Conférences Plénieres

I
Pr. Jamal MIMOUNI

Theoretical Physics in a Nutshell
From QED to UHECR, GRB's and more

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Abstract
Theoretical Physics is the leading edge of physics. It is the exploration of its ever evolving frontiers with a heavy use of the mathematical tool, not only as its natural language but also as its source of inspiration and guidance, thus its strong connection if not sometime abusive identification with so called mathematical physics.
We wish to explore in this talk, the moving frontiers of theoretical physics, its great successes as well as its resounding failures, attempting to bring a better appreciation of its aspirations and undertakings. We will start with QED (Quantum ElectroDynamics), a towering achievement of physics and indeed the most precise theory of all times and across all the sciences with accuracy reaching down 12 decimal places. Then we shall follow the track of the gauge theories and the various unification attempts up to the superstrings and its almost demise. The lack of progress in the unification attempts and the dreams of a final theory which was indeed supposed to be within hand reach three decades ago is now looming in the far future if not vanished from the realistic goals of theoretical physics. We will further explore the major actual puzzles at the high end of physics and astrophysics which go by the names of UHECR, CMBn, GRB's, GZK limit, Dark Matter (DM) and Dark Energy (DE), and we will have something to say about this year's discovery of the gravitational waves (GW).

II
Pr. Ali BOULTIF

Sur les difficultés inhérentes à l'opération de la détermination de la symétrie de la maille à partir d'un diagramme de poudre

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Résumé
La résolution du problème de la détermination de la symétrie de la maille appelée « indexation », à partir d'un diagramme de diffraction sur un composé finement cristallisé, peut comporter plusieurs obstacles. Dans cet exposé, il sera question d'aborder les difficultés les plus cruciales que l'on rencontre au cours de cette opération. Parmi les difficultés, on parlera de l'effet conséquent que peut avoir l'erreur commise sur les positions des pics de diffraction sur les résultats. Ensuite, on présentera le problème du cas des singularités métriques. Les grands volumes ainsi que la présence de grands ou de petits axes introduisent également des difficultés qui seront passées en revue. Un autre obstacle susceptible de constituer un problème dans la recherche de la symétrie de la maille est dû à la présence de ce qu'on appelle « les zones dominantes ». Un moyen très utile pour confirmer les solutions

trouvées est, en plus du critère habituel qu'est la figure de mérite, la décomposition du diagramme par un _*whole pattern fitting*' dont on dira quelques mots. Mais on doit préciser que, là aussi, des difficultés peuvent apparaître.

III

Pr. Hassane NAJI

Mesoscopic-based approaches in thermal science beyond Navier-Stokes's traditional methods: Modeling, simulations and applications

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Abstract

In the field of computational dynamics, a variety of numerical methods has been constructed with the aim at computer simulation of flow phenomena. Some of these methods rely on microscopic scales (e.g., Molecular Dynamics or Monte Carlo methods); others are based on macroscopic modeling perspective (e.g., finite volume methods). The separation between these two extreme scales allows an intermediate approach, so-called mesoscopic description for the dynamic behavior. The first and intermediate methods belong to the class of methods known as kinetic, which connect the microscopic and macroscopic descriptions of the dynamics, providing a promising approach. The use of kinetic methods for the description of macroscopic fluid flows with and without heat transfer is made possible by the following reasons: (i) macroscopic dynamics of the fluids is the result of interaction of microscopic particles, and (ii) the macroscopic dynamics is not sensitive to the underlying details in microscopic physics. In addition, mesoscopic flows and heat are important to understand because they hold the key to the interaction between the macroscopic flow and the microstructures in porous media.

In this framework, there already exist a few mesoscopic methods such as the Lattice BoltzmannEquation (LBE), Discrete Velocity Models (DVM) of the Boltzmann equation, Smoothed Particle Hydrodynamics (SPH), Dissipative Particle Dynamics (DPD), and Multiparticle Collision Dynamics (MPCD).

Through this work, I will give a brief overview over these methods, while focusing on the modeling and simulation of heat transfers via LBMs.

In the last decade or so, LBM has emerged as a new and effective numerical approach of computational fluid dynamics (CFD) and achieved considerable success in simulating fluid flows and associated transport phenomena. It leans on the Boltzmann equation. The LB dynamics is a sequence of alternating collision and streaming steps. The distributions are first reshuffled in the collision step, and then evolve in the streaming step according to an established protocol. The collision step describes particle scattering events, which relax the distributions towards a local equilibrium distribution with a linear collision operator. It offers various advantages, including use of Cartesian grids, high space-time resolution, full scalability on parallel computers, as well as efficient and robust implementation in complex geometries.

In this work, some examples of industrial simulations are given. Among them, we can mention:

Thermal micro flows, flow and heat transfer past heated cylinders in a vee shape, natural convection and volumetric radiation in square enclosures, flow in porous and fibrous permeable media, solid-liquid phase change with natural convection, melting/solidification problems with convection, to cite a few.

THEME 1

Communications Orales

Physique Nucléaire et Applications

Projection data generation in neutron tomography by means of Monaco/Mavric code

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Abstract
In the present study, SCALE6.1 package is used for the analysis of experimental neutron transmission data and for the determination of neutron attenuation characteristics of various neutron absorbing materials. The neutron beam hardening is highlighted as well as its influence on shielding calculation and tomographic image reconstruction accuracy. Reconstruction is performed from projection data generated by the Monaco/Mavric code as it is demonstrated in this work. Experimental thermal neutrons transmission data of Al, SS304 and 304B7 materials are used for comparison purpose and to proof the used codes capacity in neutron tomography simulation and image correction.Good agreement between experimental and calculated values is found. Indeed, this code can provide accurate data exactly comparable to the experimental values.
Keywords: neutron transmission, beam hardening, SCALE 6.1, Monaco/Mavric.

Quality control and performance evaluation of k_0-based neutron activation analysis laboratory using SRM-NIST

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Abstract
Quality evaluation of the k_0-standardized neutron activation analysis (k_0-NAA) at Es-Salam research reactor has been implemented by analyzing SRM-NIST, the standard reference material of National Institute of Standards and Technology (USA). Four SRM such as: Tomato leaves, Estuarine sediment, rice flour and oyster tissue have been analyzed by k_0-NAA method. The results revealed that the k_0-NAA established in our laboratory has met the requirements of multi-element analysis for the intended applications with about 32 elements: As, Au, Ba, Br, Ca, Ce, Co, Cr, Cs, Eu, Fe, Hf, K, La, Mn, Mo, Na, Nd, Rb, Sb, Sc, Se, Sm, Sr, Ta, Tb, Th, U, W, Yb, Zn and Zr in matrices of environment, geology and biology among others. Evaluation criteria for the laboratory quality used in this work are the statistical analysis parameters namely: *u*-scores, laboratory result/certified value ratios and relative biases as well as the control charts those are shown in the paper.

Keywords: Quality control, Performance, neutron activation, SRM-NIST

Indirect determination of astrophysical factor S(E) and reaction rate of $^{12}C(\alpha, \gamma)^{16}O$

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Abstract
The reaction $^{12}C(\alpha, \gamma)^{16}O$ was investigated through the direct α-transfer reaction (^{7}Li,t) at 28 and 34 MeV incident energies. We determined the reduced α-widths of the subthreshold 2+ and 1− states of ^{16}O from the DWBA analysis of the transfer reaction $^{12}C(^{7}Li,t)^{16}O$ performed at two incident energies. The obtained result for the 2^{+} and 1^{-} sub-threshold resonances as introduced in the R-matrix fitting of radiative capture and elastic-scattering data to determine the E2 and E1 S-factor from 0.01MeV to 4.2MeV in the center-of-mass energy. We precise that S(E1)=100keV-barn and S(E2)=50keV-barn at stellar energy (0.3 MeV). After determining the astrophysics factor of $^{12}C(\alpha, \gamma)^{16}O$ S(E,)at energies cited above, with Pierre Descouvement code, i determined numerically the new reaction rate of this reaction at a different stellar temperature (0.06 Gk-2 GK). The $^{12}C(\alpha, \gamma)^{16}O$ reaction rate at $T_9 = 0.2$ is $[7.21+2.15-2.25] \times 10^{-15}$ cm^3 s^{-1} mol^{-1}. Some comparisons and discussions about our new $^{12}C(\alpha, \gamma)^{16}O$ reaction rate are presented. The agreements of the reaction rate below $T_9 = 2$ between our results and with those proposed by NACRE indicate that our results are reliable, and they could be included in the astrophysical reaction rate network.

L'impact de la Radioactivité sur l'Environnement

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Résumé
Les recherches sur la radioactivité ont permis de reconstituer l'histoire de l'univers et de la Terre, et fournissent des outils et instruments indispensables pour la médecine, la biologie ou la géologie. La radioactivité se retrouve au cours de nombreux enjeux et applications dans notre vie quotidienne tels l'étude des rayonnements nécessaires à la compréhension des mécanismes régulant le corps humain ou encore pour la surveillance d'éléments radioactifs présent dans notre environnement.
Dans cette contribution on présente l'origine de la radioactivité dans l'environnement ainsi que les méthodes de détection et d'analyse utilisée pour identifier et quantifier un grand nombre de radionucléides via les énergies gammas émis principalement l'analyse par spectrométrie gamma. L'impact radiologique des éléments radioactifs sur l'environnement et les êtres vivants sera aussi illustrer.

Treatment of lung cancer with protontherapy

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Abstract
In radiotherapy, lung cancer is associated with local control rates very low. The difficulty of this type of treatment is to irradiate relatively radio-resistant lung lesions very radiosensitive. Thus, the issue of adequate therapeutic doses is often limited by the size of the target volume in order to keep the risk of complications to an acceptable level. Radiotherapy of lung tumors is sully by many uncertainties that must be considerate by the safety margins, implying an increase in the size of the target volume. The challenge is to implement methods to reduce uncertainties, and therefore the size of the target volumes. In addition, the proton therapy may better spare the healthy tissues relative to the X-ray radiotherapy.

It is necessary to carry out the study of the impact of heterogeneity on the position of the Bragg peak and the absorbed dose in the target volume to be able to perform processing in proton therapy. For this we used the simulation in different positions with the Geant4 code to better appreciate the need for this therapy.

Keywords: Proton, lung cancer, heterogeneity.

Evaluation of different parameters influencing the radiotherapy treatment plans (VMAT-RapidArc)

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Abstract
Volumetric modulated arc therapy (**VMAT**)is a modern technique of high accuracy radiotherapy that allows the irradiation of tumor volume using a complete arc instead of fixed beams and protects the healthy tissues in the same time.The complexity of this technique raises the possibility of deviations in treatment plans deliverance to patient. The goal of this study is to evaluate the differences between doses distributions planed in TPS and doses distributions actually delivered by linear accelerator.

Key words: VMAT, radiotherapy, tumor volume, dose, linear accelerator.

Analysis of dosimetric characteristics of flattening filter free photon beams and comparison with regular beams

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Purpose: Flattening Filter Free (FFF) photon beams have recently become available on some modern linear accelerators in radiation therapy with high dose rate, but for the use of this beam type, the accuracy of basic dosimetric data acquisition is important because it is directly related to the dose given to patients.
This study aimed to analyze the dosimetric data of the FFF photon beams, as compared to the standard photon beams.
Methods: Basic dosimetric properties of 6 MV and 10 MV photon beams from a linear accelerator operating without the flattening filter have been analyzed. These include dose rate data, depth dose dependencies, lateral profiles and output factor in a water phantom and transmission factors of a multi-leaf collimator. The data are compared with dosimetric data for the flattened beams (FB).
Results: The FFF beams have the following : a higher dose rate by factors of 2.3 (6 MV) and 4 (10 MV), the maximum dose is closer to the surface (varies less with field size and is deeper for largest field sizes), beam quality is lower (5% for 6X FFF & 4% for 10X FFF), surface dose is higher and flatness is similar for small field sizes, decreased penumbra, lower out-of-field dose (around 1.7 % for 10X FFF), smaller output in air variation with the field sizes, leaf transmission is lower (0.2% for both energy), less head scatter and no beam hardening in central region of the beam (lower mean energy, uniform energy spectra along the field).
Conclusions: This study provided us valuable information on the characteristics of the FFF beams, its variation with respect to FB and its consistency. The findings suggest that with a flattening filter free

accelerator better radiation treatments can be developed, with shorter delivery times and lower doses to normal tissues and organs.

Keywords: flattened beams (FB), Flattening Filter Free (FFF), high dose rate.

Evaluation of radioactivity levels in sediment samples collected from Beni Haroun dam using high resolution gamma-ray spectrometry

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Abstract
The majority of exposure to radiation comes from natural sources. Therefore, the knowledge of radionuclide distribution and radiation levels in the environment is important. The purpose of the study is twofold: first to measure the concentrations of radionuclides in sediment samples collected from three different locations near Beni haroun Dam using hyper-pure germanium detectors where the means activity concentrations levels in the current study for ^{226}Ra, ^{232}Th and ^{40}K were 24.39, 24.53 and 217 Bq/kg, respectively; and second to evaluated the radiological risks associated to these radionuclides by estimating the radiological parameters.

Keywords : Dam sediment samples, Radionuclides**,** Gamma spectrometry**,** Radiation hazards.

Three-body forces and shell structure in tin isotopes

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Abstract
This work is devoted to the study of the nuclear structure around the doubly magic ^{132}Sn nucleus in the frame of the shell model. We are interested in studying and understanding the role of the three body effects on the shell model calculations for the neutron rich even-even ^{134}Sn, ^{136}Sn and ^{138}Sn nuclei. The calculations are carried out by means of OXBASH nuclear structure code. In order to reproduce the experimental data of excitation energies, we use the CWG interaction with Z50N82 space model. We carry out some modifications to get CWGM interaction. The obtained results are compared with experimental data and those of the literature.

Physique Théorique

Phase diagrams of noncommutative ϕ4 theory

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Abstract
We study nocommutative scalar phi-four theory on the fuzzy sphere,which is a two-parameter model, which enjoys three stable phases: disordered phase, uniform ordered phase, non-uniform ordered phase. Wehave used Monte Carlo method to simulate two different multitrace approximations of the model. We have calculated the phase diagram, thetriple point and the termination point in the two models, and also calculated the critical exponents of the using transition line, and found agood agreement with the theory.

Solution of the Klein-Gordon oscillator in cosmic string space-time for scalar potentials

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Abstract
We study in this work the exact solutions of two-dimensional relativistic particuls of spin-0 in the cosmic string background under the effects of scalar potentials as modification in the momentum operator $p_\mu \rightarrow p_\mu - eA_\mu$ and in the mass term $m \rightarrow m + S\ \rho$. In this way, we solve the Klein-Gordon oscillator (KG) and find the energy levels for bound states. Finally the dependance of the scalar potentials interaction with the angular frequency and the energy spectrum has been discussed.

Contribution à l'étude d' hamiltoniens effectifs pour des systèmes quantique à masse dépendant de la position

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Résumé
Le mouvement d'une particule dans un réseau cristallin estassimilé comme une particule libre avec une masse effective m* dépend de la nature et les propriétés de la structure cristalline de réseaux.Dans les hétérostructures la masse prend des valeurs diffèrent pour chaque jonction c'est-à-dire la masse est une fonction de position m(x). Je présent dans mon poster un calcul analytique pour résolu l'équation de Schrödinger avec un Hamiltonien de forme et une étude de cas limite m(x) tends vers m0 et les contraints génère sur alpha bita gamma.

Path integral for a time dependent harmonic oscillator

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Abstract
We present a space-time transformation to the harmonic oscillator with a time-dependent mass and frequency and we transform the problem to that of constant mass and time-dependent potential of the form$\Omega^2\ t\ x^2$. The propagator and the corresponding wave functions are given. A new general model of time-dependent mass is proposed.

Keywords: Path integral, Time dependent mass, time dependent harmonic oscillator, time dependent transformations**.**

Path integral of a particle in a general magnetic potential

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Abstract
The path integral of a particle with a time dependent mass in a new general magnetic potential has been presented and exactly calculated through suitably chosen transformations.

Key words: Path integral, Time dependent mass, time dependent harmonic oscillator, time dependent transformations**.**

Nonlocal separable potential in the one-dimensional DKP equation

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Abstract
In this work, we solve the DKP equation (1+1) dimension for non-local potential of the form of Lorentz scalar plus vector $\beta g +\quad v\ x\ v(x^{'})$. The energy spectrum is found and discussed for this equation.

Generalization of a Störmer problem for dust grain with the effect of a quadrupolar magnetic term

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Abstract
In this work, we will investigate the generalized Störmer problem for a charged dust grain near a rotating spherical magnetic planet with the effect of a quadrupolar magnetic term with a simultaneous influence of electromagnetic and gravitational forces. Furthermore, the equilibrium state of these dust grains is

treated here with a detailed discussion of equatorial and Halos orbits existence conditions with analytical and numerical solutions.

The study of cosmic rays in the high-energy and the possibility monitored with telescope JEM EUSO

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Abstract
Ever since the discovery of cosmic rays by Victor Hess [Hes12] in 1912 great efforts have been undertaken to understand the origin of cosmic rays up to the highest energies of 10^{21}eV. A common detection method utilizes the fluorescence light produced in the atmosphere during extensive air showers induced by cosmic rays. Due to the extremely low flux of particles in the ultra high energy domain vast volumes of atmosphere have to be monitored. The largest fluorescence telescope, the Pierre Auger Observatory, is located in Argentina and covers over 3000km^2. The space based JEM-EUSO mission is a proposed pathfinder mission to further increase the amount of observed atmosphere. The Extreme Universe Space Telescope (EUSO) will be attached to the Japanese Experiment Module (JEM) of the International Space Station (ISS) and provides a high resolution sensor and a wide field of view ($\pm 30^{\circ}$).

We have discussed this in the simulated light fluorescence and fluorescence study Output FY_{λ} US to take the standard model of the atmosphere,we came through the simulation process to know that synthetic atmosphere and physical characteristics of the structure, temperature, density and pressure changing in terms of height h and even the wavelength λ of photons fluorination all affect the output of fluorination FY_{λ} .

Key words: cosmic rays; air showers; telescopes JEM-EUSO ; fluorescence.

Path Integral Solution of Non-Central Potential

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Abstract.
In this paper, we calculate the propagator of a system of particle moving in a class of non-central potential. This study is done in the framework of path integrals. It has been possible to treat this potential in spherical coordinates thanks to the introduction of the system energy by means of the Green's function and with the help of an appropriate temporal transformation which ensures the separation of angular and radial parts. The propagator is then expressed as a product of two partial kernels. The angular kernel is related to the triangular Pöschl-Teller potential while the radial one describes the motion with the oscillator plus inverse square potential. The energy spectrum and the normalized wave functions of the bound states can then be obtained. Particular cases of this potential have also been deduced.

Keywords:Path integral, Time dependent mass, time dependent harmonic oscillator, time dependent transformations**.**

Vector boson fusion in the frame of singlet scalar extended Standard Model

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Abstract
In the framework of the singlet scalar extended standard model, we calculate the cross section of the vector boson fusion into top quark pairs relatively to the gluons fusion one. We also study the importance of different helicity states. Then we investigate the new physics effects induced by this extension.

Key words: Beyond Standard Model, Higgs Physics

Particule de dirac et le formalisme de gitman non commutatif

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Résumé
En utilisant le formalisme non commutatif de gitman et al les fonctions d'ondes ainsi que le spectre d'énergies associées à la particule de Dirac en interaction avec un champ extérieur sont bien déterminés

Observational constraints on the parameters of Dark matter model

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Abstract
In this work, we will begin by introducing the various clues that lead to the hypothesis of dark matter. Then we will present several proposals that have been made to try to answer the question "what is made of this dark matter.
We will use the observational data sets from Planck, WMAP9 …etc, to constrain the model parameters.

CP sensitivity in the scalar sector through WW-scattering

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Abstract
Additional sources of CP violation can be covered by extending the scalar sector of the standard model, as well as in model independent way through adding higher dimensional operators. We look through the WW-scattering into quarks pairs processes to quantify the CP violation deviations that can be observed into the TeV colliders. For this we perform the calculation of the Jarlskog invariant and the Electric Dipole Moment (EDM) in Beyond Standard Model framework, and discuss their contributions to the Yukawa couplings as well as the related phenomenology at LHC and ILC.

Keywords: Beyond Standard Model, CP-violation, Higgs Physics

Lewis-Riesenfeld Approach to the Solution of the Dirac Equation in Time-Dependent Non-Commutative Phase Space

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Abstract
In this paper we investigated the solution of the Dirac equation in the time dependent non commutative phase-space using the Lewis–Riesenfeld invariant method. Wherein the Dirac time dependent hamiltonian obtained from a time dependent Bopp-Shift linear translation, then it used to construct the Lewis–Riesenfeld invariant operators. Afterward the results are used to obtain the general solution of the system.

The Muon Anomalous Magnetic Moment in the Minimal 341 Model

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Abstract
An extension of the gauge group $SU(3)_c \otimes SU(2)_L \otimes U(1)_Y$ of the standard model to the symmetry group $SU(4)_L \otimes U(1)_X$ (3-4-1 for short) is presented. With the minimal scalar sector. The mass matrix of neutral gauge bosons is exactly diagonalized, and the photon eigenstate is independent on the symmetry breaking parameters - VEV‘s of Higgs scalars.
The muon anomalous magnetic moment can be accurately measured but the experimental result does not entirely agree with the theoretical calculation from the standard model so we investigate the muon anomalous magnetic moment in the context of the minimal 341 model.

The radiation of the GRB Afterglows

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Abstract
Ones of the most energetic phenomena in the word are the Gamma Ray Bursts, observed by hazard in 1967 by USA military satellite. In 1997 discovered the Afterglows emission. Because of that they were suggest two types of chocks, the chocks intern of many shells between each other for the prompt emission and the chock external of the jet with the medium environment. In this work we are trying to describe the radiation of the GRB Afterglows by synchrotron emission mechanisms as, absorption effect like synchrotron self-absorption and ignore the diffusion effect of the Inverse Compton.

Bosonic Creation In Noncommutative Bianchi I Space-time and Quantum Entanglement

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Abstract
During the last few years, noncommutative (N.C.) Seiberg– Witten (S.W.) space–time geometry has played an important role in understanding various phenomena for example in particle physics and cosmology [1]–[3]. Quantum entanglement (Q.E.) has been extensively studied in nonrelativistic flat-space setups and expanding universes [4]–[6]. Increasing interest to the emerging field of relativistic quantum information and entanglement has attracted many people [7,8]. Refs. [7] and [8], show that
Q.E. of fermionic and bosonic particles in a certain type of Freedman– Robertson– Walker (F.R.W.) universe has been shown to have special k-modes frequencies and antifermions pair creation modes mass dependence. To quantify the entanglement created between bosonic modes in noncommutative Bianchi I space-time we choose the Von Neumann entropy, which is related to Shannon‘s measure of information.
Using the general modified field equation, a general noncommutative Klein-Gordon equation up to the second order of the noncommutativity parameter is derived in the context of noncommutative Bianchi I space-time. Using Bogoliubov coefficients and a special technics called conformal time; the boson-antiboson pair creation density is determined. The Von Neumann boson - antiboson pair creation quantum entanglement entropy is presented to compute the entanglement between the modes created.

Nouvelles approches mathématiques dans l'étude de quelques systèmes quantiques

H. Moulla, N. Mebarki, I. Leghrib

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Abstract
A generalized q-deformed PT symmetric and somme non trivial applications are studied

The Foldy-Wouthuysen Transformation of the Dirac Equation in Non-Commutative Phase Space.

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Abstract
A method of Foldy-Wouthuysen transformation for relativistic spin-1/2 particles in external fields is proposed, in the present work the basic properties of the Dirac hamiltonian in the FW representation in the noncommutative phase-space are investigated and the Schrödinger-Pauli equation is found, knowing that the used methods for extracting the full phase-space noncommutative Dirac equation are, the Bopp-shift linear translation method, and the Moyal-Weyl product (star-product).

The two-mode squeezed state in optomechanical quantum systems under non-Markovian Brownian noise

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Abstract
We study the generation of the two modes squeezed states in a system of two mechanical oscillators. The target state is obtained as the steady state of the system with the help of optomechanical interactions and the dissipation of the radiation field of the cavity of the optomechanical system. Then we analyze the quality of the generated two modes squeezed state when the mechanical oscillators are in thermal equilibrium with a non{markovian bath.
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PT symmetry in non commutative geometry

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Abstract
A PT symmetric and pseudo hermitien hamiltonien is constructed in the context of the seubery. Written non commutatitive space-time and some physical application are presented.

Iron K Reverberation in Seyfert galaxy NGC 5506

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Abstract
NGC 5506 is a Seyfert galaxy whose AGN how strong X-ray variability and its spectrum shows both narrow and broad components of the Iron K alpha line, making it a an excellent target for X-ray reverberation. Using a new XMM-Newton observation, we measure the lag-energy spectrum and constrain the shape of the broad component of the iron line. By comparing this with the shape of the photon spectrum, we are able to constrain the location of the inner edge of the accretion disk and obtain limits on the spin from both spectroscopy and timing.

Unified treatment of the Scarf potentials and the Pöschl-Teller potentials using the Ma-Xu quantization rule

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Abstract
A general class of potentials covering the Pöschl-Teller type and Scarf type is considered. The analytical expression of the energy eigenvalues is established with the help of the exact quantization formula. Then, using appropriates coordinates transformations, the exact spectrums of five well known potentials: Poschl-Teller, Pöschl--Teller I and Pöschl--Teller II , as well as Scarf I and Scarf II , are deduced in a simple way.

Keywords:Pöschl–Teller potentials, Scarf potentials, persymmetric-WKB condition, exact solution.

Etude des modèles inflationnels et confrontation aux résultats de Planck 2013.

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Résumé

La théorie du Big Bang est restée, pendant des décennies la théorie la plus appropriée qui rend compte de données observationnelles: l'expansion de l'univers, le fond diffus cosmologique et la synthèse des éléments légers. Cependant on sais bien que cette théorie n'explique pas certaines observations qui ont été faites récemment. Plusieurs problèmes sont apparus, mais aucune explication en accord avec la théorie du Big Bang n'était possible: le problème d'horizon, le problème de planéité, l'asymétrie matière/antimatière, le nombre baryonique, le problème d'unitarité, Le problème des monopoles.

Une nouvelle théorie a été introduite par Alan Guth en 1981 pour expliquer tous ces problèmes. L'idée de l'inflation suppose que juste après le Big Bang l'univers observable a connu une phase d'expansion très violente qui lui aurait permis de grossir d'un facteur considérable: au moins 10^{26}. A cause de l'inconsistance du modèle inflationnels de A. Guth avec certaines data cosmologiques, il y a eu plusieurs propositions de scenarios d'inflation cosmologiques, dépassant les 70, chacun possédant ses propres paramètres.

Le satellite européen Planck, vient de rendre compte de ses résultats d'analyse concernant les paramètres cosmologiques, en particulier: fluctuations de température du rayonnement **CMB** (pour ***Cosmic Microwave Background Radiation***), polarisation de ce rayonnement.

Les résultats de la mission de ce satellite renforce l'idée de l'inflation, mais tout en écartant certains scenarios d'inflation, car leur paramètres cosmologiques ne concordent pas avec les données observationnelles.

On se propose dans ce travail d'étudier les modèles inflationnels et de voir le meilleur qui rend compte le mieux des résultats de la mission du satellite Planck 2013, en comparant les résultats obtenus en utilisant un code de calcul approprié.

Iintroduction to $f(R)$ gravity and applications

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Abstract

Recent cosmological data show that the universe is expanding at an accelerating rate. This contradicts the results of general relativity, at least for a Universe composed only of matter. To attack this problem, two general ways have been taken: introducing a new type of energy (such as the cosmological constant Λ, dark energy) or modifying the theory of gravitation.

So, several extensions to the theory of gravitation were proposed in order to preserve the positive results of Einstein's Theory of general relativity. The simplest extension is the so called $f(R)$ gravity which consists in replacing the Ricci scalar R by a function f of it.

Here, we review $f(R)$ gravity, a modification to general relativity, are all about modifying the Einstein-Hilbert action and taking it to higher orders in the Ricci scalar. There are three versions of $f(R)$ modified gravity: Metric, Palatini and Metric-affine gravity.

In this work we will briefly review these versions of $f(R)$ modified gravity. We will be essentially interested in examining how does $f(R)$ gravity affects the behavior of a charged compact star.

Keywords: General Relativity, Extended theory of gravity, $f(R)$ gravity, Charged compact star.

Rotating Charged Cosmic Strings from Seiberg-Witten Non Commutative Geometry

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Abstract
En utilisant la géométrie non commutative de l'espace-temps de Seiberg-Witten, pour la gravitation de jauge d'une corde cosmique charge en rotation on a déterminé explicitement en fonction du paramètre de la non commutativité de l'espace-temps les différentes expressions des veirbeins et les connections de spin non commutatifs nécessaires pour l'étude de l'effet tunnel. En utilisant la méthode BKW, pour des particules spinorielles, on a pu montrer la forme de l'expression de la température de Hawking au voisinage de l'horizon.

New modified non-Hermitian Swanson Model

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Abstract
We investigate a new Kemp algebra to study the Swanson modelin a deformed space. The pseudo hermiticity property is also examined.

Diphoton Higgs Decay in compact 341 Model.

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Abstract
Diphoton Higgs Decay is studied in the context of the compact 341 Model and in the light of the recent resonances discovered at the LHC. Some new predictions are also discussed.

Quantum Entanglement in Geodesic Motion

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Abstract
Quantum entanglement is a phenomenon observed in quantum mechanics in our work we try to understand quantum information by including a gravitational field this let us to study spin entanglement of a two particles system in geodesic motion by using the Wootters concurrence, where we look for a reduced density matrix for the particles spin

Monte Carlo Phase Space Generator for the Initial State Radiation

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Abstract
Efficient phase space integration is important for collider experiments. Using the Altarelli-Parisi splitting functions as the underlying probability for a splitting, we developed a phase space generator that distribute phase space points according to the singular limit of QCD.

Noncommutative Paraquantum Strings and D-Branes.

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Abstract
A parabosonic string is assumed to propagate in a total noncommutative target phase space. Two models are investigated: open strings between two parallel Dp–Dq branes and closed ones. A generalization of the oscillators algebra of the string and the corresponding Virasoro algebra is obtained. The mass operator is no more diagonal in the ordinary Fock space, a redefinition of this later will modify the mass spectrum, so that, neither massless vector state nor massless tensor state are present.
The restoration of the photon and the graviton states imposes specific forms of the noncommutativity parameter matrices, partially removes the mass degeneracy and gives new
additional ones.
In particular, for the D-branes, one can have a tachyon free model with a photon state when more strict conditions on these parameters are imposed, while, the match level condition of the closed string model induces the reduction of the spectrum.

Communications Affichées (Posters)

Physique Nucléaire et applications
Physique Théorique

Calculations of Maxwellian Averaged capture Cross Sections Using the ENDF/B-VII.1, KADONiS, EXFOR and JEFF-3.1 evaluated nuclear reaction data libraries

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Abstract
We calculate the Maxwellian-averaged cross sections (MACS) of the stellar nucleosynthesis reactions (n,g) using the ENDF/B-VII.1, KADONiS, EXFOR and JEFF-3.1 evaluated nuclear data libraries. The calculated capture cross sections were compared first with the change of database where the nuclear reaction libraries were processed under the same conditions for Maxwellian temperatures (kT) for two cases for 30 kev and for 1420 kev and in the second way between two database one in 30 kev and the other in 1420 kev and finally with a same database library and for different Maxwellian temperatures (kT) of different elements.

Relativistic K shell decay rates and fluorescence yield for Fe

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Abstract
In this work, we derive the K-shell fluorescence yield using a Dirac-Fock model. To compute, radiationless and radiative transition rates we have used the MCDF code of Desclaux and Indelicato [1-3]. The wave functions were calculated in the single-configuration approach with magnetic (Gaunt) and first-order retardation terms of the Breit interaction included in the self-consistent variational method. Higher-order Breit retardation terms were added as perturbations. Regarding the QED contributions, the one-electron self-energy is evaluated using the values of Mohr and Kim [4-5] and the self-energy screening is treated with using the Welton method reported by Indelicato [1]. Vacuum polarization is included in the calculations taking the following approach: the Uelhing contribution is evaluated to all orders by being included in the self-consistent field while higher order corrections are accounted for as

perturbations. The continuum electron wave function in the final state is evaluated by solving the Dirac-Fock equations with the full exchange potential and is normalized to represent one ejected electron per unit energy. The results are compared with available data from other authors.

Keywords:K-shell fluorescence yield, ,radiationless and radiative transtion rates, Dirac-Fock calculations

Relativistic calculations of K-shell photoionization cross-sections for $^{32}_{16}S$ at 59.6 keV excitation energy

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Abstract
In this work we calculate photoionization X-ray cross-sections of K-shell vacancies in S at incident photon energy of 59.6 keV using the Dirac-Fock method and the MCDFGME (**M**ulti **C**onfiguration **D**irac **F**ock and **G**eneral **M**atrix **E**lement) code [1-3]. Calculations are performed in single configuration approach with the Breit interaction. Higher-order retardation corrections and QED effects were also included as perturbations. Fluorescence yield necessary to derive the X-ray production cross section (XPCS) were obtained in a previous work using the exact same approach. The obtained results are compared to existing theoretical and experimental results.

Keywords: Photoionization, X-ray production, Cross-sections, Dirac-Fock calculations

New calculation of L_1 subshell yields fluorescence of heavy elements

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Abstract
The analytical methods based on X-ray fluorescence have a great importance for a number of practical applications in a variety of fields including atomic physics, X-ray fluorescence surface chemical

analysis, medical research and treatments (such as cancer therapy) and industrial irradiation processing. In this contribution, a summary of experimental data published in the period of time between 1955 to february-2016 was presented in a tabular form for L_1 subshell fluorescence yields (ω_{L1}) taken from different sources. First, a critical examination of these data using the *weighted average values* $\omega_{L1\text{-}W}$ was presented. Then, an interpolation using the famous analytical function $\left(\omega_{L1\text{-}W}\ /\left(1-\omega_{L1\text{-}W}\right)\right)^{1/4}$ vs the atomic number Z was proformed to deduce a new empirical L_1 subshell fluorescence yields for elements in the range $70 \leq Z \leq 96$ [1-3]. At last, our calculated empirical L_1 subshell fluorescence yields have been compared with other theoretical and empirical values reported in the literature.

Keywords: L_1 subshell fluorescence yields, weighted average values, empirical fluorescence yields

Dose Evaluation in adaptive radiotherapy in head and neck cancers

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Abstract

Recent developments in radiotherapy techniques, particularly VMAT technique is a tool of choice in the treatment of tumors with complex shapes such as head and neck cancers.

Patients with head and neck cancer are prone to anatomical variations and progressive changes in their tumor masses that can distance the dose distribution of the projected goals.

The advent of imaging systems in radiotherapy treatment rooms, allows the realization of volumetric images on a regular basis during the irradiation sessions, allowing monitoring of individual anatomical variations in each patient during treatment

The preliminary study results obtained from 3D images showed the need for replanning of treatment in patients with high tumor melting or collapse of their outer contours, due to a significant weight loss during the treatment period.

The completion of this dose assessment can guide patients with head and neck cancer to adaptive radiotherapy strategy.

Keywords: Adaptative radiotherapy, VMAT,CBCT, head and neck cancers,

Nuclei structure around shell closure N = 82

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Abstract

The nuclei with A=140 having a few holes in the N =82 shell closure offer a fertile region to investigate the shape evolution. They are spherical or only slightly deformed in the ground state and at small angular momenta, but they can get deformed at high spins as evidenced by recent experimental results. The investigation of Ce isotopes with neutron number close to N = 82 is very important to study the dipole bands showing magnetic rotation at the highest spins.

We have studied the structure of the observed high spin states of ^{138}Ce nucleus [T. Bhattacharjee et al., Nuclear Physics A 825 (2009) 16–38]. Several positive and negative parities configurations of the dipole bands are investigated on the basis of cranked Nilsson-Strutinsky (CNS) and tilted axis cranking (TAC) calculations where we have assigned the configurations that have the best agreement with the results of the experimental work for this nuclei.

Keywords: shell closure, shape evolution, parameters deformation, CNS, TAC

The numerical study of the origin of the ultra high energy cosmic rays with CRPropa.

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Abstract
The origin of ultra-high-energy cosmic rays is one of the most enigmatic questions in modern physics. The study of a such high-energy particles is a new and active research area where scientists wish to find the still-unknown sources and acceleration mechanisms of these particles. This work aims to interpret some recent experimental results provided by the Pierre Auger Observatory concerning the energy spectrum of cosmic rays above 10^{17} eV. We used the publically available Monte Carlo code CRPropa to simulate the propagation of ultra-high-energy cosmic rays in the universe, taking into account all relevant interactions, and also the influence of the galactic and extragalactic magnetic fields.

Inflationary models and applications

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Abstract
Study the cosmic microwave background: polarization and anisotropy.The inflationary model has been proposed to address the shortcomings of the standard model of cosmology. This cosmological model offers both a solution to the horizon problem and the flatness problem.
The idea of inflation states that just after the Big Bang, the observable universe has experienced a violent expansion phase that would allow it to grow a significant factor. The collected data of the European satellite Planck reinforce the scenario of inflation. Launched in 2009, the satellite analyzed for 15 months the "cosmic microwave background: CMB".
The analysis focused on the CMB temperature fluctuations. The theory of inflation also provides the polarization of this radiation. The satellite Planck was designed to also measure the polarization parameter. It is proposed in this paper to study the cosmic microwave background radiation, the anisotropy of its temperature and its polarization.

Keyword: Inflation, ΛCDM, inflationary models, FRW metric, cosmic microwave background (CMB) CMB anisotropy and polarization, ...etc.

On Yang-Mills Matrix Models: Emergent Geometry

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Abstract
One of the most fundamental questions we can ask about a given gauge theory is its phase diagram.
We present Monte Carlo simulations, for a simple three matrix model that exhibits an exotic phase transition. we focus on determined the phase structure of the Bosonic d = 3 Yang-Mills Matrix Models, study both theoretically and numerically a three matrix model. The model has a phase transition with two phase, one matrix phase and other geometrical (Fuzzy sphere)

Path Integral Solution of a Singular Oscillator Potential

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Abstract
By path integral formulation and delta functional technics we calculated the propagator of singular oscillator. We have foundthe discrete spectrum and the corresponding wave functions.

Keywords: Path integral, non-central potential, propagator, bound states, energy spectrum, wave functions..