collisions at sqrt(s)=7 TeV, corresponding to an integrated luminosity of 4.8 fb−1, collected with the CMS detector at LHC. The ratios are measured for Upsilon(nS) as a function of the number of charged tracks. Evidence of a decrease of the ratios between the higher and the lower mass states as a function of the particles'multiplicity is observed.

Collaboration name:

CMS

Poster session / 50

Prompt D(*) production cross section in pp collisions at sqrt(s)=13 TeV

Autore: Collaboration CMS[None]

Autore corrispondente: stosi@cern.ch

The production cross section of the prompt open charm mesons has been measured in pp collisions at the LHC center of mass energy of 13 TeV. The data sample corresponds to an integrated luminosity of 29 nb^-1 collected by the CMS experiment in 2016. The differential cross section of the D(*) mesons has been measured in bins of transverse momentum and paseudorapidity and compared to several theoretical predictions.

Collaboration name:

CMS

Astroparticle Physics and Cosmology / 51

Cuckoo's eggs in neutron stars: can LIGO hear chirps from the dark sector?

Autore: Ranjan Laha[None]

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We explore in detail the possibility that gravitational wave signals from binary inspirals are affected by a new force that couples only to dark matter particles. We discuss the impact of both the new force acting between the binary partners as well as radiation of the force carrier. We identify numerous constraints on any such scenario, ultimately concluding that observable effects on the dynamics of binary inspirals due to such a force are not possible if the dark matter is accrued during ordinary stellar evolution. Constraints arise from the requirement that the astronomical body be able to collect and bind at small enough radius an adequate number of dark matter particles, from the requirement that the particles thus collected remain bound to neutron stars in the presence of another neutron star, and from the requirement that the theory allows old neutron stars to exist and retain their charge. Thus, we show that any deviation from the predictions of general relativity observed in binary inspirals must be due either to the material properties of the inspiraling objects themselves, such as a tidal deformability, to a true fifth force coupled to baryons, or to a non-standard production mechanism for the dark matter cores of neutron stars. Viable scenarios of the latter type include production of dark matter in exotic neutron decays, or the formation of compact dark matter objects in the early Universe that later seed star formation or are captured by stars.

Collaboration name:

Astroparticle Physics and Cosmology / 52

Lensing of fast radio bursts: future constraints on primordial black hole density with an extended mass function and a new probe of exotic compact fermion/ boson stars

Autore: Ranjan Laha[1]

[1] *CERN*

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The discovery of gravitational waves from binary black hole mergers has renewed interest in primordial black holes forming a part of the dark matter density of our Universe. Various tests have been proposed to test this hypothesis. One of the cleanest tests is the lensing of fast radio bursts. In this situation, the presence of a compact object near the line of sight produces two images of the radio burst. If the images are sufficiently separated in time, this technique can constrain the presence of primordial black holes. One can also try to detect the lensed image of the mini-bursts within the main burst. We show that this technique can produce the leading constraints over a wide range in lens masses
$gtrsim$ 2 $M_\odot$ if the primordial black holes follow a single mass distribution. Even if the primordial black holes have an extended mass distribution, the constraints that can be derived from lensing of fast radio bursts will be the most constraining over wide ranges of the parameter space. We also show that this technique can probe exotic compact boson stars and fermion stars and outline the particle physics parameter space which can be probed.

Collaboration name:

Astroparticle Physics and Cosmology / 53

Low-Energy Cosmic-ray Measurements with HEPD

Autore: Vincenzo Vitale[1]; CSES-Limadou Collaboration[None]

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For energies below 30 GeV, the Cosmic Rays flux is modulated in intensity by the solar activity. This effect can be efficiently monitored with space-borne detectors for charged particles. The High-Energy Particle Detector (HEPD) is a space apparatus on board of the China Seismo- Electro-magnetic Satellite (CSES). It is built around a segmented calorimeter, having as upper part a tower of plastic scintillator counters and as lower part an array of LYSO large crystals. At the calorimeter top there is a versatile trigger system and a silicon tracker, while all around the calorimeter additional plastic scintillators act as an anti-coincidence system. The HEPD energy range goes from few to 100 MeV for electrons, from few tens to few hundreds of MeV/nucleon for protons and light nuclei (He,C). Because of its polar orbit, it can detect solar particles and low-energy cosmic rays at high latitudes, where the geo-magnetic cut-off is minimal. These measurements allow to perform the low-energy cosmic ray monitoring, on short time scales. A detailed overview of HEPD and its preliminary results will be given in this talk.

Collaboration name:

CSES-Limadou Collaboration

Electroweak Interactions and Higgs physics / 54

EXOTIC SEARCHES AT THE NA62 EXPERIMENT AT CERN

Autore: Lorenza Iacobuzio[1]

[1] *University of Birmingham*

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The features of the NA62 experiment at the CERN SPS –high-intensity setup, trigger-system flexibility, high-frequency tracking of beam particles, redundant particle identification, and ultra-high-efficiency photon vetoes –make NA62 particularly suitable to search for long-lived, weakly-coupled particles within Beyond the Standard Model physics.
Searches for Heavy Neutral Lepton (HNL) production in charged kaon decays using the data collected by the NA62 experiment are reported. Upper limits are established on the elements of the extended neutrino mixing matrix for HNL masses in the range 130-450 MeV, improving on the results from previous HNL production searches.
Latest results on production searches of Dark Photons in neutral pion decays at NA62 are also presented, together with sensitivity results for production and decay searches of Axion-Like Particles, and prospects for future data taking at the NA62 experiment.

Collaboration name:

NA62 Collaboration

Flavor and Precision Physics / 55

Measurements of CPV in b and c decays at LHCb

Autore: LHCb collaboration[None]

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Precision measurements of CP violating observables in the decays of b and c hadrons are powerful probes to search for physics beyond the Standard Model. The most recent results on CP violation in the decay, mixing and interference of both b and c hadrons obtained by the LHCb Collaboration with

Run I and years 2015-2016 of Run II are reviewed. In particular world best constraints and world first measurements are provided for CKM elements, unitarity angles and charm parameters.

Collaboration name:

LHCb

Flavor and Precision Physics / **56**

B-flavour anomalies in b->sll and b->clnu transitions at LHCb

Autore: Julian Garcia Pardinas[1]

[1] *Zurich U.*

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The concept of lepton universality, where the muon and tau particles are simply heavier copies of the electron, is a key prediction in the Standard Model (SM). In models beyond the SM, lepton universality can be naturally violated with new physics particles that couple preferentially to the second and third generation leptons. Over the last few years, several hints of lepton universality violation have been seen in both b->c and b->s semileptonic beauty decays. This presentation will review these anomalies and give an outlook for the near future. Other probes of NP in highly suppressed b-hadron decays will also be discussed.

Collaboration name:

LHCb

Neutrino / **57**

SNO+, from water to scintillator

Autore: Juan Pablo Yanez[1]

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The SNO+ experiment is a low background, liquid scintillator neutrino detector with the goal of detecting neutrinoless double beta decay in Tellurium-130. The experiment has been taking data filled with water since early 2017 setting world-leading limits in invisible nucleon decay and a very low background measurement of solar neutrinos. SNO+ is in the process of being filled with liquid scintillator, a phase in which reactor antineutrinos and solar neutrinos will be measured. The Te-loaded phase is expected to start towards the end of the year. The results, status and future of the detector are discussed.

Collaboration name:

SNO+ Collaboration

Poster session / 58

The minimal inverse Type III See-saw Models

Autore: Manuele Filaci[1]; Carla Biggio[2]; Jacobo Lopez-Pavon[None]; Josu Hernandez-Garcia[None]; Fernandez-Martinez Enrique[None]

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The Type III See-saw Models are extensions of the Standard Model with some fermion triplets, with the purpose of generating neutrino masses. The minimal inverse cases, which can explain the smallness of neutrino masses even having relatively light triplets and large coupling constants, consist in the addiction of 2 or 3 fermion triplets. In this talk I will review the main aspects of these models and show the updated bounds both on the general case and on the minimal inverse cases.

Collaboration name:

Neutrino / 59

Sterile Neutrinos with Altered Dispersion Relations as an Explanation for the MiniBooNE, LSND, Gallium and Reactor Anomalies

Autore: Dominik Döring[1]

Coautore: Heinrich Päs [1]; Philipp Sicking [1]; Thomas J. Weiler [2]

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Recently the MiniBooNE Collaboration has reported an anomalous excess in muon to electron (anti-)neutrino oscillation data. Combined with long-standing results from the LSND experiment this amounts to a 6.1 sigma evidence for new physics beyond the Standard Model. We develop a framework with 3 active and 3 sterile neutrinos with altered dispersion relations that can explain these anomalies without being in conflict with the absence of anomalous neutrino disappearance in other neutrino oscillation experiments.

Collaboration name:

Astroparticle Physics and Cosmology / 60

First model independent results from DAMA/LIBRA–phase2

Autore: Vincenzo Caracciolo[1]; DAMA collaboration[None]

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The first results obtained by the DAMA/LIBRA–phase2 experiment are presented. The data have been collected over 6 independent annual cycles corresponding to a total exposure of 1.13 ton × yr, deep underground at the Gran Sasso Laboratory. The DAMA/LIBRA–phase2 apparatus, about 250 kg highly radio-pure NaI(Tl), profits from a second generation high quantum efficiency photomultipliers and of new electronics with respect to DAMA/LIBRA–phase1. The improved experimental configuration has also allowed to lower the software energy threshold. The DAMA/LIBRA–phase2 data confirm the evidence of a signal that meets all the requirements of the model independent Dark Matter annual modulation signature, at 9.5 sigma C.L. in the energy region (1–6) keV. In the energy region between 2 and 6 keV, where data are also available from DAMA/NaI and DAMA/LIBRA–phase1, the achieved C.L. for the full exposure (2.46 ton × yr) is 12.9 sigma.

Collaboration name:

Flavor and Precision Physics / 61

Lepton Flavour Universality in B Decays and Other Recent Results at Belle

Autore: Maria Rozanska [1]

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Indications for lepton flavour universality violation in the mode B -> D(\) *tau nu and B -> K(*\) l+ l- have been of interest
and can be a hint for the New Physics effect.
We report new measurements on R(D) and R(D\) *(branching ratio of B -> D(*\) tau nu over B -> D(\) *l nu where l + e, mu) the semi-leptonic tag method,*
nd on R(K\) (branching ratio of B -> K*mu+ mu- over K*\ e+ e-).
A few more results from Belle experiment are also covered.
The analyses are based on the full data set recorded by the Belle detector at the Y(4S) resonance containing 772 million BBbar pairs from e+ e- collisions produced by the KEKB collider.

Collaboration name:

Belle

Astroparticle Physics and Cosmology / 62

Precision measurement of the time variation of cosmic rays fluxes measured by the Alpha Magnetic Spectrometer on the ISS

Autore: Behrouz Khiali[1]

[1] *INFN Tor Vergata & SSDC-ASI*

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The precision measurements of the monthly variation of proton, helium, carbon, and oxygen cosmic ray fluxes for the period from May 2011 to May 2018 and in the rigidity range from ~2 GV up to ~60 GV, obtained with the Alpha Magnetic Spectrometer on the International Space Station are presented. This period covers both the ascending phase of solar cycle # 24 together with the reversal of the Sun'

s magnetic field polarity through the minimum. The time dependence of the p/He, C/p, O/p, C/He and O/He flux ratios are also presented.

Collaboration name:

AMS-02 Collaboration

Poster session / 63

Neutrinoless-double beta decay and its potential to investigate neutrino properties

Autore: Sabin Stoica[1]

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Abstract.
Neutrinoless double beta decay (0νDBD) is a nuclear process which is permitted within theories more general than the Standard Model (SM) in its original formulation. The discovery of this double-beta decay (DBD) mode would confirm the lepton number violation and the nature of neutrinos (Majorana particles) and could provide important information about neutrino properties still unknown until now (neutrino mass scale, mass hierarchy, existence of sterile neutrinos), deviations from the CP and Lorentz symmetries, etc. Theoretically, the 0νDBD study consists in the derivation of the half-life formulas in different approximations and for different possible mechanisms that can contribute to its occurrence and the precisely computation of the nuclear matrix elements (NMEs) and phase space factors (PSFs) entering these formulas, for different decay modes and transitions to final ground or excited states of the daughter nuclei. Accurate computations of these quantities result in reliable predictions of half-lives and constraints of the beyond SM parameters associated to these possible mechanisms.
In my talk I give first a short review of the theoretical challenges in the study of 0νDBD decay and of the broad potential of this decay mode to investigate physics beyond SM. Then I present a new, more reliable, approach to calculate the products NMEs x PSFs by a direct computation and I present new limits for the neutrino mass parameters for the light and heavy neutrino exchange scenarios. Also, I show how possible deviations from the Lorentz symmetry in the neutrino sector can be investigated within the DBD study.

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S.Stoica, Chinese Phys. C 43, no.6 (2019)(in press).

Collaboration name:

Astroparticle Physics and Cosmology / 64

Towards understanding the origin of cosmic electrons and positrons: precision measurements of e+ and e- fluxes with the Alpha Magnetic Spectrometer on the ISS

Autore: Maura Graziani[1]

[1] *KIT*

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Precision measurements of cosmic ray positrons and electrons are presented based on 1.9 million positrons and 28.1 million electrons collected by the AMS-02 experiment on the International Space Station. For the first time, the positron flux is measured up to 1 TeV and the electron flux up to 1.4 TeV: in the entire energy range the electron and positron spectra have distinctly different magnitudes and energy dependences leading to a clear evidence that most high energy electrons originate from different sources than high energy positrons. The study of the anisotropies in their arrival directions is also presented, which can be provide further information to understand their origin.

Collaboration name:

AMS

Neutrino / 65

Hyper-Kamiokande

Autore: Lagoda Justyna[1]

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Hyper-Kamiokande is a next generation large-scale water Cherenkov detector. Its fiducial volume will be about an order of magnitude larger than Super-Kamiokande and the detector performance is significantly improved with newly developed photo-sensors. Combination of the Hyper-Kamiokande detector with the upgraded J-PARC neutrino beam will provide unprecedented high statistics of the neutrino and antineutrino signals to measure the CP violation and reveal a full picture of neutrino mixing with high precision. Prospects for the CP violation measurements by the Hyper-Kamiokande long baseline project will be presented. In addition , we will discuss the physics potential of Hyper-K on solar and astrophysical neutrinos.

Collaboration name:

Astroparticle Physics and Cosmology / 66

GAPS: Searching for Dark Matter using Antinuclei in Cosmic Rays

Autore: Riccardo Munini[1]

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The General Antiparticle Spectrometer (GAPS) is designed specifically to measure low energy ($E < 0.25$ GeV/nucleon) antinuclei in the cosmic radiation.
Many beyond standard model theories predict a possible signal of antinuclei from dark matter annihilation or decay. In this context, the antideuteron component is particularly interesting because the intensity from secondary/tertiary interactions is expected to be several orders of magnitude lower than the dark matter signal. This represents a background free searches for indirect dark matter measurement.

GAPS will also conduct a low-energy antihelium search and a high precision measurement of low energy antiprotons. Together, these observations will provide a powerful search for dark matter and for primordial black hole evaporation.

GAPS will use a novel particle identification method based on exotic atom formation and decay, characterized by the emission of pions, protons and atomic X-rays from a common annihilation vertex.
This detection technique will give GAPS the high rejection factors necessary for rare antinuclei searches.

The detector consists of a a plastic scintillator
time-of-flight system which surround a tracking system made up of ten planes of lithium-drifted silicon Si(Li) detectors.

The first of a series of a long-duration Antarctic balloon flight is expected for the austral summer of 2020 or 2021. This presentation covers the design, the scientific motivation for the GAPS experiment and its current status.

Collaboration name:

GAPS collaboration

Astroparticle Physics and Cosmology / 67

The High Energy cosmic-Radiation Detection facility: goals, design and performances

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The High Energy cosmic-Radiation Detection (HERD) facility will be installed on board the China's Space Station (CSS) in the years around 2026 and will operate for a period of about 10 years measuring the flux of cosmic rays. Thanks to its innovative design, based on a large, homogeneous and isotropic calorimeter made of LYSO crystals, HERD is capable of detecting particles that enters the detector not only from the top face, but also from the lateral faces. In this way, it is possible to significantly increase the effective geometric factor of the instrument by more than one order of magnitude respect to the experiments currently operating in space. At the same time the high 3D segmentation of the calorimeter is essential to obtain a good electron/hadron separation power, exploiting the reconstruction of the shower profile. HERD will be the first experiment able to directly measure the gamma-ray spectrum from 500 MeV to 100 TeV, electrons+positrons energy flux from 10 GeV to 100 TeV, and protons and nuclei energy flux from 30 GeV up to 1 PeV. Exploiting this potential, it will be possible to pursue two main scientific goals: the search for signatures of the annihilation/decay products of dark matter particles and the understanding of the mechanism responsible for the cosmic rays knee structure. In this talk, we will discuss in detail the goals of the experiment, the requirements needed for these tasks, and the design and the optimization of the instrument to match the required performances.

Collaboration name:

HERD

Astroparticle Physics and Cosmology / 68

Precision measurement of the Energy Dependence of Primary and Secondary Cosmic Rays with the Alpha Magnetic Spectrometer on the International Space Station

Autore: Yi Jia[1]

[1] *MIT*

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Precision study of cosmic nuclei provides detailed knowledge on the origin and propagation of cosmic rays. AMS is a multi-purpose high energy particle detector designed to measure and identify cosmic ray nuclei with unprecedented precision. It is able to provide precision studies of nuclei simultaneously to multi-TeV energies. In 7 years on the Space Station, AMS has collected more than 120 billion both primary and secondary cosmic rays. Primary cosmic rays, such as p, He, C and O, are believed to be mainly produced and accelerated in supernova remnants, while secondary cosmic rays, such as Li, Be and B are thought to be produced by collisions of heavier nuclei with interstellar matter. Primary cosmic rays such as He, C, and O are found to have identical rigidity dependence, similarly to secondary cosmic rays (such as Li, Be and B) which share the same the same spectral shape. The peculiar case of Nitrogen being a mixture of a primary and secondary component will also be shown.

Collaboration name:

AMS Collaboration

Neutrino / 69

Recent results on the search for eV sterile neutrinos with the STEREO experiment

Autore: Christian Roca[1]

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In the recent years two unsolved anomalies have appeared during the study of the reactor neutrinos: one related to the neutrino spectral shape, and another to the absolute neutrino flux. The latter, known as the Reactor Antineutrino Anomaly (RAA), presents a deficit in the observed flux compared to the expected one. This anomaly could point to the existence of a light sterile neutrino participating in the oscillation phenomena, which can be tested by searching for oscillations of reactor neutrinos at very short baselines.

The STEREO experiment is aiming to find an answer to this anomaly. It observes neutrinos from the compact, highly enriched fuel element of the research reactor of the Institut Laue-Langevin (Grenoble, France). The detector is placed at only 10 meters from the reactor core, and in order to have an independent measurement of the neutrino spectrum, it is segmented in six independent cells providing a multiple baselines analysis. The recorded data during 185 days reactor-on and 233 days reactor-off are compatible with the null oscillation hypothesis and reject the original best-fit of the RAA at 99.8 C.L. The improvements performed during the second phase of data taking and preliminary results will be presented in this talk.

Collaboration name:

Stereo

Astroparticle Physics and Cosmology / 70

The Recoil Directionality (ReD) Experiment

Autore: Simone Sanfilippo[1]

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Directional sensitivity to nuclear recoils would provide a smoking gun for a possible discovery of dark matter in the form of WIMPs. A hint of directional dependence of the response of a dual-phase liquid argon Time Projection Chamber (TPC) was found in the SCENE experiment. Given the potential importance of such a capability in the framework of dark matter searches, a new dedicated experiment, ReD (Recoil Directionality), was designed in the framework of the DarkSide Collaboration, in order to scrutinize this hint.
A small dual-phase liquid argon TPC is irradiated with neutrons produced by the p(Li7,Be7)n reaction from the TANDEM accelerator of the INFN Laboratori Nazionali del Sud (LNS), Catania, such to produce Ar nuclear recoils in the range of interest for Dark Matter searches. Energy and direction of nuclear recoils are inferred by the detection of the elastically-scattered neutron by a set of scintillation detectors. Golden scattering events can be further selected by gating of the associated Be7, which is detected by a telescope made of two Si detectors. As an additional valuable by-product, ReD can be operared to study the response of the TPC to very low-energy nuclear recoils (in the keV range).
In July 2018, the ReD set-up was deployed and integrated on a beam line of the LNS allowing for the first characterization and for the integration of the three detector systems (TPC, liquid scintillators, Si telescope). After this first test-beam, the entire system were ri- assembled in the Cryogenic Laboratory for the research of Dark Matter of INFN Naples. This contribution will describe the performance of the detectors achieved during the test- beam in Catania, the current status of ReD and the perspectives for physics measurements during the forthcoming beam-time.

Collaboration name:

Neutrino / 71

Oscillation Physics with KM3NeT-ORCA

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The Kilometer Cube Neutrino Telescope (KM3NeT) is a next generation undersea neutrino telescope in the Mediterranean sea, currently under deployment. It's low energy configuration ORCA (Oscillations Research with Cosmics in the Abyss) will have a low neutrino energy detection threshold of 3 GeV. The effective mass of the fully completed detector is estimated to be around 5.8 Mega tonnes. The primary goal of ORCA is to determine the neutrino mass hierarchy with atmospheric neutrinos and make precise measurement of the atmospheric oscillation parameters. It will also be able to test the PMNS unitarity and constrain non-standard physics scenarios such as sterile neutrinos and Non-Standard Physics (NSI). In this talk the status and prospects for the oscillation measurements will be presented and potential future upgrades of ORCA will be discussed.

Collaboration name:

KM3NeT Collaboration

Electroweak Interactions and Higgs physics / 72

Leptogenesis and low-energy CP violation in a type-II-dominated left-right seesaw model

Autore: Thomas Rink[1]; Werner Rodejohann[2]; Kai Schmitz[3]

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Our work deals with a left-right symmetric leptogenesis framework in which light neutrino masses and the generation of a baryon asymmetry in the universe (BAU) are dominated by a type-II seesaw contribution. With an additional SO(10)-inspired relation between neutrino Dirac mass and up-quark mass matrix the model's parameter space can be reduced to a few variables that separate nicely into high and low energy regions. A detailed investigation with flavored Boltzmann equations shows that this simple model can reproduce the correct BAU and underlines its dependence on low-energy neutrino observables.

Collaboration name:

Astroparticle Physics and Cosmology / 73

Recent results from the DAMPE experiment

Autore: Zhaomin Wang[1]

Coautore: Guillermo Torralba [2]; Ines Valino [2]; Ivan De Mitri [2]

[1] *GSSI*

[2] *Gran Sasso Science Institute*

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DAMPE (Dark Matter Particle Explorer) is a powerful space-borne experiment for direct detection of high-energy cosmic rays, electrons and gamma rays. DAMPE scientific goals include the search for dark matter signatures in electron and photon energy spectra from few tens of GeV up to 10TeV with unprecedented resolution (better than 1.5% at 800GeV), and the study of galactic cosmic rays with energies up to 100TeV/n (with resolution better than 40% at 800GeV). The latest scientific results of DAMPE will be reported, together with the detector description and the on-orbit detector performance.

Collaboration name:

Flavor and Precision Physics / 74

Dalitz plot analyses of three body charmonium decays and study of $\Upsilon(1S)$ radiative dacays in BaBa

Autore: Antimo Palano[1]

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We perform Dalitz plot analyses of J/ψ three-body hadronic decays to $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$ and $K^0_S K^\pm\pi^\mp$ using the isobar and Veneziano models. The J/ψ is produced through the Inital-State-Radiation process. We also perform Dalitz plot analyses of η_c three-body hadronic decays to $K^+K^-\pi^0$ and $K^0_S K^\pm\pi^\mp$, where the η_c is produced in two-photon interactions. We study the $\Upsilon(1S)$ radiative decays to $\gamma\pi^+\pi^-$ and γK^+K^- using data recorded at center-of-mass energies at the $\Upsilon(2S)$ and $\Upsilon(3S)$ resonances. Branching fraction measurements and spin-parity analyses are reported for all the resonances observed in the mass spectra.

Collaboration name:

This abstract is submitted on behalf of the BaBar Collaboration.

Poster session / 75

Measurement of hadronic cross sections with the BABAR detector

Autore: Fabio Anulli[1]

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The measurement of exclusive e^+e^- to hadrons processes is a significant part of the physics program of BABAR detector, aimed to improve the calculation of the hadronic contribution to the muon g−2 and to study the intermediate dynamics of the processes. We present the most recent results obtained by using the full data set of about 470 fb^{-1} collected by the BABAR experiment at the PEP-II e^+e^- collider at a center-of-mass energy of about 10.6 GeV. In particular, we report the results on the channels $e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0$, $e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0\pi^0(\eta)$ and , $e^+e^- \rightarrow \pi^+\pi^-\pi^0\pi^0\pi^0(\eta)$, and $e^+e^- \rightarrow \pi^+\pi^-\eta$.

Collaboration name:

This abstract is submitted on behalf of the BaBar Collaboration.

Astroparticle Physics and Cosmology / 76

Neutrino astronomy with the Antares detector and perspectives for KM3NeT-ARCA

Autore: Pasquale Migliozzi[1]

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Antares, the largest deep-underwater Cherenkov neutrino telescope in the Northern hemisphere, has been taking data continuously since 2007. Its primary goal is the search for astrophysical neutrinos in the TeV-PeV range. Antares, thanks to its excellent angular resolution, has performed dedicated searches for promising neutrino source candidates and several interesting regions like the Galactic Plane and the Fermi Bubbles have been explored. The location and the high quality of the data provided by Antares, despite of the modest size of the detector if compared to IceCube, have permitted to reach competitive results. This allowed Antares to develop a manifold multi-messenger

program: latest experimental results from searches of neutrinos from Gamma Ray Burst sources or neutrinos correlated with the recently discovered gravitational wave signals will be reported. So far, no significant correlation with external observations has been detected. The Antares results demonstrate the tremendous potential of the new, much larger array, KM3NeT-ARCA that is being built in the Mediterranean see. The status and the perspectives of the KM3NeT-ARCA project for neutrino astronomy will be discussed.

Collaboration name:

Antares and KM3NeT Collaborations

Astroparticle Physics and Cosmology / **77**

Direct dark matter search with the XENON1T experiment

Autore: Pietro Di Gangi[1]

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The XENON Dark Matter Project opened the era of ton-scale detectors seeking for direct evidence of dark matter with the XENON1T experiment. XENON1T focused on the search for WIMPs, the most investigated class of particles hypothesized to be the DM constituent. The detector is a dual-phase (liquid-gas) time projection chamber (TPC) featuring 2.0 t liquid xenon (LXe) target mass and operated in the underground Laboratori Nazionali del Gran Sasso.
XENON1T reached the lowest ever electronic recoil background in dark matter direct searches of $82^{+5}_{-3}(\mathrm{syst}) \pm 3(\mathrm{stat})\,(\mathrm{t}\cdot\mathrm{y}\cdot\mathrm{keV})^{-1}$, in agreement with the rate and spectrum predicted by MC simulations.
A total of 278.8 live-dayswere collected, between late 2016 and early 2018, with XENON1T for WIMP search, corresponding to the final exposure of 1 t·y for the selected 1.3 t fiducial mass of LXe.
The profile likelihood analysis finds no significant excess over background and sets the world-best exclusion limit on the WIMP-nucleon spin-independent cross section for WIMP masses above 6 GeV/c^2, with a minimum of $4.1 \times 10^{-47}\mathrm{cm}^2$ at 30 GeV/c^2.
The XENON Dark Matter Project will rapidly move towards the upgraded detector, XENONnT, with increased TPC (containing 6 t of LXe) and further reduced background. The XENONnT experiment will improve the sensitivity to WIMPs by one order of magnitude in 5 years of data acquisition.

Collaboration name:

XENON

Neutrino / **78**

First measurement of the neutron-argon cross section between 100 and 800 MeV

Autore: Christopher Mauger[1]

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The DUNE experiment directs a neutrino beam from Fermilab towards a 40 kiloton liquid argon time-projection chamber (TPC) 1300 km away in the Sanford Underground Research Facility in South Dakota. By measuring electron neutrino and anti-neutrino appearance from the predominantly muon neutrino and anti-neutrino beams, DUNE will determine the neutrino mass ordering and explore leptonic CP violation. The neutrino oscillation phenomena explored by DUNE require robust determinations of the (anti-)neutrino energies by reconstructing the particles produced in charged current reactions. Among the particles emerging from the interaction which carry significant energy, neutrons are the most challenging to reconstruct. The CAPTAIN collaboration has made the first measurement of the neutron-argon cross section between 100 and 800 MeV of neutron kinetic energy - an energy regime crucial for neutrino energy reconstruction at DUNE. We made the measurement in a liquid argon TPC with 400 kg of instrumented mass. I describe the measurement, its importance to DUNE, and discuss future plans.

Collaboration name:

CAPTAIN Collaboration

Neutrino / **79**

The upgrade of the T2K Near Detector ND280

Autore: Marco Zito[1]; Yury Kudenko[2]

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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 σ level for a significant fraction of the possible δ_{CP} values. To reach this goal, an upgrade of the T2K near detector ND280 has been launched, 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, (JINST 13 (2018) no.02, P02006; NIM A923 (2019) 134), with dimensions of ~2x1.8x0.6 m3 and a total mass of about 2 tons. It consists of about 2x10^6 small scintillator cubes each of 1 cm3. Each cube is covered by a chemical reflector. The signal readout from each cube is provided by wavelength shifting fibers inserted in these holes and connected to micro-pixel avalanche photodiodes MPPCs. The total number of channels will be ~60,000. We have demonstrated that this detector, providing three 2D projections, has excellent PID, timing and tracking performance, including a 4π angular acceptance, especially important for short proton and pion tracks.
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. 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 appr. 1 cm2. The front-end cards, based on the AFTER chip, will be mounted on the back of the Micromegas and parallel to its plane.
The time-of-flight (TOF) detector will allow to reject events generated in the passive areas of the detector and improve particle identification. The TOF will consist of 6 planes with about 5 m2 surface area surrounding the target and TPCs. The plane will be assembled of 2.2 m long cast plastic scintillator bars with light collected by arrays of large-area MPPCs from two ends. The time resolution at the bar centre is 150 ps.
In Summer 2018 we have tested prototypes of the SuperFGD, the resistive Micromegas and the TOF

in a CERN PS test beam with excellent results.
We have recently completed the detailed TDR describing all the components of the ND280 Upgrade (arXiv:1901.03750). The project has been recently approved by CERN as part of the Neutrino Platform (NP07). In this talk we will report on the design of these detectors, their performance, the results of the test beam and the plan for the construction.

Collaboration name:

Flavor and Precision Physics / 80

Search for forbidden decays of the D^0 meson and observation of $D^0 \to K^-\pi^+e^+e^-$

Autore: Marcello Rotondo[1]

[1] *INFN LNF*

Autore corrispondente: antimo.palano@ba.infn.it

Decay modes with two oppositely charged leptons of different flavor correspond to lepton flavor violating (LFV) decays and are essentially forbidden in the Standard Model (SM) because they can occur only through lepton mixing. Decay modes with two leptons of the same charge are lepton-number violating (LNV) decays and are forbidden in the SM. Hence, decays of the form $D^0 \to hh'll$' provide sensitive tools to investigate new mediators or couplings in physics beyond the SM.
In this talk, we report on a search for decays of the type $D^0 \to hh'll$' (with $h, h' = K/\pi$ and l, l' $= e/\mu$) using data taken by the BABAR experiment at the PEP-II e^+e^- collider at the SLAC National Accelerator Laboratory. Upper limits on the branching fractions are improved by up to two orders of magnitude.
We also report the observation of the rare decay $D^0 \to K^-\pi^+e^-e^+$. We measure $\mathcal{B}(D^0 \to K^-\pi^+e^-e^+) = (4.0 \pm 0.5) \times 10^{-6}$ in the di-lepton mass range $0.675 < m(e^+e^-) < 0.875$ GeV/c^2, where the production of the intermediate state $\rho \to e^+e^-$ dominates, and set upper limits for decays outside this interval where long-distance effects are not expected to be significant.

Collaboration name:

This abstract is submitted on behalf of the BABAR Collaboration

Neutrino / 81

Recent T2K Neutrino Oscillation Results

Autore: Ciro Riccio[1]

[1] *NA*

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T2K is a long baseline neutrino experiment producing a beam of muon neutrinos at the Japan Particle Accelerator Research Centre on the East coast of Japan and measuring their oscillated state 295 km away at the Super Kamiokande detector. Since 2016 T2K has doubled its data in both neutrino and antineutrino beam modes. Coupled with improvements in analysis techniques this has enabled the experiment to make world leading measurements of the PMNS oscillation parameters \Delta_m^{2}*{32}, sin^2(\theta*{23}) and the CP violating phase \delta_{CP}. In particular the CP conserving values of \delta_{CP} now appear to be disfavoured at the 95\% CL and there are regions

of parameter space excluded at the 99.7\% CL. This talk will describe these results and the analysis improvements that have enabled them.

Collaboration name:

T2K

Neutrino / 82

T2K latest results on neutrino-nucleus cross sections

Autore: Marcela Batkiewicz-Kwasniak[1]

[1] *ifj -Poland*

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A detailed understanding of neutrino(ν)-nucleus interactions is essential for the precise measurement of neutrino oscillations at long baseline experiments, such as T2K. The T2K near detector complex, designed to constrain the T2K flux and cross section models, also provides a complementary program of neutrino interaction cross-section measurements. Through the use of multiple target materials (carbon, water, argon, iron, lead), and the ability to sample different neutrino spectra (with detectors located on- and off-axis with respected to the flux), T2K is able to investigate atomic number and energy dependence of interaction cross sections in single experiment. An overview of the T2K measurement strategy, adopted to reduce the model dependence, and the most recent results will be presented.

Collaboration name:

T2K

Poster session / 85

Search for heavy neutrinos with the ATLAS detector

Autore: Collaboration ATLAS[1]

[1] *CERN*

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Multiple theories beyond the Standard Model predict the existence of heavy neutrinos, such as the Type I or Type III seesaw mechanisms which can explain the light neutrino masses, or left-right symmetric models which restore parity symmetry in weak interactions at higher energy scale and predict right-handed counterparts to the weak gauge bosons. Searches for such heavy Majorana or Dirac neutrinos with the ATLAS detector will be presented using proton-proton data from the LHC at a center-of-
mass energy of 13 TeV.

Collaboration name:

ATLAS

Astroparticle Physics and Cosmology / 86

Dark Matter searches with the ATLAS Detector

Autore: Tae Min Hong[1]

[1] *CERN*

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The presence of a non-baryonic dark matter (DM) component in the Universe is inferred from the observation of its gravitational interaction. If dark matter interacts weakly with the Standard Model (SM) it could be produced at the LHC, escaping the detector and leaving a large missing transverse momentum as their signature. The ATLAS experiment has developed a broad and systematic search program for DM candidates, including resonance searches for the mediator which would couple DM to the SM. The results of these searches on 13 TeV pp data, their interplay and interpretation will be presented, along with some prospects for the HL-LHC.

Collaboration name:

Electroweak Interactions and Higgs physics / 87

Combined Higgs boson measurements at the ATLAS experiment

Autore: Stefano Manzoni[1]

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The most precise measurements of Higgs boson cross sections, using the framework of simplified template cross sections, are obtained from a combination of measurements performed in the different Higgs boson decay channels. This talk presents the combined measurements, as well as their interpretation, which also takes into account results of searches for H->invisible decays as well as off-shell Higgs boson production.

Collaboration name:

Electroweak Interactions and Higgs physics / 88

Higgs boson couplings to quarks at the ATLAS experiment

Autore: Zhijun Liang[1]

[1] *Institute of High Energy Physics, Chinese Academy of Sciences*

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Testing the couplings of the Higgs boson to quarks is important to understand the origin of quark masses. The talk presents cross section measurements in Higgs boson decays to two b quarks, as well as a search for Higgs boson decays to two c quarks. It also presents measurements of Higgs boson production in association with a ttbar pair using Higgs boson decays to bbbar pairs, to two Z bosons, to other multi-lepton final states, and to a pair of photons. All analyses are based on pp collision data collected at 13 TeV.

Collaboration name:

Electroweak Interactions and Higgs physics / 89

Search for Higgs boson pair production with ATLAS

Autore: Nikos Konstantinidis[1]

[1] *University College London*

Autore corrispondente: n.konstantinidis@ucl.ac.uk

The latest results on production of Higgs boson pairs at 13 TeV by the ATLAS experiment are reported, including a combination of six different decay modes. Results include bbtautau, bbbb, bbgamgam, bbWW, WWWW and WWgamgam final states, and they are interpreted both in terms of sensitivity to the SM and as limits on kappa_lambda, a scaling of the triple-Higgs interaction strength.

Collaboration name:

ATLAS

Electroweak Interactions and Higgs physics / 90

Searches for electroweak production of supersymmetric gauginos and sleptons and R-parity violating and long-lived signatures with the ATLAS detector

Autore: Collaboration ATLAS[1]

[1] *CERN*

Autore corrispondente: tmhong@cern.ch

Many supersymmetry models feature gauginos and sleptons with masses less than a few hundred GeV. These can give rise to direct pair production rates at the LHC that can be observed in the data sample recorded by the ATLAS detector. R-parity violation introduces many viable signatures to the search for supersymmetry at the LHC. Supersymmetric particles may decay into many leptons or jets with or without missing transverse momentum. Several supersymmetric models also predict massive long-lived supersymmetric particles. The talk presents recent ATLAS results from searches for supersymmetry, including searches for directly produced gauginos and sleptons, as well as searches for SUSY models featuring long-lived particles and R-parity violation. The searches have been performed with pp collisions at a centre-of-mass energy of 13 TeV.

Collaboration name:

ATLAS

Electroweak Interactions and Higgs physics / 91

Searches for squarks and gluinos with the ATLAS detector

Autore: Philipp Mogg[1]

[1] *Albert-Ludwigs-Universität Freiburg*

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Despite the absence of experimental evidence, weak scale supersymmetry remains one of the best motivated and studied Standard Model extensions. This talk summarizes recent ATLAS results on searches for supersymmetric squarks and gluinos, including third generation squarks produced directly or via decay of gluinos. The searches involve final states containing jets (possibly identified as coming from b-quarks), missing transverse momentum and, in some cases, leptons, and were performed with pp collisions at a centre-of-mass energy of 13 TeV.

Collaboration name:

ATLAS

Astroparticle Physics and Cosmology / 92

QUBIC: Exploring the primordial Universe with the QU Bolometric Interferometer

Autore: Jean-Christophe Hamilton[1]

[1] *APC-CNRS-IN2P3*

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QUBIC (the Q and U Bolometric Interferometer for Cosmology) is a CMB polarimeter designed to search the B-mode polarization of the CMB, the signature expected from primordial gravitational waves generated during the inflation phase of the early Universe.
QUBIC, a collaboration between French, Italian, Argentinean, Irish and British laboratories, is an innovative instrument based on the novel technology of bolometric interferometry that combined the high sensitivity of bolometric detectors (2048 Transition Edge Sensors) along with the observation of interference fringes (400 channels) allowing for an unprecedented control of systematic effects. Furthermore, our synthesized beam being significantly frequency-dependent, QUBIC has spectro-imaging capabilities allowing us to reconstruct multiple sub-frequency CMB polarizations maps within our two wide-band filters (150 and 220 GHz). This opens promising perspectives for the control of foreground B-modes contamination, especially in the likely presence of complex dust emission.
End-To-End simulations have shown that QUBIC will reach a sensitivity of σ(r)=0.01 after two years of integration.
After integration in 2018 in Paris, QUBIC is now being calibrated and tested showing behavior and performances in excellent agreement with our expectations and simulations. The instrument will be installed in late 2019 in its observation site near San Antonio de los Cobres on the Puna plateau in Salta, Argentina at 5000m a.s.l. offering dry atmosphere and clear sky.

Collaboration name:

QUBIC

Astroparticle Physics and Cosmology / 93

The Dark Matter Programme of the Cherenkov Telescope Array

Autore: Aldo Morselli[1]

[1] *INFN Roma II*

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In the last decades an incredible amount of evidence for the existence of dark matter has been accumulating. At the same time, many efforts have been undertaken to try to identify what dark matter is. Indirect searches look at places in the Universe where dark matter is known to be abundant and seek for possible annihilation or decay signatures. The Cherenkov Telescope Array (CTA) represents the next generation of imaging Cherenkov telescopes and, with one site in the Southern hemisphere and one in the Northern hemisphere, will be able to observe all the sky with unprecedented sensitivity and angular resolution above a few tens of GeV. The CTA Consortium will undertake an ambitious program of indirect dark matter searches for which we report here the brightest prospects.

Collaboration name:

CTA

Astroparticle Physics and Cosmology / 94

The SABRE Proof of Principle

Autore: Ambra Mariani[1]; Simone Copello[1]

[1] *GSSI - LNGS*

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SABRE (Sodium-iodide with Active Background REjection) is a direct dark matter search experiment aiming to measure the annual modulation of the dark matter interaction rate with NaI(Tl) crystals. A modulation with very high statistical significance (12.9σ) has been measured by the DAMA experiment at Laboratori Nazionali del Gran Sasso using the same target material.
Results from several other experiments with different sensitive materials seem to exclude the interpretation of the DAMA signal as due to dark matter nuclear scattering whithin the standard hypothesis. However, a model independent comparison of the results of the existing experiments is not possible and so it is very important to carry out a new measurement using NaI(Tl) crystals in order to confirm or refute the DAMA claim.
The SABRE experiment focuses on the achievement of an ultra-low background rate by means of high-purity crystals operated inside a liquid scintillator veto for active background rejection. In addition, twin detectors will be located in the northern and southern hemispheres to disentangle any possible contribution to the modulation from seasonal or site-related effects.
This talk will provide an overview on the SABRE initial Proof-of-Principle phase (PoP) at LNGS, designed to assess the radio-purity of the crystals as well as the efficiency of the liquid scintillator veto and the overall background level.

Collaboration name:

SABRE

Neutrino / 95

Far-Field Monitoring of Reactor Antineutrinos for Nonproliferation

Autore: Adam Bernstein[1]; Gary Smith[2]

[1] *Lawrence Livermore National Laboratory*

[2] *University of Edinburgh*

Autore corrispondente: gary.smith@ed.ac.uk

Numerous experimental efforts have shown that antineutrino-based monitoring provides a non-intrusive means to estimate the fissile content and relative thermal power of nuclear reactors for nonproliferation. However, close proximity to the reactor core is required in order to collect relatively high-statistics data needed for such applications. This has limited the focus of most studies to the so-called 'near-field', up to about 200 meters from the reactor core. Until now, there have been no experimental demonstrations dedicated to exploring the nonproliferation potential of large detectors required for long-range monitoring. In this low-statistics regime detailed measurements of the fissile fuel content are not practical, but remote monitoring and discovery of reactors may be achievable. The goal of the Advanced Instrumentation Testbed (AIT) program is to test novel methods for the discovery of reactor cores, specifically in the mid-field to far-field, beyond 200 meters and out to tens or hundreds of kilometers, using kiloton-scale to megaton-scale detectors. The main physical infrastructure of the AIT consists of an underground laboratory, expanding the Boulby Mine Underground Laboratory in Northern England. The site is located at a 25 km standoff from the Hartlepool Reactor Complex, which houses two 1.5 GWth advanced gas-cooled reactors. The first detector to be deployed at the AIT is the WATer CHerenkov Monitor of ANtineutrinos (WATCHMAN). WATCHMAN will use ~6,000 tons of gadolinium doped water in order to detect a few reactor antineutrinos per week from the Hartlepool reactor complex. WATCHMAN will focus on understanding the signal efficiency, radiological backgrounds, and the operational pattern recognition for reactor antineutrinos arising from a single reactor complex with two cores. Here, the nonproliferation goals are to understand the sensitivity for discovery of one reactor in the presence of another, the discovery of any reactor operations above a well-understood background, and the sensitivity to confirm the declared operational cycles of both reactors. Uniquely, AIT-WATCHMAN also offers a flexible platform at which nascent technologies such as water-based scintillator and fast photomultiplier tubes can be tested in real-world conditions. We present the AIT-WATCHMAN program and status.

Collaboration name:

AIT-WATCHMAN

Astroparticle Physics and Cosmology / 96

Status and performance of the Advanced Virgo detector

Autore: Fabio Garufi[1]

[1] *INFN Napoli*

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After a brief introduction on Gravitational Waves interferometric detection, we report on the present status of the Advanced Virgo dtetector.In the last O2 data taking the network of GW dtetectors observed the first NS-NS merger in coincidence with gamma rays, opening the multimessenger astronomy to GWs. The three GW detectors are now jointly taking data with an improved sensitivity for the O3 run and first observations are coming and Open Public Alerts being sent out.

Collaboration name:

Virgo

Poster session / 97

A multi-PMT photodetector system for the Hyper-Kamiokande experiment

Autore: Alan Cosimo Ruggeri[1]

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Hyper-Kamiokande (Hyper-K) is the next upgrade of the currently operating Super-Kamiokande experiment. Hyper-K is a large water Cherenkov detector with a fiducial volume which will be approximately 10 times larger than its precursor. A system of small photomultipliers as implemented in the KM3NeT experiment, the so called multi-PMT module (mPMT), is considered as an option to improve the Hyper-K physics capability.
The resulting segmentation of the sensitive area features several attractive advantages compared to the conventional single-PMT concept due to a superior photon counting, extension of dynamic range, intrinsic directional sensitivity, while uncorrelated singe-hit noise such as dark rate can be suppressed by using local coincidences among individual PMTs. In this contribution the development of a mPMT module for Hyper-K is discussed.

Collaboration name:

Hyper-Kamiokande proto collaboration

Flavor and Precision Physics / 98

Recent BESIII results

Autore: Rinaldo Baldini Ferroli[1]; Ravindran Krishnakumar [2]

[1] *LNF*

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BESIII has collected data sets corresponding to integrated luminosities of 2.93 fb-1, 3.19 fb-1 and 0.567 fb-1 at center-of-mass energies of 3.773, 4.178, and 4.6 GeV, respectively. We report the measurements of the decay constants fD(s)+, the semileptonic form factors f_P(0), the CKM matrix elements |Vcs(d)|. These results are important to test the LQCD calculations of fD(s)+ and f_P(0) and the CKM matrix unitarity. Precision tests of lepton flavor universality are also made via D(s)+ -> l+v and D0(+) -> K-bar(pi)l+v, decays. The data set collected at 3.773 GeV contains quantum-correlated D0D0bar pairs that allow access to the phase differences between amplitudes. We report the measurements of strong phase differences in D0(-bar) decays, especially for K_S/Lpi+pi-, which are important to constrain the gamma/phi3 measurement at LHCb and Belle II. In addition, we report the measurements of the absolute branching fraction and amplitude analysis of D+, D0, Ds+ and Lambda_c+

Collaboration name:

BESSIII

Flavor and Precision Physics / 99

Recent progress on the charmonium and XYZ states at BESIII

Autore: Rinaldo Baldini Ferroli[1]; Xiaorong Zhou[2]

[1] *LNF*

[2] *University of Science and Technology of China*

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This talk will cover recent progress on the charmonium and XYZ states at BESIII. I shall talk about the measurements of hadronic decays of the eta_c, chi_cJ, h_c, and psi(3686); new results on the X(3872) decaying into pi0 chi_c1 and omega J/psi; and new cross section measurements of e+ e- -> pi pi D Dbar and omega chi_c0. The upcoming data samples and the prospects for future charmonium and XYZ studies at BESIII will be discussed in the summary part.

Collaboration name:

BESSIII

Flavor and Precision Physics / 100

Status and prospects of charged lepton flavor violation searches with the MEG-II experiment

Autore corrispondente: francesco.renga@roma1.infn.it

The MEG experiment took data at the Paul Scherrer Institute in the years 2009-2013 and published the most stringent limit on the charged lepton flavor violating decay $\mu \to e\gamma$: $BR(\mu \to e\gamma) < 4.2 \times 10^{-13}$ @90% C.L.
The MEG detector has been upgraded in order to reach a sensitivity of 5×10^{-14}, which corresponds to an improvement of one order of magnitude.
The basic idea of MEG-II is to achieve the highest possible sensitivity by making the maximum use (7×10^7 muons/s) of the available muon intensity at PSI with an improved detector, since MEG ran at a reduced intensity (3×10^7 muons/s) in order to keep the background at a manageable level.
The key features of the MEG-II are the increase of the rate capability of all detectors to enable running at the intensity frontier, and to increase the resolutions while maintaining the same detector concept.
A new mass, single volume, high granularity tracker, together with a thinner muon stopping target, leads to better spatial, angular and energy positron resolution.
A new highly segmented timing counter improves positron timing capabilities. The detector acceptance for positrons is increased by more than a factor 2 by diminishing the material between these two detectors. The liquid Xenon calorimeter has new smaller photosensors (VUV-sensitive SiPM) that replace current phototubes and improve in particular photon energy resolution. The results of the 2018 pre-engineering run, the first with all the sub-detectors, and the current schedule will presented.

Collaboration name:

MEGII

Flavor and Precision Physics / 101

Weak Decays of Doubly Heavy Baryons

Autore: Wei Wang[1]; Yu-Ji Shi[None]; Zhen-Xing Zhao[1]

[1] *SJTU*

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We calculate the weak decay form factors of doubly-heavy baryons using three-point QCD sum rules. The Cutkosky rules are used to derive the double dispersion relations. We include perturbative contributions and condensation contributions up to dimension five, and point out that the perturbative contributions and condensates with lowest dimensions dominate. An estimate of part of gluon-gluon condensates show that it plays a less important role. With these form factors at hand, we present a phenomenological study of semileptonic and nonleptonic decays in the factorization approach. Branching ratios are predicted and many of them are found sizable. The future experimental facilities can test these predictions, and deepen our understanding of the dynamics in decays of doubly-heavy baryons.

Collaboration name:

Neutrino / 103

Results from NOvA

Autore: Maury Goodman[1]; Denver Whittington[2]

[1] *Argonne*

[2] *Syracuse University*

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The NOvA experiment is a long-baseline neutrino oscillation experiment
that uses the upgraded NuMI beam from Fermilab to detect both electron
appearance and muon disappearance. NOvA employs two functionally identical
detectors: a Near Detector, located at Fermilab, and a Far Detector,
located at Ash River, Minnesota over an 810 km baseline. NOvA's primary
physics goals include precision measurements of neutrino oscillation
parameters, such as theta2 and the atmospheric mass-squared splitting,
along
with probes of the mass hierarchy and the CP violating phase. This talk
will present NOvA measurements of the neutrino oscillation
parameters using neutrino and antineutrino disappearance and appearance.

Collaboration name:

NOvA

Neutrino / 104

Recent results from EXO-200 experiment

Autore: Gaosong Li[1]

[1] *Stanford University*

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EXO-200 is a neutrinoless double beta decay (0vBB) experiment using a time projection chamber filled with ~150kg of liquid xenon, enriched in 136Xe. The experiment, located at the Waste Isolation Pilot Plant (WIPP) near Carlsbad New Mexico, recently completed data taking that started in 2011. The last two years of data, after some hardware upgrades, resulted in improved energy resolution. Together with improved analysis techniques for better background discrimination and larger statistics, the final analysis promises a half-life sensitivity well beyond the current value of 3.7×10^25 yr at 90% CL. This talk will present the most recent results from the experiment.

Collaboration name:

EXO-200

Astroparticle Physics and Cosmology / 105

The Pierre Auger Observatory and Multi-Messenger Physics

Autore: Roberta Colalillo[1]; for the Pierre Auger Collaboration[None]

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The discovery of gravitational waves and the observation of cosmic-derived neutrinos led to the birth of multi-messenger astronomy. Gravitational waves, neutrinos, photons, cosmic rays will be simultaneousily studied to investigate the highest energy phenomena in the Universe. The Pierre Auger Observatory, designed for the detection of ultra high energy cosmic rays, can search for primary photons and for neutrinos with energy above 100 PeV from pointlike sources across the sky with equatorial declination from about -65° to +60°. Neutrino candidates are searched among inclined showers detected. A targeted search for neutrinos yielded no candidates in the Auger data collected within +/- 500 s around or 1 day after the UTC time of GW150914 and GW151226, as well as in connection with the GW candidate event LVT151012. The nonobservation led to costrain the amount of energy radiated in neutrinos from these events. No candidates consistent with the source were found also in the follow-up searches of GW170817. The Auger Collaboration is working on the improvement of neutrino search, as well as on photon search, and is always ready to respond to alerts from GW experiments.

Collaboration name:

Pierre Auger Collaboration

Neutrino / 106

Progress on Muon Ionization Cooling Demonstration with MICE

Autore: Vittorio Palladino[1]

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The Muon Ionization Cooling Experiment (MICE) at RAL has collected extensive data to study the ionization cooling of muons. This is a decisive demonstration towards new neutrino sources based on muon storage rings.
Several million individual muon tracks have been recorded passing through a series of focusing magnets in a number of different configurations and a liquid hydrogen or lithium hydride absorber. Measurement of the tracks upstream and downstream of the absorber has shown the expected effects of the 4D emittance reduction.
Further studies are providing now more and deeper insight.

Collaboration name:

Muon Ionization Cooling Experiment (MICE)

Neutrino / 107

Neutrino masses generated through new physics at the TeV scale

Autore: Renato Fonseca[1]

[1] *IPNP*

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The small neutrino masses might be a consequence of the well known seesaw mechanism, which requires new fields as heavy as 10^{14} GeV. However, there are alternative explanations. For example neutrino masses might be generated through loops or via high-dimensional operators. In both cases, the mediating particles can have TeV-scale masses, and if so it might be possible to produced them at the LHC.

Collaboration name:

Poster session / 108

Observation of two excited B+c states and measurement of the B+c(2S) mass in pp collisions at √s= 13 TeV with CMS

Autore: Samet Lezki[1]

[1] *INFN Bari*

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The observation of two states consistent with being with the B+c(2S) and B∗+c(2S) states, in \ pp collisions at s√= 13 TeV, is presented.

It is obtained by exploiting an event sample corresponding to an integrated luminosity of 143\ fb−1, collected by the CMS experiment

during the whole Run-II of the LHC. These excited b¯c states are observed in the B+cπ+π− inva\ riant mass spectrum, with the ground

state B+c reconstructed through its decay to J/ψπ+.

The two states are reconstructed with a mass difference equal to 29.1 ± 1.5 (stat) ± 0.7 (sys\ t) MeV.

The mass of the B+c(2S) meson is measured to be 6871.0 ± 1.2 (stat) ± 0.8 (syst) ± 0.8 (B+c) \ MeV.

Collaboration name:

CMS

Astroparticle Physics and Cosmology / 109

The JEM-EUSO program to study Ultra-High Energy Cosmic Rays from Space

Autore: Valentina Scotti[1]

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The origin and nature of Ultra-High Energy Cosmic Rays (UHECRs) are still unsolved in the contemporary scenario of Astroparticle Physics. To give an answer to these questions is rather challenging because of the extremely low flux of a few per km^2 per century at extreme energies such as E > 5x10^19 eV.
The main objective of the JEM-EUSO program (Joint Experiment Mission - Extreme Universe Space Observatory) is the realization of a space mission devoted to the study of UHECR.
A super-wide-field telescope will look down from space onto the night sky to detect UV photons emitted from air showers generated by cosmic rays of highest energies in the atmosphere.
The JEM-EUSO collaboration has been developing different test experiments using fluorescence detectors to make a proof-of-principle of the UHECR observation from space, to meet the science requirements and the constraints (mass, power, hardness) of space-borne detectors, and to raise the technological level of the instrumentation to be employed in a space mission (EUSO-TA, EUSO-Balloon, EUSO-SPB, Mini-EUSO). The final goal of the collaboration is the realization of much more challenging missions such as K-EUSO and POEMMA.
This contribution will review scientific, technical and programmatic aspects, as well as the role of each mission in the program.

Collaboration name:

JEM-EUSO Collaboration

Electroweak Interactions and Higgs physics / 110

Measurements of Higgs boson properties at CMS

Autore: Collaboration CMS[None]

Autore corrispondente: stosi@cern.ch

Highlights of latest measurements of Higgs boson properties at CMS will be presented

Collaboration name:

CMS

Electroweak Interactions and Higgs physics / 111

Searches for an extended Higgs boson sector at CMS

Autore: Collaboration CMS[None]

Autore corrispondente: stosi@cern.ch

Higlights from recent searches for additional Higgs bosons at CMS will be presented.

Collaboration name:

CMS

Flavor and Precision Physics / 112

Implications of chiral symmetry on positive parity heavy-light meson spectroscopy

Autore: Meng-Lin Du[1]

[1] *HISKP, University of Bonn*

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It is demonstrated that,if the lightest positive parity charm mesons are assumed to owe their existence to non-perturbative GoldstonebosonD/D^* scattering, various puzzles in the charm meson spectrum get resolved. Most importantly the ordering of the lightest strange and non-strange scalars becomes natural. It is demonstrated that the amplitudes for Goldstone boson-D/D^* scattering are fully consistent with the high quality data on decays $B^- \to D^+\pi^-\pi^-$, $B_s^0 \to \bar{D}^0K^-\pi^+$, $B^0 \to \bar{D}^0\pi^-\pi^+$, $B^- \to D^+\pi^-K^-$ and $B^0 \to \bar{D}^0\pi^-K^+$, provided by LHCb. The results provide a strong support of the scenario that the broad scalar charmed meson $D_0^*(2400)$ should be replaced by two states, the lower one of which has a mass of around 2.1 GeV, much smaller than that extracted from experimental data using a Breit–Wigner parameterization. It implies that the lowest positive-parity charm mesons are dynamically generated rather than quark-antiquark states.

Collaboration name:

Flavor and Precision Physics / 113

Semileptonic and leptonic B decay results from early Belle II data

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The Belle II experiment at the SuperKEKB energy-asymmetric e^+e^- collider is a substantial upgrade of the B factory facility at the Japanese KEK laboratory. The design luminosity of the machine is 8×10^{35} cm^{-2}s^{-1} and the Belle II experiment aims to record 50 ab^{-1} of data, a factor of 50 more than its predecessor. From February to July 2018, the machine has completed a commissioning run, achieved a peak luminosity of 5.5×10^{33} cm^{-2}s^{-1}, and Belle II has recorded a data sample of about 0.5 fb^{-1}. Main operation of SuperKEKB has started in March 2019. In this presentation we show

first results from studying missing energy signatures, such as leptonic and semileptonic B meson decays based on early Belle II data. We report first studies on re-measuring important standard candle processes, such as the abundant inclusive $B \to X\ell\nu$ and $B \to D^*\ell\nu$ decays. Furthermore, we will also present an overview of the semileptonic B decays that will be measured in the upcoming years at Belle II and discuss prospects for important B-anomalies like R(D) and R(D*), as well as other tests of lepton flavor universality.

Collaboration name:

Belle II

Flavor and Precision Physics / 114

Searches for Lepton Flavour Violating decays at LHCb

Autore: Cedric Meaux [1]

[1] *CCPM*

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Recent hints for lepton-universality violation in b->sll transitions could imply the existence of lepton-flavour violating B decays. The LHCb experiment is well suited for the search for these decays due to its large acceptance and trigger efficiency, as well as its excellent invariant mass resolution and particle identification capabilities. Recent results on searches for lepton-flavour violating decays from the LHCb experiment will be presented.

Collaboration name:

LHCb collaboration

Flavor and Precision Physics / 115

New physics in Kaon

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Kaon physics is one of the most powerful probes of physics beyond the standard model (SM), and sensitive to high scale new physics.
The exciting topic in kaon physics which gets attention is the discrepancy in the direct CP violation in $K \to \pi\pi$ decays, ϵ'/ϵ. Current progress of lattice calculations enables us to predict the ϵ'/ϵ accurately, and the SM prediction for it appears to be significantly below the experimental data. This may suggest a new physics model providing enhancement of ϵ'/ϵ.
In this talk, I will discuss implications of ϵ'/ϵ anomaly and the correlation with other observables.

Collaboration name:

Flavor and Precision Physics / 116

CP violation in the charm sector within the Standard Model and beyond

Autore: Aleksey Rusov[1]; Alexander Lenz[2]; Jakub Scholtz[3]; Mikael Chala[3]

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In light of the recent LHCb observation of CP violation in the charm sector,
we review Standard Model (SM) predictions in the charm sector and in particular for ΔA_{CP}. We get as an upper bound in the SM $|\Delta A_{CP}^{\rm SM}| \leq 3.6 \times 10^{-4}$, which can be compared to the LHCb measurement of
$\Delta A_{CP}^{\rm LHCb-2019} = (-15.4 \pm 2.9) \times 10^{-4}$. We discuss resolving this tension within an extension of the SM that includes a flavour violating Z' that couples only to $\bar{s}s$ and $\bar{c}u$. We show that for masses below 80 GeV and flavour violating coupling of the order of 10^{-4}, this model can successfully resolve the tension and avoid constraints from dijet searches, $D^0 - \overline{D}^0$ mixing and measurements of the Z width.

Collaboration name:

Electroweak Interactions and Higgs physics / 117

Disentangling Higgs and Electroweak sectors at Future Leptonic Colliders

Autore: Jorge De Blas Mateo[1]; Gauthier Durieux[2]; Christophe Grojean[3]; Jiayin Gu[4]; Ayan Paul[5]

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[3] *DESY, Hamburg*

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With Higgs measurement prospects reaching the per-mille level at future lepton colliders, the interplay between the Higgs and electroweak sectors of the Standard Model Effective Field Theory is expected to become relevant. We investigate the impact of electroweak uncertainties in Higgs coupling determination and examine what electroweak measurements are needed to achieve the full potential of the precision Higgs physics program. We also discuss the potential improvement on electroweak parameters otherwise brought by Higgs measurements. In addition, we study the effects of polarization at future linear colliders.

Collaboration name:

Poster session / 118

Final State Interactions, SU(3) and CP asymmetries in D → PP decays

Autore: Franco Buccella[1]; Ayan Paul[2]; Pietro Santorelli[3]

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We analyse □ decays to two pseudoscalars (□,□) assuming the dominant source of SU(3)_□ breaking lies in final state interactions. We obtain an excellent agreement with experimental data and are able to predict CP violation in several channels based on current data on branching ratios and ΔA_{CP}. We also make predictions for □_{□□} and the branching fraction for the decay □⁺_□⟶□⁺□_□.

Collaboration name:

Poster session / 119

Probing a four flavor vis-a-vis three flavor neutrino mixing for ultrahigh energy neutrino signals at a 1 km2 detector

Autore: MADHURIMA PANDEY[1]; Debasish Majumdar[2]; Amit Dutta Banik[3]

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We consider a four-flavor scenario for the neutrinos where an extra sterile neutrino is introduced to the three families of active neutrinos and study the deviation from the three-flavor scenario in the ultrahigh-energy (UHE) regime. We calculate the possible muon and shower yields at a 1 km2 detector such as IceCube for these neutrinos from distant UHE sources, e.g., gamma-ray bursts, etc. Similar estimations for muon and shower yields are also obtained for the three-flavor case. Comparing the two results, we find considerable differences between the yields for these two cases. This can be useful for probing the existence of a fourth sterile component using UHE neutrino flux.

Collaboration name:

Flavor and Precision Physics / 120

Flavour anomalies before and after Moriond 2019: new emerging scenarios.

Autore: Joaquim Matias[1]

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Flavour anomalies before and after Moriond 2019: new emerging scenarios. This talk will basically explain the changes in the patterns of New Physics we have found in a model independent analysis.

Collaboration name:

Astroparticle Physics and Cosmology / 121

A nonlinear analysis of Gravitational Waves from Core-collapse Supernovae

Autore: Irene Di Palma[1]

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Core collapse supernovae, among the most energetic explosions in the modern Universe, have not been detected yet, while gravitational waves have been detected from mergers of binary black holes and binary neutron stars.
To enhance the detection efficiency of such category of signals we present a nonlinear method based on convolutional neural network algorithm to extract core collapse supernova signals embedded in Gaussian noise with spectral behaviour of Advanced LIGO and Virgo detectors.
Using this new approach we can classify signal from noise and identify the signal more efficiently than the algorithm currently used by the LIGO-Virgo Collaboration to search for gravitational wave transient signals.

Collaboration name:

Virgo

Electroweak Interactions and Higgs physics / 122

Top Physics at LHCb

Autore: LHCb collaboration[None]

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Results from LHCb on top production in the forward region are presented. LHCb provides unique coverage at forward rapidities at the LHC, and measurements at LHCb probe a unique kinematic range, providing novel constraints on parton distribution functions. The potential for future measurements at LHCb, following major upgrades that will enable the collection of integrated luminosities of at least 300/fb, will also be discussed.

Collaboration name:

LHCb collaboration

Electroweak Interactions and Higgs physics / 123

Searches for Exotic Higgs-like boson decays at LHCb

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LHCb has made a series of searches sensitive to Higgs-like bosons and their decays. These analyses include searches for long-lived particles produced in the decays of such resonances, with these particles decaying to various final states probed in different analyses, and a search for Higgs-like bosons that produce lepton-flavour-violating decays, producing a tau mu final state. The unique design of the LHCb detector, with a flexible trigger and a precision vertex detector, enables competitive and world-best limits, particularly for low mass states, and for states that have a low lifetime. These results, along with future prospects, will be presented.

Collaboration name:

LHCb collaboration

Astroparticle Physics and Cosmology / 124

Possible Synchrotron Radiation Signal from the Annihilation of Dark Matter at the Galactic Centre and its Detectability at SKA and other Radio Telescopes

Autore: Debasish Majumdar[1]; Avik Paul[2]; Amit Dutta Banik[3]

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Dark Matter particles if accumulated in considerable numbers after being captured inside a massive astrophysical object such as Galactic Centre, may undergo the process of self annihilation to produce Standard Model particles such as fermion-antifermion pairs, gamma rays etc. In case the annihilation products include electrons then under the influence of magnetic field present in the Galactic Centre region, these electrons can emit synchrotron radiation which if detected by the terrestrial radio telescopes could be a possible indirect signature of Dark Matter. In the present work we explore such possibilities by proposing a particle Dark Matter model. In our model, we propose a fermionic Dark Matter candidate by extending the Standard Model of particle physics with a Dirac fermion and a real pseudoscalar. The added fermion which is the Dark Matter candidate interacts with Standard Model via the Higgs portal through a dimension 5 coupling and also by the pseudoscalar. The coupling parameters are constrained by the Dark Matter relic density results from PLANCK experiment and the LHC constraints as also the experimental direct detection limits. Within the framework of this model we then explore the annihilation of this Dark Matter to electron-positron at the Galactic Centre and estimate the synchrotron radiation flux that could be produced. The detectability of these flux at various presently operating and future radio telescopes such as SKA, GMRT, Jodrell Bank etc. are then discussed. The results are shown for two Dark Matter density profiles.

Collaboration name:

Neutrino / 125

FERS-5200: a distributed and scalable Front-End Readout System for large detector arrays.

Autore: Nicola Paoli[1]

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FERS-5200 is a Front-End Readout System designed for the readout of large detector arrays, such as SiPMs, multi-anode PMTs, Silicon Strip detectors, Wire Chambers, GEM, Gas Tubes and others. FERS is a distributed and scalable system, where each unit is a small card that houses 32 or 64 channels with preamplifier, shaper, discriminator, A/D converter, trigger logic, synchronization, local memory and readout interface. FERS is a flexible platform: keeping the same back-end (that is a readout architecture and interface), different types of front-end will be developed to fit a variety of detectors. Typically, the front-end is based on ASIC chips that allow for high density, cost-effective integration of multi-channel readout electronics into small size and low power modules. The first unit being developed is the A5202 that uses the Citiroc-2A chip produced by Weeroc for SiPM readout, but there will be a complete line of FERS units using different Weeroc chips as well as ASIC from other vendors or even preamps made of discrete components. Depending on the used Front End ASIC, the system may have self-triggering capabilities and provide energy (pulse height or charge) and/or timing information, either independently channel by channel or simultaneously on all channels

Collaboration name:

126

The status of nuSTORM

Autore: Ken Long[1]

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The nuSTORM facility will provide \nu_e and \nu_\mu beams from the decay of low energy muons confined within a storage ring. The instrumentation of the ring, combined with the excellent knowledge of muon decay, will make it possible to determine the neutrino flux at the %-level or better. The neutrino and anti-neutrino event rates are such that the nuSTORM facility serving a suite of near detectors will be able to measure \nu_eN and \nu_\muN cross sections with the %-level precision required to allow the next generation of long-baseline neutrino-oscillation experiments to fulfil their potential. By delivering precise cross section measurements with a pure weak probe nuSTORM may have the potential to make measurements important to understanding the physics of nucleii. The precise knowledge of the initial neutrino flux also makes it possible to deliver uniquely sensitive sterile-neutrino searches. The concept for the nuSTORM facility will be presented together with an evaluation of its performance. The status of the planned consideration of nuSTORM at CERN in the context of the Physics Beyond Colliders workshop will be summarised.

Collaboration name:

nuSTORM

Electroweak Interactions and Higgs physics / 127

Exploring the SM EFT with Diboson production at the LHC and beyond

Autore: Marc Montull[1]

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One way to structure our knowledge of what may lie beyond the SM is by studying the higher dimensional operators appearing in the SM EFT. Diboson production is specially interesting because it is sensitive to operators which in many BSM models are closely related to the EWSB. Due to an energy growing behavior of some of these operators, the LHC can surpass LEP in setting bounds to some of these operators, even if the systematics are much larger. In particular it is possible for the LHC to set stronger constrains than LEP on the couplings between the light quarks and the Z boson as well as on the anomalous Triple Gauge Couplings for certain BSM models. We study the leptonic channels for pp > WW, WZ at the LHC and HL-LHC and comment on the interplay between the vertex corrections and the aTGC when setting exclusion bounds. We also study the projected sensitivity of pp > Wh at the LHC and FCC.

Collaboration name:

Poster session / 128

Status of neutrino oscillation measurements with IceCube DeepCore

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Designed to observe neutrinos from astrophysical sources at TeV-PeV energies, IceCube and its DeepCore in-fill array also observe large numbers of atmospheric neutrinos down to a few GeV. Using these events, DeepCore can measure the "atmospheric"neutrino mixing parameters in an energy range higher than neutrino beam experiments and well above the tau lepton production threshold, making appearance and disappearance studies possible. Renewed calibration efforts have improved our knowledge of the detector and new developments in data analysis have significantly increased the statistics of our already large neutrino samples as well as our expected measurement precision. The status of these efforts will be discussed.

Collaboration name:

IceCube

Overview Talks / 129

Neutrino: Experiments

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Collaboration name:

Overview Talks / 130

Neutrino: Theory

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Overview Talks / 131

Electroweak and Higgs: Experiments

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Collaboration name:

Overview Talks / 132

Electroweak and Higgs: Theory

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Collaboration name:

Overview Talks / 133

Astroparticle: Experiments

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Collaboration name:

Overview Talks / 134

Astroparticle: Theory

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Collaboration name:

Overview Talks / 135

Flavor and Precision Physics: Experiments

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Collaboration name:

Overview Talks / 136

Flavor and Precision Physics: Theory

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Collaboration name:

Hihlight talks / 137

CP Violation in charm mesons at LHCb

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Collaboration name:

Hihlight talks / 139

Prospect in Accelerators

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Collaboration name:

Hihlight talks / 140

Next WIN2021

Autore: Marvin Marshak[1]

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Collaboration name:

Hihlight talks / 141

Status and prospects of the double Beta decay experiments

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Collaboration name:

Hihlight talks / 142

20 years of SuperKamiokande and GD new era

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Collaboration name:

Hihlight talks / 143

High energy Cosmic Rays and Neutrinos: Present and Future

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Collaboration name:

Hihlight talks / 144

Cosmology: Present and Future

Autore: Paolo de Bernardis[1]

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Collaboration name:

Hihlight talks / 146

New frontiers in the proton decay search

Autore: Francesca Di Lodovico[1]

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Collaboration name:

Hihlight talks / 147

Majorana Neutrinos

Autore: Francesco Vissani[1]

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Collaboration name:

Hihlight talks / 148

Gravitational waves

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Collaboration name:

Hihlight talks / 149

Outlook

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Collaboration name:

What's next / 150

What's next: Europe

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Collaboration name:

What's next / 151

What's next: Asia

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Collaboration name:

What's next / 152

What's next: Americas

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Collaboration name:

Neutrino / 153

The CERN Neutrino Platform

Autore: Andrea Zani[1]

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The European Strategy for Particle Physics has classified in 2013 the long-baseline neutrino programme as one of the four highest-priority scientific objectives. The Neutrino Platform was then born as the CERN enterprise to encourage and support the next generation of accelerator-based neutrino oscillation experiments. Part of the present CERN Medium-Term Plan, the Neutrino Platform has since been providing facilities to develop and prototype the next generation of neutrino detectors. It also acts as the hub for the European neutrino community engaged in US and Japanese projects.
A very important guideline of the Platform is the R&D on LAr-TPC technologies, carried out on small- and large-scale detectors dedicated to neutrino physics and, more recently, Dark Matter searches. The most significant result is the construction of the two prototypes of the DUNE far detector, one of which (Single Phase) had a successful beam run in 2018 and is still collecting cosmics. The second detector (Dual Phase) is going to be commissioned in the summer. The Platform is also strongly involved in FNAL SBN program, as it hosted the ICARUS T600 refurbishment and it is now a main actor in its upcoming commissioning, as well as in the construction of the near detector, SBND.
However the Platform is involved in a much wider range of activities, among which we find the newly added ENUBET project and the T2K experiment, which includes the BabyMIND magnetized muon spectrometer and recent participation to the ND280 near detector upgrade. All these activities will be presented in this contribution, along with an overview of the upcoming future of the Neutrino Platform

Collaboration name:

CERN Neutrino Platform

What's next / 154

Discussion & closing

Poster session / 155

Constraining NSI and Sterile Neutrino Physics with nu_tau Appearance in DUNE

Autore: Anish Ghoshal[1]; Alessio Giarnetti[2]; Davide Meloni[2]

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[2] *University Roma Tre*

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We consider the $\nu\ \mu \longrightarrow \nu\ \tau$ appearance channel in the future Deep Underground Neutrino Experiment (DUNE) which offers a good statistics of the ν_τ sample. In order to measure its impact on constraining the oscillation parameters, we consider several assumptions on the efficiency for ν_τ charged-current signal events (with subsequent $\tau \longrightarrow e$ decay) and the related backgrounds and study

the effects of various systematic uncertainties. Two different neutrino
fluxes have been considered, namely a CP-violation optimized flux and a ν τ optimized flux.
Our results show that the addition of the ν μ → ν τ appearance channel does not reduce the current uncertainties on the standard 3-ν oscillation parameters while it can improve in a significant way the sensitivity to the Non-Standard Interaction parameter | \epsilon_μτ | and to the new mixing angle θ 34 of a sterile neutrino model of the 3 + 1 type.

Collaboration name:

Welcome / 158

Welcome from INFN and Bari University

Autore corrispondente: giuseppe.iaselli@ba.infn.it

Welcome / 159

Welcome to WIN 2019

Autore corrispondente: catanesi@ba.infn.it

Award / 160

Status of investigations of neutrino properties with the νGEN-spectrometer at Kalinin Nuclear Power Plant

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Award / 161

Oscillation measurements with IceCube DeepCore

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