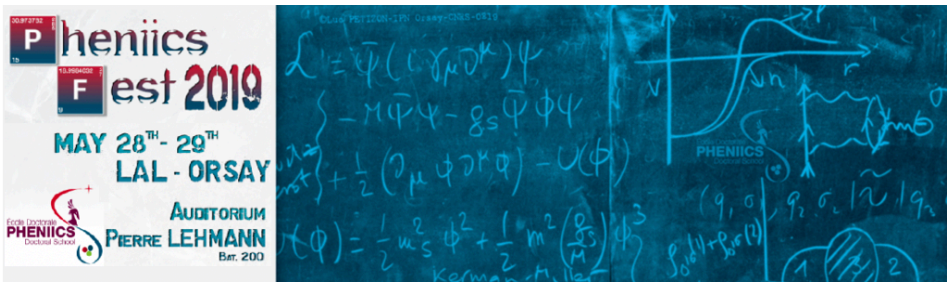
PHENIICS Fest 2019



Report of Contributions

https://indico.cern.ch/e/801637

Contribution ID: **3** Type: **Talk**

Conference - Supernovae, gravitational waves and black holes

Tuesday 28 May 2019 14:00 (1 hour)

No abstract yet.

Presenter: Dr MOCHKOVITCH, Robert (IAP)

Session Classification: Conference

Contribution ID: **5** Type: **Talk**

The D2I2 network

Tuesday 28 May 2019 09:45 (15 minutes)

The D2I2 association (which stands for Doctorants et Docteurs des deux Infinis) is a social and professional network for PhD students and doctors in high energy physics of the two infinites. From parties to seminars you can meet new people, create your own network and use it to find a postdoc or a job after your PhD.

Presenter: FAVIER, Zoé (CEA-Saclay)

Session Classification: Presentation of associations

Contribution ID: **6** Type: **Talk**

Characterization of front-end electronics for the High Granularity Timing Detector in ATLAS

Tuesday 28 May 2019 10:50 (20 minutes)

The expected increase of the particle flux at the high luminosity phase of the LHC with instantaneous luminosities up to L=7.5$\times 10^{34}$ cm^{-2}s^{-1} will have a severe impact on pile-up. The pile-up is expected to increase on average to 200 interactions per bunch crossing. The performance of particle reconstruction will be severely degraded in the end-cap and forward region of the ATLAS detector. The High Granularity Timing Detector (HGTD) is a proposed silicon detector for the forward region of the ATLAS detector in the High Luminosity LHC. It's high granularity and excellent timing resolution can be used to greatly improve pile-up mitigation and open new possibilities in the particle reconstruction, physics analysis and luminosity measurement at the HL-LHC. In this presentation, starting from the physics motivations of the High Granularity Timing Detector, the proposed detector layout and sensor technology, laboratory and beam test characterization of the prototype front-end electronics will be discussed.

Presenter: AGAPOPOULOU, Christina (LAL)

Session Classification: Instrumention

Contribution ID: **7** Type: **Talk**

The Advanced Virgo detector: control, noise hunting and data quality to improve its sensitivity

Tuesday 28 May 2019 11:10 (20 minutes)

Now that gravitational waves from compact binary coalescences have been successfully detected by the global LIGO-Virgo network, a key challenge is to improve the detector sensitivity in order to detect more transient sources —weaker or located further away. The detectors' sensitivity can be enhanced by increasing the laser power travelling within the arm cavities, for it reduces the effect of the laser quantum phase noise, which is the fundamental noise that dominates the sensitivity in the high-frequency range (above a few hundreds of Hz). However, a nonlinear optomechanical phenomenon that has long been studied, and which is called parametric instabilities (PI), may limit the amount of energy stored in the Fabry-Perot resonator, and thus the laser power. PI comes from the coupling of three modes: a mirror mechanical mode (MM) that sets the mirror surface in motion, the fundamental optical mode of an optical cavity (TEM00), and a higher order optical mode (HOM). Photons scattering from the TEM00 to a HOM can generate an optical beat note if the difference in frequencies of the two optical modes is equal to the MM resonance frequency. This beat note, in turn, can either damp or increase the mechanical motion via radiation pressure. The latter effect could lead to an excitation, that is, first exponentially growing, and then reaches a plateau after some time. The signal associated with this mirror excitation would be aliasing in the detection band, thus saturating the electronics. In 2015, during the Observing Run 1 (O1), LIGO observed PIs when a mirror mechanical mode at 15 kHz became unstable, for an intracavity power of 50 kW. That is why we study the effects of PIs for the Virgo configuration with various parameters in order to scan PIs around theoretical and computed values so that we could take hypothetical errors into account. We, as well, compare results using perfect spherical maps and measured mirror maps. Finally, we show that the O3 nominal intracavity power of 272 kW, could bring from zero to a few tens of unstable modes, depending on the radii of curvatures of the mirrors, if all the mechanical modes quality factors are assumed to be equal to 10ˆ7.

Presenter: COHEN, David (LAL)

Session Classification: Instrumention

Contribution ID: **8** Type: **Talk**

Search for neutrinoless double-beta events in a high pressure Xenon TPC with Micromegas detection at the PandaX-III experiment

Tuesday 28 May 2019 11:30 (20 minutes)

The PandaX-III experiment aims to search for the rare neutrinoless double beta decay in Xenon 136. To achieve this goal, it is mandatory to select carefully the main detectors that have to achieve a very good energy resolution (at the level of 1% at 2.5MeV) and a good spatial resolution for the discrimination between double beta events and external gammas coming from radioactive isotopes. It seems then compelling to choose microbulk Micromegas that displays a better energy resolutionand a good radio-purity with a 20x20 cm area. The gain and the energy resolution of theses detector will be assessed alongside the challenges that come with the manufacturing of large area Microbulk detectors. It is important to reduce at the maximum small defects that can cause leakage current, or a dead strip inside the active area. As these detectors will be used in array, the detector homogeneity will be emphasized. Our recent measurements on a 20x20cm large Microbulk prototype show large unexpected gain inhomogeneities up to 25% from one spot to the other on the detector surface. It is possible to improve the energy resolution of individual detectors by taking theses inhomogeneity of gain into account and correct them through a good 2D calibration. I will discuss the performances of the microbulk Micromegas compared to a bulk micromegas with the same design. Through a comparison of the gain and its homogeneity, the energy resolution and the radiopurity of each detector, I will present a study in order to find the better design of micromegas for the search for the double beta decay in Xenon 136.

Presenter: MANIER, Benjamin (CEA)

Session Classification: Instrumention

Contribution ID: **9** Type: **Talk**

Development of Picosec Micromegas for fast timing in high rate environments

Tuesday 28 May 2019 11:50 (20 minutes)

Progress of the Picosec Micromegas concept towards a particle detector with a restive and segmented readout Detectors with a time resolution of several 10 ps and robustness under higher particles flux are necessary for a accurate vertex separation in future HEP experiments. The Picosec detector concept is a Micro-Pattern Gaseous Detector (MPGD) based solution facing this particular problem. The Picosec concept is based on a Micromegas MPGD coupled with a Cherenkov radiator and a photocathode. The feasibility of this concept to reach a time resolution in the order of several 10 ps has been demonstrated with a measured time resolution of up to 24 ps. The next step is to further develop this concept towards a usable device for precise time and position measurements in high flux environments. To archive this goal several prototypes have been build and tested. Different kinds of restive layers has been tested to operate the detector stable under a high intensity pion beam. With the additional protective layer a time resolution of up to 28 ps has been obtained. Different types of photocathode materials have been tested in order to find a robust solution against ion back flow bombardment under higher particle flux. Moreover a first prototype has been tested with a hexagonal segmented anode pads. With this detector a combined time resolution of 36 ps for shared signals over multiple pads has been measured. This conference contribution will show the progress and development of the well-proven Picosec concept towards a durable and precise tracking detector targeting for the HL-LHC era and beyond.

Presenter: SOHL, Lukas (CEA)

Session Classification: Instrumention

Contribution ID: **10** Type: **Talk**

Study of heat and mass transfer in superfluid helium in confined geometries

Tuesday 28 May 2019 12:10 (20 minutes)

No abstract yet.

Presenter: VITRANO, Andrea (CEA)

Session Classification: Instrumention

Contribution ID: **11** Type: **Talk**

Shape evolution in exotic neutron-rich nuclei around mass 100

Tuesday 28 May 2019 15:00 (20 minutes)

The shape of a nucleus is one of its fundamental properties. The nuclei in the neutron-rich region around mass 100 are well known to exhibit rapid shape changes. The simplest estimate of nuclear deformation in even-even nuclei can be obtained from the energy of the 2+1 state. For Sr (Z = 38) and Zr (Z = 40) isotopes this energy is observed to decrease dramatically at N = 60, while its evolution is much more gradual in Mo nuclei (Z = 42) [1]. Precise lifetime measurements provide a key ingredient in the systematic study of the evolution of nuclear deformation and the degree of collectivity in this region.

Neutron-rich nuclei in the mass region of A = 100-120 were populated through the fusion-fission reaction of a 238U beam at 6.2 MeV/u on a 9Be target. The compound nucleus 247Cm was produced at an excitation energy of ˜45 MeV before undergoing fission. The setup used for this study comprised the high-resolution mass spectrometer VAMOS [2] in order to identify the nuclei in Z and A, the Advanced γ-ray Tracking Array AGATA [3] of 35 germanium detectors to perform γ-ray spectroscopy, as well as a plunger mechanism to measure lifetimes down to a few ps using the Recoil Distance Doppler Shift method (RDDS) [4]. In addition, the target was surrounded by 24 Lanthanum Bromide (LaBr3) detectors for a fast-timing measurement of lifetimes longer than 100 ps.

In this contribution, we will report on new lifetime results for short-lived states in neutron-rich A˜100 nuclei, with an emphasis on the Zr and Mo chains. We will discuss the experimental techniques used to evaluate the lifetimes as well as their interpretation in terms of state-of-the-art nuclear structure models.

[1] S. Ansari et al. Phys. Rev. C 96, 054323

[2] M. Rejmund et al. Nuclear Instruments and Methods in Physics Research A 646 (2011) 184–191

[3] S. Akkoyun et al. Nuclear Instruments and Methods in Physics Research A 668 (2012) 26–58

[4] A. Dewald et al. Progress in Particle and Nuclear Physics 67, 3

Presenter: ANSARI, Saba (CEA)

Session Classification: Nuclear physics I

Contribution ID: **12** Type: **Talk**

Behaviour of uranium dioxide under irradiation: combined effects of radiation defects induced by ballistic and electronic excitation

Tuesday 28 May 2019 15:20 (20 minutes)

No abstract yet.

Presenter: BRICOUT, Marion (CEA)

Session Classification: Nuclear physics I

Contribution ID: **13** Type: **Talk**

Structure of heavy nuclei and associated R&D

Tuesday 28 May 2019 16:40 (20 minutes)

No abstract yet.

Presenter: CHAKMA, Rikel (CSNSM)

Session Classification: Nuclear physics II

Contribution ID: **14** Type: **Talk**

Étude expérimentale du ralentissement des ions légers dans des cibles de composés ioniques: Pouvoir d'arrêt et straggling en énergie

Tuesday 28 May 2019 17:00 (20 minutes)

Presenter: AMARI, Lounès (IPNO)

Session Classification: Nuclear physics II

Contribution ID: **15** Type: **Talk**

Polarex, a future facility for on line nuclear orientation

Tuesday 28 May 2019 17:20 (20 minutes)

Low temperature nuclear orientation (LTNO) allows to study polarized exotic nuclei. At very low temperature (˜10mK) nuclei can experience a very high polarization in the hyperfine field which exists into a ferromagnetic metal host. The decay products can be observed using proton, alpha or beta-particle detectors fitted within the cryostat and/or external gamma or neutron detectors, providing a very versatile instrument. Oriented nuclei give access to a wide range of experiments. These include a precise measurement of nuclear moments using the NMR technique and the observation of beta-decay to, and gamma emission from, excited states in the daughter nucleus to study aspects of nuclear structure. As a special feature of LTNO, far-reaching studies of fundamental weak interactions and associated symmetries can be made as well as investigations of parity non conservation. PolarEx (Polarization of Exotic nuclei) is a facility dedicated to this kind of study through the decay of polarized nuclei that will run on-line at the ALTO facility at Orsay, France. This experimental setup is also designed to give a large access for the detection system: up to eight germanium detectors can be fitted in the plan perpendicular to the orientation axis to study the spatial asymmetry of the gamma radiation. In this contribution will be presented the status of Polarex and the on going off-line studies, in particular the new measurements of the multipole mixing ratios in 56Fe.

Presenter: THOËR, Rémy (CSNSM)

Session Classification: Nuclear physics II

Contribution ID: **16** Type: **Talk**

Rejection of surface events in macrobolometers by means of Al-film crystal coating

Tuesday 28 May 2019 17:40 (20 minutes)

Neutrinoless double-beta decay is a hypothetical rare nuclear transition (T1/2>1026 yr) and its observation would imply lepton number violation and Majorana nature of neutrinos ($\nu^{-}=\nu$), allowing to determine the absolute scale of the neutrino mass and to probe effects beyond the Standard Model. In this transition two neutrons decay simultaneously into two protons and two electrons and it is allowed for 35 nuclei (100Mo, 130Te⋯). This decay could be studied with large mass bolometers operated at 10-20 mK which are among the best energy resolution particle detectors. A bolometric absorber can be developed from highly radiopure materials and can contain the ββ-decay candidate nucleus. Background induced by charged-particle surface radioactivity is currently the limiting factor in large-scale bolometric experiments like CUORE. A new R&D has recently begun within the CROSS project (Cryogenic Rare-event Observatory with Surface Sensitivity) aiming at the development of bolometric detectors capable of discriminating surface alpha and beta interactions by exploiting superconducting properties of Al film deposited on the crystal surface. The crystals studied in CROSS are Li2MoO4 and TeO2. The first prototypes operated at CSNSM showed that a-few-μm-thick Al film deposited on one of the crystal's surfaces can efficiently discriminate surface alpha particles from bulk events. The CROSS technology has the potential to further improve the background suppression in bolometers for double beta decay and simplify the detector construction in large-scale setups.

Presenter: KHALIFE, Hawraa (CSNSM)

Session Classification: Nuclear physics II

Contribution ID: **17** Type: **Talk**

Diamond microdosimetry for hadrontherapy

Wednesday 29 May 2019 14:20 (20 minutes)

Hadron therapy is an innovative type of radiotherapy for cancer treatment which enables tumour cells to be more effectively destroyed than conventional radiotherapy using photons. The precise knowledge of the lineal energy of particles is used in the field of microdosimetryas a fundamental parameter in the prediction of the relative biological efficiency (RBE) of clinical beams.The access to these experimentally measured quantity is essential for validating simulations and models that are currently used to improve the treatment efficiency. Currently, no such a microdosimetric detector is available on the market for routine clinical use.
Within the frames of this PhD project novel prototypes of solid-state microdosimeters based on single-crystal CVD diamond membranes, for such lineal energy measurements have be developed. Their response to single projectiles was investigated in ion microbeams (IBIC) and compared with theoretical predicted results using Monte Carlo and TCAD simulations, showing very promising results. At this stage, the microdosimeter prototypes of the device are integrated with suitable multi-channel electronics. Finally, their full performance will be evaluated with clinical proton and carbon beams leading to first step for the implementation in radiobiological models.

Presenter: ZAHRADNIK , Izabella

Session Classification: Medical physics

Contribution ID: **18** Type: **Talk**

Radiotherapy

Wednesday 29 May 2019 14:00 (20 minutes)

Despite remarkable advancements, the tolerance dose of normal tissue continues being the main limitation in radiotherapy. To overcome it, we have recently proposed a novel concept: proton minibeam radiation therapy (pMBRT). It combines the inherent physical advantages of protons with the normal tissue preservation observed when irradiating with submillimetric, spatially fractionated beams (minibeam radiation therapy). The ability of pMBRT to spare normal tissue in rat brains has already been experimentally demonstrated. The existing implementation using a mechanical collimator is suboptimal due to very low dose rates and neutron production in the collimator. One of the main challenges is now the generation of (submillimetric) proton beams intense enough to treat patients in a reasonably short time with minimum neutron contamination. Magnetic beam focussing appears to be an important step to achieve this goal.

Presenter: SCHNEIDER , Tim (IMNC)

Session Classification: Medical physics

Contribution ID: **19** Type: **Talk**

Development of tau selection techniques for the search of the Higgs boson produced with two top quarks decaying to two tau leptons in the CMS experiment

Wednesday 29 May 2019 14:40 (20 minutes)

My thesis work focuses on taking advantage of the newer analysis and selection techniques to search for tau leptons coming from Higgs which was produced associated to two tops (ttH) in the CMS detector. The ttH production mode is important to characterize the properties of the Higgs boson and in particular its coupling to top quarks, to which the ttH process has direct access. Given the mass of the Higgs, the tau decay mode is certainly favored but still represents challenging aspects in both selection and reconstruction techniques, due to the complexity of the final state. The thesis focuses both on development of tau selection techniques at trigger level, as well as analysis of the ttH process where the Higgs decays into a pair of tau leptons.

Presenter: MARTIN PEREZ , Cristina

Session Classification: Particle physics II

Contribution ID: **20** Type: **Talk**

High power and high finesse optimization in a Fabry-Perot cavity for ThomX, an X-ray demonstrator

Wednesday 29 May 2019 15:00 (20 minutes)

Presenter: AMOUDRY , Loïc

Session Classification: Particle physics II

Contribution ID: **21** Type: **Talk**

Inclusive high pT Z boson into two lepton final analysis

Wednesday 29 May 2019 15:20 (20 minutes)

At ATLAS experiment, this analysis is using inclusive high pT Z boson events which decay into two lepton final state to search for deviations from SM expectations with Run2 data. The leptonic decays of the Z bosons at high pT provide a clean and fully triggered data sample. The requirement of the high pT Z bosons also helps to suppress the SM background contribution, especially the QCD process. This analysis is model-independent and generic in the sense that all possible final states are studied. The potential signals could be either X produced with Z boson or Y decaying into Z boson with other objects.

Presenter: KUNLIN , Han

Session Classification: Particle physics II

Contribution ID: **22** Type: **Talk**

Charmonium production in heavy ion collisions analysis

Wednesday 29 May 2019 11:30 (20 minutes)

At very high energy densities, matter undergoes a phase transition from confined states called hadrons to a soup of their constituents, called the quark gluon plasma. The QGP can be artificially produced in heavy ion collisions. It is studied using different probes, one of which is charmonium states. The talk will show results from the CMS collaboration at CERN regarding charmonium production in heavy ion collisions.

Presenter: DIAB, Batoul (Centre National de la Recherche Scientifique (FR))

Session Classification: Hadronic physics

Contribution ID: **23** Type: **Talk**

Generalized Parton Distributions

Wednesday 29 May 2019 11:50 (20 minutes)

Generalized Parton Distributions (GPDs) describe the correlations between the longitudinal momentum and the transverse position of the partons inside the nucleon. They give access to the contribution of the orbital momentum of the quarks to the nucleon spin. They are nowadays the subject of an intense effort of research, in the perspective of understanding nucleon structure. GPDs
have been studied in several experiments worldwide mainly using Deeply Virtual Compton Scattering (DVCS, ep → e'p'γ).
This talk will be composed of two parts. In the first part, the Central Neutron Detector will be presented. This scintillator time-of-flight detector has been built at IPN and installed in CLAS12 at Jlab in the Fall 2017. The CND will allow to perform DVCS measurements on neutron (en → e'n'γ). In the second part, the measurement, using CLAS12 data, of the time-reversal conjugate process of DVCS, Timelike Compton Sattering (TCS) will be discussed. TCS (γp → γ*p'→e + e - p') is the photoproduction of a virtual timelike photon off the proton, which then decays into a lepton pair. Experimental studies of DVCS and TCS are complementary.

Presenter: CHATAGON , Pierre (IPNO)

Session Classification: Hadronic physics

Contribution ID: **24** Type: **Talk**

Quarkonium elliptic flow in Pb-Pb collisions at 5.02 TeV

Wednesday 29 May 2019 12:10 (20 minutes)

ALICE experiment at LHC studies through ultra-relativistic heavy ion collisions, a deconfined state of matter, the Quark Gluon Plasma (QGP). This state raises many questions about mechanisms of strong interaction and the cohesion of matter. Moreover, QGP is an extremely hot and dense state that behaves more like a nearly ideal, strongly interacting fluid and it can represents the universe at the first microseconds. According to Quantum Chromodynamics (QCD) the theory that describes strong interaction, heavy quarks pairs represent an ideal probe to study this state. Thus, the measurement of azimuthal anisotropy in particles distribution called elliptic flow, for heavy resonances at an energy in the center of mass at 5.02 TeV, will allow to constrain the models describing the QGP.

Presenter: CARON, Robin Albert Andre (Université Paris-Saclay (FR))

Session Classification: Hadronic physics

Contribution ID: **26** Type: **Talk**

Towards precision measurements on the Higgs boson decays in b quark pairs with the ATLAS detector at the LHC

Wednesday 29 May 2019 09:55 (20 minutes)

Presenter: AL KHOURY, Konie (Centre National de la Recherche Scientifique (FR))

Session Classification: Particle physics I

Contribution ID: **27** Type: **Talk**

Study of the neutrinoless double beta decay of 82Se with the SuperNEMO demonstrator

Wednesday 29 May 2019 09:35 (20 minutes)

Presenter: GIRARD-CARILLO , Cloé

Session Classification: Particle physics I

Contribution ID: **28** Type: **Talk**

Optic and Beam diagnostics for the project MYRRHA 100MeV

Wednesday 29 May 2019 10:15 (20 minutes)

Presenter: KRAFT, Henri

Session Classification: Particle physics I

Contribution ID: **29** Type: **Talk**

Electron energy scales from Z⊠ee events for high and low pile-up data with Release 21

Wednesday 29 May 2019 09:15 (20 minutes)

Presenter: ATMANI, Hicham (Centre National de la Recherche Scientifique (FR))

Session Classification: Particle physics I

Contribution ID: **30** Type: **Talk**

Inclusive J/psi production in pp and Pb-Pb collisions at sqrt(sNN)=5.02 TeV with the ALICE muon spectrometer at the LHC

Wednesday 29 May 2019 11:10 (20 minutes)

Presenter: HUANG, Chun-Lu (Centre National de la Recherche Scientifique (FR))

Session Classification: Hadronic physics