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The Third Algerian WORKSHOP ON ASTRONOMY & ASTROPHYSICS

الملتقى الجزائري الثالث في علم الفلك والفيزياء الفلكية

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BOOK OF ABSTRACTS

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Laboratoire de Physique Mathématique & de Physique Subatomique

TALKS

The Realm of Extrasolar Planets

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Are we alone in the Universe? We are leaving at the exciting epoch when one can address this old question with the scientific method and adequate instrumentation. I shall briefly show how the 450 or so known extrasolar planets have been detected, and how some of them can be characterized, including their atmospheres. In expected discoveries have led to reshaping models of formation and evolution of planetary systems. The next step will be to search for bio-signatures in these outer worlds.

The Dark Matter Status; Detecting WIMPs as DM Candidates,

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This talk will review the hypothesis that the Galactic Dark Matter is in the form of Weakly Interacting Massive Particles, and discuss possible methods to test the hypothesis. These tests include the "Direct method" that tries to detect the elastic scattering of dark matter particles with nuclei, and "Indirect Methods", that try to detect the products of annihilation of dark matter particles with each other. Possible "hints" from different experiments will be analyzed.

Co-evolution of Black Holes and Galaxies

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One of the most intriguing discoveries of astrophysics in the last decade was to realize that the mass of galactic black holes is tightly correlated to the large scale properties of their host galaxy bulges. The main physical process at work in shaping this relation is still not clear. Theoreticians are facing a degeneracy problem: various scenarios are in fact able to successfully reproduce the observed local relations. Most of these models invoke AGN feedback of kinematic or radiative nature to quench star formation and/or prevent gas cooling flows. One of the main path currently followed to provide additional constrains to theory is to determine the evolution of the black hole mass – galaxy relation with redshift. I will review in this talk the status in which we are currently standing. I will then report on recent results that we obtained with HST/NICMOS observation of low luminosity host galaxies of z>1 AGN.

An FRW like Cosmology and Dark Energy from a Non Commutative Seiberg-Witten Geometry

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An FRW like cosmological Model in the Non Commutative Seiberg-Witten space-time is proposed and explicit expressions of the scale factor, Hubble constant and deceleration parameter are derived. The Dark energy scenario is also discussed.

A Cosmological Model for the Poincaré Gauge Gravity and Dark Energy

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A cosmological Model for the Poincaré Gauge Gravity is proposed. It is shown that the torsion plays an important role in explaining the accelerated expansion of the universe. Some of the cosmological parameters like the distance luminosity are also expressed in terms of the redshift and comparaison with observational results are discussed.

EQUATION OF STATE AND PLASMA PHASE TRANSITION IN STRONGLY CORRELATED HYDROGEN PLASMAS

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The equation of state of astrophysical plasmas as in giant planets and brown dwarfs is studied with the use of the kinetic theory. In such plasmas, the electron screening plays a central role in particle interactions. In this work, this screening is taken into account through the Singwi, Tosi, Land and Sjôlander model [1]. This one is based on the use of the local field corrections (LFC) in the dielectric function, to describe the electron gas dynamic. On the other hand the ions are classically described using the Hyper-Netted-Chain (HNC) formalism.

The hydrogen plasma pressure is numerically calculated as a function of the electron density. It is shown that, if the LFC are taken into account, a thermodynamic instability corresponding to a plasma phase transition can occur. This instability is driven in the density and temperature ranges corresponding to the strongest electron coupling. The critical temperature corresponding to the onset of the instability is also estimated. This estimation is in good agreement with the results established with Monte Carlo simulation

String Fragmentation, Diquark Breaking, Coplanar Emission, Consequences at LHC Energy

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We have elaborated a Monte Carlo collision generator for coplanar emission, including the respective structure functions of valence/sea quarks and gluons; the tension of the string developed between the valence quark and the valence diquark (1GeV/fm according to Gribov Regge theory) are explored in terms of Pt's production following Schwinger theory.
The very high tension of the particular string stretched between the partners of the valence diquark before the rupture might be the source of the particle alignment observed in emulsion chambers near 10 PeV. The consequences are described at LHC energy around 100 PeV (probably no more alignments, but other typical signatures) and also for EAS at UHE.

Measurement of Production Cross Sections for γ-Rays Induced in Nuclear Interactions of Protons and Alpha particles with Various Target Materials : Application to Solar Flares and Low Energy Cosmic Rays

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We have recently carried out a series of nuclear physics experiments at the Orsay Alto accelerator devoted to the determination of the cross sections for γ-rays induced in nuclear interactions of protons and alpha particles with various solid and gaseous targets. Beams of energies within the ranges 6 - 26.2 MeV and 7 - 39.2 MeV, respectively, and high energy resolution and high efficiency crystals for recording γ-ray spectra were used. The measured excitation function and angular distribution data for γ-rays produced in several interaction processes such as, e.g., inelastic scattering off 14N, 28Si and 20Ne nuclei were analyzed in the framework of modern nuclear reaction computer codes like Talys. Obtained results applied to account for γ-ray production in solar flares and interstellar medium are reported and discussed.

On Gravity Finite propagation speed

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We showed that the velocity-dependent gravitational potential predicts exactly the observed value for the anomalous precession of Mercury's perihelion in general relativity framework, contrary to what is found in (Chaos, Solitons and fractals, 38, 1004, 2008), where only one third the observed value was predicted by using classical mechanics tools.

Disk Galaxy Evolution Since z=1

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We have constructed a data set of ~200 disk galaxies at red shifts 0.1<z<1.0 (~130 of which show extended rotation curves usable for a determination of the total masses) with Very Large Telescope (VLT) spectroscopy and Hubble Space Telescope imaging. This is one of the largest kinematical samples of distant disks to date.
The mean stellar mass-to-light ratios evolve more strongly in the low-mass galaxies than in high-mass galaxies and the mean stellar ages are lower for low-mass galaxies than for high-mass galaxies. This points to an ANTI-HIERARCHICAL evolution of the stellar populations (aka "downsizing"), possibly due to supernova feedback. On the other hand, the stellar-to-total-mass ratios are observed to have remained constant since z~1, which favors a HIERARCHICAL buildup of the dark matter halos the disks reside in. Our data hence point to an opposite evolution of baryonic and dark matter in disk galaxies that is still quite challenging to numerical simulations.
We will also present first results from a study of very low- and very high-mass disks; these data are among the deepest spectra of distant galaxies ever taken with the VLT.

GRB's Radiative Processes: Synchrotron and Synchrotron Self Absorption for a Power Law Particle Distribution

with Finite Energy Range

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Synchrotron emission behind relativistic magnetic internal-external and reverse shocks in gamma-ray bursts cosmological explosions is assumed to be the basic emission mechanism for prompt gamma and optical flashes, X-ray flares and afterglow emission. Inverse Compton from relativistic electrons can also have appreciable effects by upscattering initial synchrotron or blackbody photons (from the fireball photosphere) up to GeV-TeV energies. For extreme physical conditions such as high magnetic fields (e.g., $B \sim 10^8$ Gauss) absorption is not negligible and can hardly affect the spectrum at least for the low energy range. In this paper we present calculations of the synchrotron power, P_ν, and their asymptotic forms, generated by a power law relativistic electron distribution of type $N_e(\gamma) = C\gamma^{-p}$ with $\gamma_1 < \gamma < \gamma_2$, especially for finite values of the higher limit γ_2 (the magnetic field being uniform). For this aim we defined the dimensionless parametric function $Z_p(x,\eta)$ with $x = \nu/\nu_1$ and $\eta = \gamma_2/\gamma_1$, so that $P_\nu \propto Z_p(\nu/\nu_1, \eta)$, with $\nu_1 = (3/2)\gamma_1^2 qB\sin\theta/mc$ (θ being the pitch angle). Asymptotic forms of this later are derived for three different frequency ranges, i.e., $x << 1$, $1 << x << \eta^2$ and $x >> \eta^2$. These results are then used to calculate the absorption coefficient, α_ν, and the source function, S_ν, together with their asymptotic forms through the dimensionless parametric functions $H_p(x,\eta)$ and $Y_p(x,\eta)$, respectively. Further calculation details are also presented and discussed.

Nonlinear Electrodynamics and the Variation of the Fine Structure Constant

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It has been claimed that during the late time history of our universe, the fine structure constant of electromagnetism, a, has been increasing (Webb et al. 2001; Murphy et al. 2003). The conclusion is achieved after looking at the separation between lines of ions like CIV, MgII, SiII, FeII, among others in the absorption spectra of very distant quasars, and comparing them with their counterparts obtained in the laboratory. However, in the meantime, other teams has claimed either a null result or a decreasing α with respect to the cosmic time (Chand et al. 2004; Levshakov et al. 2004). Also, the current precision of laboratory tests does not allow one to either comfort or reject any of these astronomical observations. Here we suggest that as photons are the sidereal messengers, a nonlinear electrodynamics (NLED) description of the interaction of photons with the weak local background magnetic fields of a gas cloud absorber around the emitting quasar can reconcile the Chand et al. (2004) and Levshakov et al. (2004) findings with the negative variation found by Murphy et al. (2001a, 2001b, 2001c, 2001d) and Webb et al. (2001), and also to find a bridge with the positive variation argued more recently by Levshakov et al. (2006a, 2007). We also show that nonlinear electrodynamics photon propagation in a vacuum permeated by a background magnetic field presents a full agreement with constraints from Oklo natural reactor data. Finally, we show that NLED may render a null result only in a narrow range of the local background magnetic field which should be the case of both the claims by Chand et al.(2004) and by Srianand et al. (2004).

Contribution to the Design of Space Telescope

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We propose in this contribution a general architecture for a space system called to accomplish an astronomy space mission. The work is realized within the activities of Algerian Space Agency, and our project related to the design of a space telescope which is necessary to complete terrestrial telescopes. Some aspects of the mission analysis, first task to do, need to be done in collaboration with the astronomy and astrophysics community that will use it. Indeed those aspects are orbit, and all technical requirements of the space telescope, the payload of the spacecraft. Those requirements can be about the telescope resolution, the magnitude of the objects of interest and the spectral bands used for the work. All these points allow us completing the principal specifications necessary for the effective realization of the space mission.

Gravity in Many Dimensions

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We will review some black hole solutions in three, four and five dimensions. The thermodynamics of black holes will be considered in some details. Finally, we will present a few results about topologically massive gravity Black holes in three dimensions and charged five dimensional black rings.

Plea for Iron Astrochemistry

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Iron is a key element and component in living bodies. It nucleus is the most stable element in nature. Also, it has a relevant abundance in the interstellar medium and dense clouds. It can be in a gas phase or included in dust particles. During this talk, I shall explain why this interest in Iron, and give a brief explanation about it origin and the stellar nucleosynthesis. After this I will detailed the rich chemistry that Iron can be involved in the interstellar medium, dense clouds and this with several species that compose the interstellar medium. I will finish on some open questions regarding the Iron astrochemistry.

How to Obtain Lorentz and Doppler Boosting Factors for Blazars

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According to the unified models of AGN, blazars, quasars and radio galaxies are in fact similar objects seen under different viewing angles. So it becomes important to know the value of this angle θ if we want to judje this kind of models. Another intrinsic parameter of the jet is the Lorentz factor Γ. It is a key parameter to study the physical processes responsible of the collimation and acceleration of the relativistic plasma ejected by the central engine of the AGN.

These two parameters θ and Γ are not directly observable. We have to measure two other quantities: The apparent superluminal velocity β and the Doppler boosting factor D before deducing θ and Γ. Thanks to VLBI imaging, we succeed to obtain the apparent velocity βa of a superluminal knot in the jet of blazar 3C454.3. Then to estimate the Doppler boosting factor D, we used the time scale of the flux variability during a radio outburst. We shall explain how we calculate these parameters and what our aim is in the next stage.

Asymptotic Level State Density for Parasuperstring and (Parasuper) p-Branes: Thermodynamics and Black Holes

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One derives the level state density for an open parasuperstring theory and obtains the asymptotic formula. These results conduct to determine the different thermodynamic quantities, a compact form of the Hagedorn temperature and the corresponding black holes which depend on order of paraquantization Q are derived, and a generalized Fock space writting in the paraquantum case is done. Finally, one generalizes the study for the (parasuper) p-branes theory.

New Phenomena in Noncommutative Field Theory And Emergent Spacetime Geometry

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We review some of the new phenomena which appears in a field theory on a noncommutative space such as the perturbative UV-IR mixing , the appearance of novel non perturbative phases known variously as stripe, nonuniform ordered or matrix phases and finally the remarkable phenomena of emergent geometry in a large class of matrix models which does not require any metric data .
In the case of scalar field theory on moyal-weyl spaces the UV-IR mixing destroys the perturbative renormalizability of the theory and new methods based essentially on the extension of renormalization group equations to matrix models are required to establish renormalizability. The stripe phase and the corresponding triple point in this case I effectively described by a lifshitz theory. In the nonuniform ordered phase we have spontaneous breakdown of translational invariance even in two dimensions. It is conjectured that there must exist two fixed points in this theory, the usual wilson-fisher fixed point at theta=0 and a novel fixed point at theta=infinity which is intimately related to the underlying matrix model structure of the model. We also discuss and compare with the known Monte-Carlo results on the fuzzy sphere and noncommuattive torus where the new transition is better understood. In the case of gauge theory on fuzzy geometries such as fuzzy complex projective spaces we describe how the corresponding matrix models allow for a new transition to and from a new high temperature phase known as yang-mills or matrix phase with no background geometrical structure. The low temperature phase is a geometrical one with gauge fields fluctuating on around complex projective space. We discuss the case of the fuzzy sphere in great detail. This transition is exotic in that it is a discontinuous transition with a jump in the entropy characteristic of a 1st order transition, yet with divergent critical fluctuations and a divergent specific heat with critical exponent equal one half characteristic of a 2nd order transition. These models present an appealing picture of a geometrical phase emerging as the system cools and suggests a scenario for the emergence of geometry in the early universe.

Cosmological Entropy And Seeking Of Genesis Of Time

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Influenced with symmetry of entropy and time in nature, we tried to invoke relation between entropy and time in space-time with new dimension. And also provided how Hubble's constant related with entropy of universe. Discussed about how entropy of universe behaves at different temperatures and at different time values of universe. We showed that age of universe is equivalent to Hubble's constant. And showed how naturally entropy arrives from the manipulations in gravity from Einstein's equation "00". And from these results we concluded that universe is isotropic, homogeneous with negative space curvature i.e. K= -1 but not flat K=0 (which doesn't explain acceleration and deceleration of universe). From these results of gravity, entropy, temperature and time we discussed the genesis of time. And proposed that at absolute zero temperature universe survives as a superconductor and that particular temperature is called as "Critical Absolute Temperature (TAB). And genesis of time occurs at first flux on repulsion in the absolute zero temperature of universe.

Simulation of f-mode Propagation through Two Identical Magnetic Flux Tubes

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Most of the magnetic flux on the Sun surface appears not in sunspots but in a small-scale flux tubes. We use the SLiM (Semi spectral Linear MHD) code to numerically investigate the propagation of f-mode wave packets through a group of two identical small flux tubes (as first step) in stratified atmosphere. We will study the effect of separation α and angle χ between the tubes on the scattering.

Cosmology within U(1)-extended MSSM

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In this work, we investigate the possible generation of the baryon asymmetry in a U(1) extension of the Minimal Supersymmetric Standard Model (MSSM). The electroweak phase transition is strongly first order for larger space parameters without the need of a light squark, when comparing to the MSSM case due to the existence of extra U(1) gauge boson and singlet in the scalar sector. We investigate also the dark matter status within new observations such as PAMELA

Geodynamical Deformation Using GPS data and the Kalman Filter: Preliminary Results

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This paper concerns the determination of the geodynamic movements of the Earth's crust by GPS measurements and analyzes the deformations by using the Kalman filter. It consists to propose a processing strategy based on Kalman technique, and to define all the parameters of GPS processing with the development of an application test on a large scale precise GPS network. A standard method of processing was performed to estimate the precise coordinates and velocities of the GPS stations. Also, we plan to obtain then a combined result of the daily solutions as well as the variance-covariance matrix which will be the input data for the developed application. We process a network of 12 permanent GPS stations of the Italian network, located in the Eurasian tectonic plate, which measurement were collected during four GPS campaigns done between 2000 and 2006; and a network of five (5) Algeonet stations located in the north of Algeria and observed in 1998 and 2001.

The elements of the Kalman filter have been calculated to allow an optimal estimation of the state in each measurement period; the innovation vector and its covariance matrix permit also to calculate the Kalman gain. The state vector is corrected using the gain computed; the state estimation during the time allowed us the monitoring of the network deformation. Also, this application has permit to perform a statistical analysis to evaluate the importance of the displacements of twelve (12) points of the Italian geodetic network, the velocities and the acceleration provided by three (3) repeated GPS campaigns of the same network.

Finally, the results obtained on the Italian and Algeonet networks were analyzed and compared, for validation, with a reference solution provided by the Bernese Software.

Science with Robotic Observatories

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Though robotic observatories (RT) are often small in size according to nowadays standards (0.2 to 2m typically), they have some interesting possibilities for a range of scientific problems: high throughput flexibility, reliability, efficiency, programming of periodic/predictable phenomena's, ability to slew quickly to observe rare target of opportunities, etc.In this talk I will present several problems which can greatly benefit of the use of robotic telescopes. The type of research done with RTs depends critically on the combination of the telescope and its instrumentation: hence, I will give some specific examples of scientific problems addressed with specific instrumental setups.

Seismology of the Sun and Stars

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The Sun and solar-like stars support a rich spectrum of oscillations, which tell us about their internal structure. Spatially-resolved observations of solar oscillations are used to image the subsurface structure and dynamics of the solar convection zone in three dimensions. This is important, in particular, to understand the mechanisms of the solar dynamo. I will summarize the

current state of helioseismology and highlight current efforts to image sunspots and magnetic active region. In parallel, and thanks to the CoRoT and Kepler space missions, the fundamental properties (mass, radius, age) of distant Sun-like stars can now be inferred seismically with a much better precision than with conventional methods. I will focus on the analysis of one particular star, for which the quality of the observations is such that even internal rotation can be detected. Stellar seismology, applied to many thousands of stars with various masses and evolutionary states, has the potential to revolutionize studies of stellar evolution and magnetism.

High Energy Astrophysics in General and the X-Ray Sky in Particular

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The High Energy Sky reveals objects for which gravitational energy release dominates, in contrast to the more familiar visible Sky. The X-ray and Gamma-Ray Sky (10^2 to 10^{12} eV) will be briefly reviewed followed by a discussion of some of the recent discoveries from orbiting X-ray telescopes.

Techniques Associated with Robotic Observatories

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Robotic observatories use modern techniques based on industrial automatisms. In this talk, we describe components to use and the importance of their reliability. The software is also the key of the scientific success. It must include management of external events such as VOEvents.

The Aurès Observatory Project Update: Perspectives & Potential

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Basic Cosmic Knowledge 2010

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What is the minimum knowledge an educated scientist should fathom about the modern Universe, so as to be "l'honnête homme" of this early 21st century? Thanks to a wide array of telescopes and detectors on the ground, as well as a flotilla of space borne like means, new pictures of the Universe have emerged: From a violent one in X and Gamma rays for highly energetic processes, to a warmer one in IR able to penetrate planetary cocoons, to a lukewarm one in microwave to go back to the earliest instants of the Universe, all the way to a quiet radio one (In fact misleadingly calm…) for extragalactic astronomy, each telling its own dedicated account.

This exciting story which is unfolding in front of our very eyes is multi-band, multi scales, multi carriers, and there is even large shadowy areas going by the name of Dark Matter and Dark Energy which might constitute 21st century physics! Well, what is thus the knowledge of the cosmos we feel confident about today, and what are its various grey areas ? That's "Basic Cosmic Knowledge 2010" or BCK – 2010, in 20 mn chrono!

Thermodynamics of (2+1)-dimensional Wormhole

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We discuss the thermodynamics of (2+1)-dimensional evolving Lorentzian wormhole by considering the shape function b(r) = r02 /r , r0 is the radius of throat. In this case, the (2+1)-dimensional wormhole spacetime admits two apparent horizons, the inner and the outer one as in the case of (3+1)-dimensional wormhole. It is shown that the Einstein field equations can be recast as a first law of thermodynamics dE = TdS +WdA, at the apparent horizons of the evolving wormhole, where E = A, T = /2, S = 4 rA, W = (-p)/2, and A = rA2, are the total matter energy, horizon temperature, wormhole entropy, work density and volume of the wormhole respectively.

Anisotropy Signatures for Ultra High Energy Cosmic Rays

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The origin of UHECR (ultra high energy cosmic rays) remains a mystery, the most promising theoretical candidates for their sources are FRII (powerful AGN) as continuous emitting sources and GRB and magnetars as bursting sources. During their propagation, UHECR may suffer deflections from EGMF (extragalactic magnetic field), those deflections are described as an accumulation of scattering events and the notion of optical depth of the Universe to UHECR is introduced. We study the opacity effect on the distribution of UHECR arrival directions and discuss the PAO results in this context.

Probing the Inner Regions around Black Holes

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Black holes are the most powerful individual objects in the universe. Understanding the accretion process around them is a key aim of modern X-ray astrophysics. In this talk, I will present the latest understanding of such system. I will talk about the techniques we use and what they tell us from wide-band spectroscopy to timing. I will concentrate on an interesting object 1H0707-495, for which we are now probing the physics around the black hole down to few gravitational radii.

An Astronomer's look at Lebanon 's meteorological data

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MHD Mode Conversion in a Stratified Atmosphere

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The Role of Astronomy in Nigeria's Space Technology Development

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There is need for African National Governments to recognize the intrinsic value of astronomy and its importance as an essential component for technological and economic growth. In this paper we highlight astronomy development in Nigeria, Nigeria's Space initiative and the contribution of astronomy to the success of Nigeria's Space initiative.

Hydrogen atom in strong magnetic and electric fields of compact stars

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We have investigated the structure and electromagnetic properties of hydrogen atom in magnetic and electric fields of compact stars.
The Hamiltonian has been diagonalized using the uncoupled basis. As consequence, we have been able to analyze, easily, the state mixing induced by such fields and to calculate electromagnetic transition probabilities.

Characterizing High Mass X-ray Binary Environments: MOST and Spitzer Space Telescope Observations

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A long-term observing project to determine unknown orbital periods in High Mass X-ray Binaries (HMXB) has been underway since 2005. The primary search methods were to look for periodicities in optical light curves and in spectroscopically measured radial velocities. In the course of our searches, other non-orbital periodicities and variations were found that reflected either stellar pulsation or changes in the configuration of circumstellar dust and gas. These observations were followed up by observations with the Canadian MOST and NASA's Spitzer space telescopes. The MOST data confirm the presence of a black hole and a normally dust-free circumstellar environment in the HMXB LS 5039. The Spitzer data, still preliminary, point to a complex circumstellar environment with a clumpy distribution of dust in the HMXB V420 Aur.

LUMINOSITY FUNCTION AND INTRINSIC CORRELATIONS OF LONG GRBS

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Our communication is devoted primarily to the study of the luminosity function of long GRB population and its relationship to the stars formation rate and the relation of correlation between

GRB total energy and its spectral parameters. This is done in two manners: the first is purely theoretical relying on the model of internal shocks, the second is statistical with simulations of the populations of GRBs by the Monte Carlo method, according to distributions of the observational data.

The HOU (Hands On Universe) Project,

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Earth's bow shock from the supersonic solar wind

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The Earth's bow shock is created by the supersonic solar wind flowing onto the geomagnetic field. The front of this shock is curved, standing around the Earth from the dayside. The bow shock is of great interest in space plasma investigation as it contains important physics ranging from kinetic to global scales. Interaction of the supersonic solar wind with Earth's magnetosphere) magnetopause creates fast mode magnetosonic waves that travel back upstream, combine and steep en to form the bow shock wave. The distance to the bow shock is then the sum of the magnetopause distance and the magnetosheath thickness. [Merka and Szabo and references therein] It has been well established that the bow shock (and the magnetopause) scales with the solar wind ram pressure Psw [Binsack and Vasyliunas, 1968; Formisano, 1979]. We are trying though to simulate the position of the bow shock by using a modified Tristan PIC EM Relativistic Code. By doing so, we will help the science community to use our model to better understand the shock physics in our geospace.

Measuring the Spin of Black Holes

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Cosmic black holes have only mass and spin. The mass can be measured from its effect at relatively large distances, whereas the spin requires a probe at small distance, a few gravitational radii (ie $r < 10GM/c^2$). X-ray observations of accreting black holes, both stellar and supermassive ones are now beginning to reveal their spin distribution.

POSTERS

Fermionic Tunneling Effect and Hawking Radiation in the Non commutative "FRW" Universe

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Using Hamilton-Jacobi tunneling method, dynamical cosmological black holes instabilities against the emission of spinors particles are studied in the context of the non commutative FRW space-time comparison with the commutative case is also discussed.

Leptogenesis and Baryogenesis from Noncommutative FRW like Cosmological Models

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A neutrino asymmetry can be obtained if the neutrinos are propagating in curved noncommutative FRW like universe. Because of the choice of the noncommutativity parameter an axial like symmetry is obtained. A baryonic asymmetry is thus generated using either GUT B-L symmetry or the electroweak sphaleron process.

Radio astronomy VLBI (Very Long Baseline Interferometry) data analysis: celestial referential and mapping of radio sources

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VLBI (Very Long Baseline Interferometry) is one of the most powerful techniques available for high resolution imaging of distant radio sources in the universe and for making accurate measurements of the motion of the earth in space. Multiple radio telescopes scattered over the surface of the earth simultaneously record data from a radio source for a 24-hour period; the

data, which is then stored on magnetic tape and shipped to a central processing site for analysis. Using VLBI (Very Long Baseline Interferometry) technique for different applications:

- In astrometry to define the celestial referential, which allow to describe the positions and the motions of all celestial bodies especially the motions of the earth in space to measure EOP (Earth Orientations Parameters)
- In astrophysics to realize radio sources (such as quasars) maps.
- In geodesy to define terrestrial referential which permit to describe the deformations of the earth's crust and displacements of the tectonics plaques.

Study of Alfvèn waves in Stellar Plasma

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Alfvèn waves are fundamental electromagnetic oscillations in magnetized plasmas. They play important roles in the heating, stability and transport of plasmas. Solar plasmas are structured and stratified both vertically and horizontally. The stability is discussed of the drift- Alfvèn wave which is driven by the equilibrium density gradient, collisional solar plasma, including the effects of both hot ions and a finite ion Larmor radius. An analytical mode analysis is used for the description of the waves in spatially unlimited plasma. In the analysis of modes, the exchange of identity between the electrostatic and electromagnetic modes is demonstrated. The results are applied to coronal and chromospheric plasmas.

Study of Black Holes in TMGE

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This work represents a study of the black holes in topologically massive gravity coupled to electrodynamics at (2+1) dimensions of space-time (TMGE). We have developed four points. Firstly, we have briefly exposed the topologically massive gravity at three-dimensional space-time, and the general properties of the black hole solutions we intend to study. Than we study of geodesics, where we have developed the equations of geodesics and studied these geodesics using an effective potential of the different black holes solutions of TMGE we have developed the general study with the Penrose diagrams. From these we have developed the Penrose diagrams of the black holes solutions of TMGE, and we have explained certain geodesic motions with the help of the Penrose diagrams of these black hole solutions, when the geodesics cross the horizon.

Cosmology and Planck mass Dependant of the new Non-commutative Variable

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Using Noncommutative space-time of Bianchi Type I universe we find that Noncommutativity modifies the structure and the topology of space-time and we derive the Planck mass as a function of new Noncommutative variable which means that it is interesting to

relate to the time dependence of the cosmological constant.

The Estimation of the Parameters of the Atmospheric Turbulence

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The estimation of the parameters of the atmospheric turbulence is made by a statistical analysis of angle of arrival fluctuations of the wave-front arriving at the ground. For determine the Fried parameter, the outer scale and the isoplanar angle we use the theoretical covariance (theoretical expression) and the experimental covariance (simulation of the solar images).

Power Budget Calculation for Two Modulation Schemes In Near Space and Deep Space Optical Communication Links

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A huge number of satellites was lunched since their introduction. Theses satellites can be divided into three categories according to their orbital altitude: LEO (Low Earth Orbit), MEO (Medium Earth Orbit) or GEO (Geostationary Earth Orbit). Other spacecrafts already constitute the communication spatial system such as ISS and spatial telescopes (Hubble) or space probes for the exploration of planets constituting the solar system. All these spacecrafts are transmitting huge quantities of data (images, scientific data, audio, video …) to ground stations or also between them. The subject of the application of lasers in space communications was discussed since their introduction in 1961. On-board equipments being heavier, less compact and consuming less on-board energy than radiofrequency communications, laser link inter-satellite communications are advantageous and would be preferable to terrestrial communications since they offer the major advantage of the absence of atmospheric turbulence and dispersion effects. The bandwidth is better used then.

This paper studies the performance of such communication links and their parameters. After presenting the general architecture of this communication system, the modulation constitutes an important step in the transmission chain. Basing in the two most used modulation schemes OOK (On-Off Keying) and PPM (Pulse Position Modulation), we shall measure the performance of each one in both near earth and deep space communications in terms of Bit Rate Error (BER), Signal to Noise Ratio (SNR), transmission bandwidth, and the optical power transmitted. The results obtained after comparison between the two methods show that, for a given BER, the PPM modulation scheme use less optical power than OOK. This results in a valiant advantage which is the on-board energy conservation. Thus, for a given transmission power, the BER of PPM modulation is smaller than OOK modulation one. We can deduce that the PPM modulation is more tolerant to noise due to radiation background and thermal noise.

To conclude, in inter-satellite laser link communications the PPM modulation can be used when the optical beam is narrow i.e. when a limited optical power is required, this is the case of communication and large distance links such as deep space communications. While the OOK modulation can be used when the beam is relatively broad and where not a very small BER is tolerated, this is the case of acquisition and tracking beacon.

Theoretical and Observational Study of GRB Afterglows

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Gamma-ray bursts (GRBs) have puzzled astronomers since their accidental discovery in the late sixties. The BATSE detector on the COMPTON-GRO satellite has been detecting one burst per day for the last six years. Its findings have revolutionized our ideas about the nature of these objects. They have shown that GRBs are at cosmological distances. This idea was accepted with difficulties at first. The recent discovery of an X-ray afterglow by the Italian/Dutch satellite BeppoSAX has led to a detection of high red-shift absorption lines in the optical afterglow of GRB970508 and in several other bursts and to the identification of host galaxies to others. This has confirmed the cosmological origin. Cosmological GRBs release ~ 1051 - 1053 ergs in a few seconds making them the most (electromagnetically) luminous objects in the Universe. The simplest, most conventional, and practically inevitable, interpretation of these observations is that GRBs result from the conversion of the kinetic energy of ultra-relativistic particles or possibly the electromagnetic energy of a Poynting flux to radiation in an optically thin region. This generic "fireball" model has also been confirmed by the afterglow observations. The "inner engine" that accelerates the relativistic flow is hidden from direct observations. Consequently it is difficult to infer its structure directly from current observations. Recent studies show, however, that this "inner engine" is responsible for the complicated temporal structure observed in GRBs. This temporal structure and energy considerations indicates that the "inner engine" is associated with the formation of a compact object - most likely a black hole. Specifically, the study will include the following parts:
Observationnal study :
Close examination of databases and documents which give the spectra for bursts afterglows, individually;
Theoretical study :
Consideration of radiation models proposed so far, including the standard model with flash and internal and external shocks

Ultra High Energy Cosmic Rays

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The present status of Ultra High Energy Cosmic Rays is briefly reported. The following topics are discussed: the energy spectrum above 4×1018 eV; the arrival directions; the depth of the shower maximum; the upper limit on the primary photon flux; the upper limit on the diffuse neutrino flux.

Contribution to stellar photometry and its applications

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Astronomy has as an aim the study of the origin, the structure and the evolution of the Universe and all the objects which make it up. It tries to decipher the enigma of the paramount Universe, to include/understand how the stars, galaxies, clusters and great structures of the Universe were formed. It seeks to know the always dubious origin of the cosmic rays and to detect the ultra-dense and ultra objects energy. In the majority of galactic or extragalactic research stellar

photometry is of great interest it enables us to have in a simple way of the information on the continuous spectrum of stars and carries out an analysis much more detailed radiation.
In this work we present stellar photometry like one of the fundamental tools of the comprehension of the stellar evolution.

Transmission and Reflection of Compressive Waves in a Sunspot

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The p-modes are oscillations observed at the sun surface, which permit to probe its interior structure. These modes interact with the superficial layers of the sun. The convection zone of the sun is the source of all disturbances and thus of the oscillating wave energy .This later is transmitted through the upper layers of the sun atmosphere up to the solar corona. It is, therefore, imperative to study the p-modes propagation through these layers, knowing that in magnetized medium, these modes are confined under sun surface. In this work, we explore interaction of acoustic waves with a simple structure composed of two regions: i) non-magnetic region, ii) magnetic region with flow. The reflected and transmitted waves and the energy balance are studied and examinated, in the aim of determining the negative energy and the unstable modes.

Dark energy from LTB Cosmology in Extra Dimensions

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A cosmological model in LTB universe with extra dimensions is proposed and some cosmological parameters as well as dark energy are discussed

Study of Lyot Coronograph

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A coronagraph is a device which blocks light from the center of the telescope beam while permitting light from surrounding sources to pass through relatively undisturbed. Coronographs are used to image the faint surroundings of stars. First used for solar corona observations, coronographs have revealed a circumstellar disk around the star. This work consists at carrying out a complete simulation of diffraction since the pupil of opening until the focal plan of the coronographic pupil. The principle of the stellar coronograph of Lyot can be described by employing the formalism of the Fourier optics.

In this work, we have developed a numerical simulation to evaluate the performances of the Lyot coronograph. Lastly, we will show some results of simulations of the coronograph associated with optics.

There are various types of coronographs resulting from the Lyot coronograph like the coronograph of Roddier § Roddier and with four quadrants coronograph. These coronographs offer extremely significant performances which open possibilities of detection of exo-planets around close stars. The principal contribution of this work fits modestly in the simulation of the Lyot coronographe. After having posed the scientific and theoretical context of this work, we presented the coronography by stressing the Lyot coronograph. We developed a digital simulation to evaluate the performances of the Lyot coronograph.

This work consists in carrying out a complete simulation of diffraction since the opening pupil until the focal plan of the coronographic pupil. The principle of the stellar coronographs of Lyot can be described by using the formalism of the Optics of Fourier.

Lastly, we will have some results of simulations of the coronograph associated with optics.

Cosmic Ray Dosimetry

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Radiation levels at aircraft cruising altitudes are twenty times higher than at sea level. Thus, on average, a typical airline pilot receives a larger annual radiation dose than someone working in nuclear industry. The main source of this radiation is from galactic cosmic radiation, high energy particles generated by exploding stars within our own galaxy. In this work I study cosmic rays dosimetry at various aviation altitudes. I will prepare computer programs to estimate the doses induced from different cosmic ray particles and compare them with those that are found by experiences.

Mini Black Holes Decay in the Atmosphere

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In the models of large Extra dimensions the interactions between particles ultra high energy can create mini black holes, a good example and that of the interaction of the UHECR in the atmosphere and more precisely the interaction of the UHE neutrinos with the nucleons of the Earth's atmosphere.

These mini black holes then decay in the atmosphere and produce air showers. In this work we compare the black holes air showers to standard model air showers and consider the criteria allowing the distinction between them.

Cosmological Implications of the Chaplygin Gas Models in Finsler Geometry

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Some cosmological models with Chaplygin gas in Finsler geometry are proposed and the related

physical implications such as dark energy are discussed.

Probing the Absolute Density of the Matter with the Oscillation of Supernova Neutrinos

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The oscillation of low energy neutrinos (Solar and Supernova) in matter can serve as a powerful tool in revealing information about the matter traveled, and in the case under interest the Earth's matter. Of particular interest, is its ability to reveal the exact positions of the density jumps, and most importantly, probe the absolute density of the matter gone through. Furthermore, it has the potential of settling several long standing disputes about the Earth's composition. In this work, we will show how this can be achieved by performing a study that, although limited to small distances traveled by the neutrinos through matter, is still of significance.

The Interstellar Medium

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The interstellar medium (ISM) is the material which fills the space between stars, it play an important role in astrophysics, because of its intermediate role between stars and galaxies, also we must interesting by the physics and a chemistry of this medium and different interactions with surrounding space. In this work we will study the dynamic of dust grain in dusty plasma under the action of a static electromagnetic field.

Study of the astrophysical reaction $^{12}C(\alpha,\gamma)^{16}O$ via the transfer reaction $^{12}C(Li,t)^{16}O$

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The 12C(α,γ)16O reaction plays an important role in helium burning in massive stars and their evolution. However, despite many experimental studies, the low energy cross sections of this reaction still highly uncertain. Moreover, the extrapolation of the measured cross section to stellar energies (E= 300 KeV) is made difficult by the presence of the two sub-threshold states at 6.92 MeV and 7.12 MeV of 16O. In order to further investigate the contribution of these two sub-threshold resonance to 12C(α,γ)16O cross section, we performed a new determination of the α-reduced widths of these two states through the transfer reaction measurement 12C(Li,t)16O at two incident energies E(7Li) = 34 MeV and 28 MeV.
The Measured and calculated differential cross sections will be presented as well as the obtained spectroscopic factors and the α-reduced widths.

On The Modified Palatini Action Coupled To Fermionic Matter

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From the generalized Palatini's action proposed in Dubois-Violette and Lagraa (2010 Lett. Math. Phys. 91 83–91), we show that we can get the standard effective action of the theory of Einstein-Cartan coupled to the fermionic matter without the usual current-current interaction and then an effective action free of the Barbero-Immirzi parameter and the torsion which establishes the equivalence between the theory of general relativity and the theory of Einstein-Cartan minimally coupled to fermions.

Geomagnetic effect on cosmic rays

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Cosmic rays are mostly high energy charged particle originating from outside the solar system, strikes the earth from all directions. They are essentially protons (≈90%) but also include heavier nuclei and to a less extent high energy electrons in their traveling towards the earth they are affected by interstellar magnetic field, spatially the geomagnetic field they must penetrate to reach the top of atmosphere. this field is strong enough to deflect low energy charged particle, which results in a low energy falloff in the flux of the primary cosmic rays observed in the vicinity of the earth , known as geomagnetic cut off. In this work we try to interpret the effect of geomagnetic field on the flux of low proton energy range , using Monte-Carlo simulation and considering only the contribution to geomagnetic field of the internal source well described by the International geomagnetic field reference (IGRF 10) which is an empirical representation based on a truncated multipole expansion corresponding to year 2000. We also use the back-tracking methods and the fourth order runge-kutta method to integrate the equations of motion.

LOW ALTITUDE AURORA : SOLAR ACTIVITY INDEX

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Proton-Neutron Pairing Interaction in Neutron Rich A=134 Nuclei

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In infinite nuclear systems, such as neutron stars, pairing phenomena have a particular interest, in the study of nuclear structure properties. Thus, pairing lies at the heart of quantum many body problems, and nuclear process connecting to nucleosynthesis. In this work, we are interested about the contribution of this aspect, for neutron rich nuclei far from stability in the vicinity of doubly magic 132Sn. The study of A=134 isobar, which presents a proton-neutron mixing in valence space, based on the proton-neutron correlation properties. Our results, using the Δd and Pd pairing pap calculations, are in good agreement with experimental data.

Transport Coefficients in Dense Plasma Matter of Astrophysical Compact objects

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We will introduce in this poster various electron scattering mechanisms which present in the core of white dwarf and in the outer crust of the neutron star, and contribute to the electrical and thermal conductivities, in the absence and in the presence of non quantizing magnetic field.

Swift GRBs with Host Galaxy Versus Swift GRBs without Host Galaxy

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It's already more than 5 years that Swift satellite was launched and since that it never stopped from providing spectacular data about Gamma Ray Bursts. Swift has made many breakthroughs and helped to a better understanding of GRB phenomena. Swift was able to detect the most distant event, "GRB090423" with the greatest z even measured (z=8.3) and the population of Swift GRBs with known redshift has now exceed 160 events. But the problem is that most of Swift GRBs are not associated with host galaxies. In this presentation I will make a comparison between the population of Swift GRBs with host galaxy, and the population of GRBs for which the host galaxy hasn't been detected. Our objective is to understand why we are not able to detect the host galaxy in most of the cases.

The Photometric Technique of the Transits to Detect and Characterize the Exoplanets and their Exospheres

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The search for planets extrasolar planets has become one of the important topics in contemporary astronomy. To observe and study the proprieties physical of the exoplanet make it possible to better include/understand the scenarios formation of the planetary systems, thus the target detection of these planets and their atmospheres by the method of the transits provides us information about the origin and the scenarios of the evolution of the planetary atmospheres.

The first exoplanet detected and characterized by the transit method is the planet HD209458b. Brown and al studied the transit of the exoplanet HD209458b which is the best studied exoplanet by the techniques of detection. The data analysis made by Brown and other in 2001 (according to the observation by the space telescope Hubble in 2000) reach to detect the exoplanet HD209458b and to extract several characteristics of this exoplanet, in particular to determine its radius with a high degree of accuracy. Thus the high precision of these observations reaches to detect the first atmosphere of an exoplanet, whereas Brown and others

(in 2002) detected the existence of sodium in the atmosphere of this exoplanet.

The « Ring-Diagram » Technique to Analyse Local Solar Phenomena

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Reactivity of Carbon Nanoparticles: Astrophysical and Environmental Applications.

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In the current models of carbon nanoparticles chemical evolution (soot or interstellar dust particles) only two processes are taken into account, namely: oxidation of soot at high temperatures or adsorption of molecules (CO, H2O…) on the surface of the grains at very low temperatures in the interstellar environment. New results show that contrary to what was thought, the nanoparticles can react chemically under quite precise conditions and this thanks to the presence of the carbon chains encrusted in the nanoparticles.

We will see the impact of these results on the existing models of the combustion (oxidation) of soot. We will explore also their repercussions on our understanding of interstellar chemistry.

Laser Effect in Stellar Medium

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Laser rays are observed in the emission lines of several stellar objects. The stellar laser rays are interpreted by the amplification of recombination radiation in stellar plasmas. This amplification is due to population inversion produced in plasma undergoing a spatial expansion accompanied by a cooling process. Consequently, the laser lines shown in the quasar's spectra can be explained as being due to laser action in certain ionized atomic species in the expanding envelope of the star. We are interested in this paper to study the stellar laser in the frame of plasma fluid theory.