S1- Galaxies and Universe

``On 23 Years of Rotational History of the Pulsar B0959-54''

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ABSTRACT:

Pulse times of arrival (TOAs) measurements made at the Hartebeesthoek Radio Astronomy Observatory (HartRAO), during the period 1985 July - 2005 August, have revealed a large permanent offset in the magnitude of the spindown rate of a pulsar with unknown history of glitch activity. Around 1991 September, the observed spindown rate of the pulsar B0959-54 started increasing steadily and by 1993 November, the fractional increase in the magnitude of the parameter amounted to ~ 1.3%. Subsequent to this event, the pulsar was found to be rotating progressively less rapidly, resulting in a significant cummulative frequency deficit. Analysis of the integrated pulse profiles at 16 and 2.3 GHz revealed features suggestive of profile shape variation during the ~ 800 d episode of persistent linear increase in the pulsar spindown rate. This result is interpreted in context of current understanding of neutron start spin evolution.

Science projects with the Armenian Virtual Observatory

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ABSTRACT:

The Armenian Virtual Observatory (ArVO) is created to develop efficient methods for science projects based on the digitized famous Markarian survey (Digitized First Byurakan Survey, DFBS) and other large astronomical databases, both Armenian and international. Two groups of projects are especially productive: search for new interesting objects of definite types by low-dispersion template spectra, and optical identifications of new gamma, X-ray, IR and radio sources. The first one is based on modeling of spectra for a number of types of objects: QSOs, Seyfert galaxies, white dwarfs, subdwarfs, cataclysmic variables, planetary nebulae, C stars, etc. Each kind of object appears in the DFBS with its typical SED and spectral lines (for objects having broad lines only), however affected also by its brightness, so that each template works for definite range of magnitudes. The search criteria define how many objects will be found for further study, and may restrict these numbers leaving with the best candidates. At present, three projects of search for new objects have been started: search for blue stellar objects, search for extremely red objects, and search for variable objects. Optical identifications have been proven to be rather efficient for IR sources from IRAS PSC and FSC. Tests have been carried out for X-ray and radio sources as well.

National astronomical activities in Armenia

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ABSTRACT:

Armenia is one of the well-known "astronomical" countries in the Middle East region. The Byurakan Astrophysical Observatory (BAO) is the main centre for astronomical research (1m Schmidt and 2.6m telescopes). In addition, astronomy is active in the Yerevan State University (YSU), some departments of the Yerevan Physics Institute and elsewhere. The Armenian Astronomical Society (ArAS) was founded in 2001 to unify all Armenian astronomers working not only in Armenia but also abroad. It has now 66 members and is one of the affiliated societies of the EAS (European Astronomical Society). Armenia also has its Virtual Observatory project, ArVO (Armenian Virtual Observatory), a member of the International Virtual Observatory Alliance (IVOA) and maintains one of the largest spectroscopic databases in the world, the Digitized First Byurakan Survey (DFBS, or Markarian survey) with its 20,000,000 low-dispersion spectra. JENAM-2007, the joint annual meeting of the European and Armenian astronomical societies, was organizid in Yerevan State University in August 2007. BAO and ArAS jointly organize annual meetings and summer schools as well. Next summer school will be held in 2008 when V.A.Ambartsumian's 100th anniversary celebrations are planned. And an IAU summer school (ISYA) is planned for 2010.

NET SOLAR RADIATION OVER HIGH POLLUTED SITES

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ABSTRACT:

ABSTRACT: A major influence controlling the water loss from irrigated crops is the net radiation intensity Qn, but measurements of this are not normally available, and so attempts are often made to deduce it from other climatic data. The use of a set of empirical predictors such as sunshine, temperature and humidity in the arrangement shown by Linacre (1968) is very common. Studying of the net solar radiation correlation against the meteorological parameters has been done using the least square fitting. The data used are one complete year data as daily variations for two high polluted sites, Tabbin and Abbasseya, for the year of 2003. A high correlation found between the net radiation against the meteorological parameters (Temperature, Relative humidity and wind direction). The root mean square error RMSE and the mean bias error MBE have been calculated.

Interrelation of solar radiation components over Tripoli, Libya

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ABSTRACT:

Abstract: Despite the recognized importance of the solar radiation components, its measurement has found little emphasis in developing countries. Therefore, the main objective of this manuscript is to test the applicability of using the available records for some parameters (global solar radiation (G), Direct (I), and diffuse (D) components) to predict and express the values of the available data. The results reveal the following conclusions: (a) UV monthly mean variation radiation, associated with the 290–385 nm wavelength region having absolute values varying from a maximum of 38 W/m2 in May to a minimum of 13.2 W/m2 in January and December. Kuv (UV/UVo) monthly mean value is 0.406, while UV/G monthly mean value is 4.59%. The annual mean values of G, I and D are 561, 639 and 153 W/m2 respectively. Annual mean value of clearness index (Kt) and diffuse fraction (Kd) are 0.705 and 0.289 respectively. Therefore, Tripoli atmosphere is considered to be an urban sky atmosphere. Using the linear least-square regression analysis, positive correlations are found between UV against G and D, while negative correlation is found between UV against R.H. Also, there are positive correlations between G against D, while, negative correlation between relative humidity (R.H) and G and D and between Kt and Kd and K which is the diffuse coefficient.

Large-Scale Structures and Voids in the nearby universe revealed by the 6dF Galaxy Survey

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ABSTRACT:

The 6dF Survey has revealed, in unprecedented detail, the labyrinth of large-scale structures and voids with cz < 25000 km/s in the southern sky. The complete survey has been examined using 'Labyrinth' software (developed at the University of Cape Town) which, inter alia, wraps surfaces around minimal spanning trees to facilitate the visualization of large-scale structures. Some six hundred distinct voids, with diameters exceeding 35 Mpc (2500 km/s), and approximately 25 major overdensities have been catalogued. Variations in the cosmic 'texture' are apparent; islands of high density are percolated by small voids (~15 Mpc diameter), while the intervening regions exhibit anaemic structures and large voids, approaching 130 Mpc in size. The greatest overdensity by far is the Shapley Region, which gives the impression of having 'drained' its surroundings to a radius of ~150 Mpc. Various analyses have been made, including visual comparison with a mock 6dF survey extracted from Lambda-CDM simulations. The simulations are remarkably successful, but fail to generate an overdensity comparable to the Shapley Region.

Is the Dynamics of Tracking Dark Energy Detectable?

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ABSTRACT:

We highlight the unexpected impact of nucleosynthesis and other early universe constraints on the detectability of tracking quintessence dynamics at late times, showing that such dynamics may well be invisible until the unveiling of the Stage-IV dark energy experiments (DUNE, JDEM, LSST, SKA). Nucleosynthesis forces $|w'(0)| < 0.2$ for the models we consider and strongly limits potential deviations from LCDM. Surprisingly, the standard CPL parametrisation, $w(z) = w_0 + w_a z/(1+z)$, cannot match the nucleosynthesis bound for minimally coupled tracking scalar fields. Given that such models are arguably the best-motivated alternatives to a cosmological constant these results may significantly impact future cosmological survey design and imply that dark energy may well be dynamical even if we do not detect any dynamics in the next decade.

Detecting z > 2 Type IIn Supernovae

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ABSTRACT:

We have shown that Type IIn Supernovae (SNe IIn) have properties that enable a reasonable fraction to be detected at z > 2 using existing facilities. We present results from our program to photometrically detect SNe IIn in the CFHTLS Deep Synoptic Survey and discuss the prospects of spectroscopic confirmation of their bright, long-lived emission lines using the Keck telescopes.

Astronomical and Space Science Research and Education, Space Weather Studies and IHY Activities in Azerbaijan: Experience, Problems and Perspectives of Collaboration

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ABSTRACT:

Current situation of astronomical and space science researches and education in Azerbaijan is described. The attention is given to the education process of astronomy and space sciences carried out in high-secondary schools, gymnasiums, universities, academic institutions through lessons, lectures, seminars, conferences, etc. Experience on the popularization of space and astronomical knowledge in Azerbaijan is provided. Perspectives taking into account tendency on choosing of specialties and worldwide outlook of young generation and influence of economical factors and realities of modern world on the astronomical education in Azerbaijan are briefly described. Expanding research activities in the field of Space Weather and its effects' study conducted in whole world during last two decades has undoubtedly influenced Azerbaijani scientific community who has initiated investigations on these problems. There is a well-established group on study of solar-terrestrial relations in the Azerbaijan National Academy of Sciences joining efforts of highly skilled scientists and specialists from different fields of science and technology – astrophysicists, geophysicists, physiologists, doctors, engineers, etc. which conduct experimental, theoretical and statistical studies on Space Weather effects and influences on the different technological systems and human life and health. Some major results of these complex investigations are provided in this paper. Azerbaijani group pays an attention to the public awareness and publication of scientific information about Space Weather, impending hazards from space, especially the prediction of solar and geomagnetic storms, etc. It is carried out, in particular, in domestic media, newspapers, television and radio broadcasts, as daily space weather information, weekly interviews, monthly newspaper columns, which are addressed mainly to public, medical and technical specialists. Scientific-popular articles are usually published in special journals, such as <Science and Life>. We provide detailed information about past and planned IHY activities in Azerbaijan, carried out through education, mass-media, public lectures. Azerbaijan is one of founders and active members of the Balkan, Black Sea and Caspian Sea Regional Network for Space Weather Studies. An International Journal <Sun and Geosphere> which was established within IHY activities is published in Azerbaijan. An IAU Symposium devoted to results of IHY is planned to be held in Azerbaijan in 2009.

Large-Scale Structure and Galaxies detected in Radio Surveys

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ABSTRACT:

The evolution of large-scale structure in the universe provides valuable probes of cosmology and information on the relationship between dark and luminous matter. Key science for the SKA and potentially KAT involves clustering studies of galaxies detected in the radio. In this thesis we review techniques for measuring clustering and use the correlation function to measure clustering of subsamples of radio galaxies detected in the FIRST survey (Faint Images of the Radio Sky at Twenty Centimeters). We consider those sources which have matches in the Sloan survey as well as those do not have optical identifications (corresponding to a higher redshift sample). We investigate constraints on the evolution of structure which can be inferred. This work will be useful for the interpretation of data coming from continuum surveys in radio as well as developing understanding of important techniques and questions in cosmology and astrophysics.

Geometrodynamics in inverse square field

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ABSTRACT:

The path of an artificial satellite in an inverse square field of attraction need not always by elliptical but may be parabolic or hyperbolic. A necessary and sufficient condition for an elliptic path is that E<0. In terms of speed v of the satellite V2=k/m (2/r-1/a). Where k is constant and a is the semi-major axis.

Determining the extragalactic extinction law with SALT

Ido Finkelman, Noah Brosch (TAU), Alexei Kniazev, David Buckley, Darragh O'Donoghue, Yas Hashimoto, Nicola Loaring, Encarni Romero, Martin Still, Petri Vaisanen (SAAO/SALT)

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ABSTRACT:

We present CCD imaging observations of early-type galaxies with dark lanes obtained with the Southern African Large Telescope (SALT) during its performance-verification phase. The observations were performed in six spectral bands that span the spectral range from the near-ultraviolet atmospheric cutoff to the near-infrared. We derive the extinction law by the extragalactic dust in the dark lanes through the fitting of model galaxies to the unextinguished parts of the image and subtracting from these the actual images. This procedure allows the derivation, with reasonably high signal-to-noise, of the extinction in each spectral band we used. We compare the total-to-selective extinction derived for these galaxies with previously obtained results and with similar extinction values of Milky Way dust to derive conclusions about the properties of extragalactic dust in different objects and conditions. We find that the extinction curves run parallel to the Galactic extinction curve, which implies that the properties of dust in the extragalactic environment are quite similar to those of the Milky Way. The ratio of total extinction in the V band to the selective extinction in V & B bands is derived for each galaxy with an average of 2.92, compared to its canonical value of 3.1 for the Milky Way. This may imply that galaxies with well-defined dark lanes have dust with smaller characteristic grain sizes than the Galactic dust.

FRII Radio Galaxies and Quasars: The Hot Spot Connection

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ABSTRACT:

In the unification scheme of Barthel, the orientation of the radio source with respect to the line of sight is considered to be a main factor when differentiating between a radio galaxy (RG) and a quasar (QSR). RGs are assumed to lie at a larger angle to the line of sight than QSRs. If this is the case, we would like to check if the location of the hot spot, i.e. "edged" or "recessed" within the radio lobes of the RGs or QSRs, can be used as an orientation indicator to differentiate between the two types of objects. Two samples of 13 FRII RGs and 13 FRII QSRs with redshifts greater than 0.3 have been observed with the VLA at 3.6 cm. To date, we have analyzed the location and compactness of hot spots in 5 RGs and 10 QSRs. Our preliminary results show that the QSRs hot spots are slightly more compact than the RG hot spots. In terms of location, 15 hot spots out of 24 are found to be "edged" hot spots, while the remaining are "recessed" hot spots. We have also found that the jetted sources have more recessed hot spots than the unjetted sources. We will discuss the importance of the hot spots observations and their statistics in terms of their implications for models of radio sources.

Stellar variability on the AGB in Local Group galaxies

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ABSTRACT:

A survey has been conducted in JHK of the red giants in Local Group galaxies accessible from the IRSF at the Sutherland field station of SAAO. The intention is to study the frequency of red variables on the AGB with emphasis on carbon stars. This paper will compare several galaxies for which analaysis has been completed or is in an advanced state, notably LeoI, Phoenix and Fornax.

Statistical studies of pulsar glitch magnitudes

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ABSTRACT:

We present a statistical analysis of the jump magnitudes of 192 glitches observed to date in 65 pulsars. These glitches come from the conventional radio pulsars, binary pulsars, millisecond pulsars, AXPs, and other manifestations of neutron stars. The implications of these glitches on the neutron star rotational stability are discussed.

Galaxies and Universe: The Vedic concepts

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ABSTRACT:

it is well recognied that ancient India had to its credit highly significant achioevements in the fields of architecture, astronomy , mahematics, medicine, metallurgy and other branches of knowledge. A perusal through the sansktir literature would confirm there was an intimae relationship beween the performance of the vedic rituals and reckoning of time,between samvatsara(year) and yajna(ritual). Knowledge of astronomy was iudisensable r tht Order of society, the order that belonged to the Brahmans or vedic traditions. The study o0f the vedas was considered complete only when the student mastered the auxiliay subjects, the vedangas consisting of shiksha, chandas, vyakarana,nirukta, kalpa and jyotisha(phonetics, metres, grammar, etymology, religions, and astronomy). The veedic seers were keen observes of nature and natural phenomena, saw the universe by the magic of their knowledge while some another vision lent them the knowledge of the physical. They referred to the "aprakshita" or undiscovered planets. Out of these came the "Siddahntas" or treatises composed after a geat deal of observation and confirmation, the Surya sidhaanta being one of them. The panchabhuta(five elements) theory was the basis, they being space, air, agni, water and earth, laying the order of evolution. The eartrn was described as circular5. The Rg veda, bahmanas, upanishads and other branchs mention about the origin nof the universe, that nothing existed in the beginning, all being void, darkness and space enveloped the undifferentiated. The concept of tme was framked on the basis of astronomy. Deerghatama, a seer, described time circle as one with twelve divisions, each signifying thirty days. Medhasthithi gave measurements of the earth, sun, and higher regions. The milky way is described with Cygbus in the middle. The sequence of evolutioin s described as sky, wind from the sky, fire from wind, earth from fire, the medicines from the eartrh, food from the oshadhis(medicines) and life from food. References o the nebulae and their various varieties, the milky way, motion towards the ultimate unknown region etc are all described in the vedas and that has a strong astronomical basis.

Results from the ESSENCE supernova survey

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ABSTRACT:

We have recently concluded six seasons of observations with the CTIO 4-m telescope and have achieved our goal of discovering more than 200 spectroscopically-confirmed Type Ia supernovae with redshifts between 0.2 and 0.8. Using our light curves we have determined that the equation-of-state parameter w = -1 within observational error. The simplest explanation is that the cosmic acceleration is due to Dark Energy described by Einstein's cosmological constant. However, several more exotic possibilities are not yet rejected with statistical significance. Observations of Type Ia SNe in rest-frame optical and infrared bands will be the foundation of future projects. These multi-band observations are required to eliminate as well as possible systematic errors resulting from different properties characterizing the host galaxy dust that affects the photometry. The field is coming to grips with the interlocking problems of intrinsic colors of supernovae and interstellar reddening.

Galactic and Extragalactic Distance Scales

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ABSTRACT:

A review will be given of recent work on the luminosities of classical and typeII Cepheids, RR Lyrae stars and Mira variables. The relevance of this work for our understanding of these stars and their use as distance indicators will be examined. Comparison will be made with other distance indicators. The implications of current work for estimates of distances within the local group (including the Large Magellanic Cloud), the distance to the Galactic Centre and the Hubble constant will be discussed

Characterizing star formation in galaxies in a variety of environmens

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ABSTRACT:

We present results from a long-term project to characterize the star formation processes in diverse regions of the nearby Universe selected on the basis of the local galaxy density. The studies rely primarily on CCD imaging from the Wise Observatory in Israel using broad-band (UBVRI) filters, and are supplemented by H-alpha imaging in the rest frame of each galaxy. Since the H-alpha measures the amount of ionizing photons, this provides information about the most massive, hence the youngest stars in these galaxies. We will present results about four sub-samples: galaxies int he Virgo cluster that represent dense galaxy environments, and galaxies in local voids where the next galaxy is a few Mpc distant. We concentrate primarily on dwarf galaxies, since these are devoid of global star-forming mechanisms.

A multiple merger in a luminous IR-galaxy and other extragalactic science with SALT

Petri Vaisanen and Alexei Kniazev (1) Seppo Mattila (2)
(1) SAAO, South Africa (2) Turku, Finland
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ABSTRACT:

I will briefly present the status and characteristics of the new 10-m class telescope in Africa, the Southern African Large Telescope (SALT), especially with regard to extragalactic science. As an example I will present a multiwavelength study of the IRAS 19115-2124 galaxy, using adaptive optics imaging with VLT/NACO and spectroscopy with RSS/SALT, combined with HST and Spitzer data. The fascinating target, dubbed the Bird, is shown to be a triple galaxy system in the process of merging, with a surprising location of its star formation peak.

Rotation and Maxwell Analogy Gravity Different Aspects (MAGDA)

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ABSTRACT:

The paper provides an actual explanation about attractive forces in any world(solar(stars)world-atom world,...)based on MAGDA Theroy ,haw does rotaion of plants,moons,electrons ,nutral particles,...occure?,haw do 3or4 arms (2 orthogonal feilds,rotation,new feild)govern any world?,speed of new feild electromagneicgravity (EMG) is surly larger than speed of light, the new feild must be considered as the responsable about rotating the charge(unit of any force) with antipolarized of it (+,-,0), new look of gravitation waves such as electric waves,magnetic waves,electromagnetic waves which must be only wave packet around its charge, coming messages from far stars and far galaxies must be reviewed since the messages may be superimposed of 2 feilds at least. based on MAGDA ,many unsolved problems be closed.

Proving of STR postulate and Pysical meaning of dimension

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ABSTRACT:

The paper provides a physical and mathmatical proof of postulate number (1)of STR about speed of light, different speeds of light in different worlds, also haw do increasing of energy due to GTR effect occured? ,the above was based on MAGDA theroy and solving PioneerPROBLEM . Each world has its own number of dimensions,tranfering from world to the above,imply the previous dimensions,from magnetic world to solr world having (10) dimensions which the same as Superstring Theroy!

Maxweell Equation correction,analogy gravity,then different aspects

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ABSTRACT:

THE paper gives anew look of Maxweel Equation after adding (2) corrections:effect of magnetic free pole (will be discussed later)and relativity effect . Using MAG OF Thierry De Mess also Hevaside idea , Murad and Bakr results ,many physical phonomenas,we'll have complete analogy between gravity and electromagnetic with results as: new feild generated from gravity fild and electromagnetic feild (causing rotation will be discussed later) ,electromagnetic charge as electric charge ,magnetic charge,gravity charge, plus permittivity in free space will be calculated with new look of Supersymmetry and MAG we have a general form Maxweel Analogy Gravity Different Aspects (MAGDA).

Multi-wavelength Exploration of Extragalactic Large-Scale Structures in the Zone of Avoidance and their Implications for the Dynamics in the Nearby Universe

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ABSTRACT:

The dust, stars and gas in the plane of the Milky Way result in a "Zone of Avoidance" in the extragalactic sky, the size and shape of which depends on the wavelength in which the galaxy distribution is being explored. An unbiased "whole-sky" map of galaxies is essential, however, for understanding the dynamics in our local Universe, in particular the peculiar velocity of the Local Group with respect to the Cosmic Microwave Background and velocity flow fields such as in the Great Attractor region. These are relevant for understanding structure formation processes and for cosmological models. A review will be given on the various observational multi-wavelength procedures that are currently being pursued to map the galaxy distribution behind the Milky Way and a discussion on the limitations of these partly complementary approaches. A few recent discoveries of particularly interesting or obscured galaxies will be highlighted. Particular emphasis will be given to discoveries in the Great Attractor region - the from streaming motions predicted huge overdensity centered behind the Galactic Plane. Analysis based on the various dedicated multi-wavelengths surveys together find the Great Attractor to consist of a nearby Great-Wall like structure centered on the rich (Coma-like) Norma cluster that crosses the Zone of Avoidance diagonally. However, questions like how massive is the GA really, what is its sphere of influence, and who is pulling in the Zone of Avoidance, the so-called GA versus Shapley controversy, still remain unanswered. Future projects that aim at lifting the last remaining secrets of the GA will also be presented.

A New Theory On The Creation Of The Visible And The Invisible Cosmos

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ABSTRACT:

It is also suggested that at the very beginning of the big bang explosion, a pair of cosmos was created, one consists of matter, and the other consists of anti matter. In order to conserve the linear angular momentum, each cosmos was ejected in the opposite side to the other. It may also be suggested that the universe may have been created from light that was split into matter and anti matter. In our cosmos, the lack of anti matter can be explained by the above concept of cosmos pair production. At the moment of destruction of the universe, the two matter and anti-matter cosmoses will be closed and pass through each other leading to the annihilation of the universe. Following the Big Bang and inflation, it is suggested that few bubbles of reduced density were left over. In these bubbles the density was still high but not high enough to prevent the light from escaping from it. It is in those bubbles that galaxies were created and the visible universe became into being. On the other hand, the bulk of the cosmos was and is still exceptionally at high density that the escape Velocity was higher than the velocity of light. The bulk of the cosmos was left therefore as dark matter.

The Moving Quasars

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ABSTRACT:

A Quasar emits perhaps two very long jets with relativistic or may be super relativistic velocities. In case of asymmetric jets, we would expect the quasar or any object emitting jets to move in the opposite direction of the most powerful jet. This allows the quasar either to move into deeper space with velocities greater than the expansion velocity of the cosmos towards the edge of the cosmos.It can also move inwards or in any linear or curved direction. We have to look for radio loud AGN without IR emission, that would mean jets but no accretion on the super massive black holes.

The Moving Quasars

Shahinaz Yousef and Matteo Guainazzi
Astronomy&Meteorology Dept.,Faculty of Science-Cairo Univ,Egypt and European Spac Astronomy Centre of ESA Villafrance del Castillo, Spain
habibat_arrahman@yahoo.com

ABSTRACT:

A Quasar emits perhaps two very long jets with relativistic or may be super relativistic velocities. In case of asymmetric jets, we would expect the quasar or any object emitting jets to move in the opposite direction of the most powerful jet. This allows the quasar either to move into deeper space with velocities greater than the expansion velocity of the cosmos towards the edge of the cosmos.It can also move inwards or in any linear or curved direction. We have to look for radio loud AGN without IR emission, that would mean jets but no accretion on the super massive black holes.

Measuring the most massive black holes in the Universe

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ABSTRACT:

We use the "reverberation mapping" technique to measure the size and mass of massive black holes in the centers of active galaxies and to study their environments. In my talk I will describe this technique and results from two decades of study. I will also present preliminary results from an on going research in this field to measure the most massive and the smallest supermassive black holes in the Universe.

New Rate Constants of Hydrogenation of CO on H2O-CO ice surface: Astrophysical Implications

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ABSTRACT:

One of the most challenging problems in constructing chemical models is the rate constant of chemical reactions especially those occur on grain surfaces. Awad et al. (2005) derived and estimated, theoretically, new rate constants for the hydrogenation process of CO molecules on grain surfaces to produce CH3OH. The new estimated rate constants were one to two orders of magnitude higher than those used in previous models. In this piece of work we investigate the influence of the new hydrogenation rate constants on the production of different species occur either in gas- or solid-phase in the region understudy. By applying these rates into two different pseudo-time dependent gas-grain chemical models that evolve under fixed physical conditions, we find that the new rate constants have direct and indirect effects on the abundance of different species. Our results show good agreement with the observations of the dense molecular cloud TMC-1

S2- Space Astronomy and High Energy Astrophysics

PRE-SOLUTION OF THE PERTURBED MOTION OF ARTIFICIAL SATELLITE

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ABSTRACT:

The authors try to find a good solution of an artificial satellite motion under the influence of J2–gravity in terms of Euler parameters by using Picard's Iterative Method. The result shows that there are many solutions for this problem depends on the initial guess solutions, although we takes more terms to get more accurate solution. The choice of correct/convince initial guess is very difficult. Applications of the method applied on many satellites.

Spectroscopic and spectral analysis of GX 340+0

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ABSTRACT:

GX 340+0 is a bright, highly absorbed, low mas X-ray binary, belonging to the class of the Z sources. We present the first broadband spectral analysis of this source, coupled to a detailed investigation of the emission and absorption features present in the Fe K-alpha region, using past observations made with the Beppo-SAX satellite and the Chandra observatory, and a more recent XMM-Newton observation. We discuss the mechanisms of the continuum emission and the diagnostic tools offered by the emission and absorption local features, that constrain the system geomtry and the plasma state around the X-ray source.

Dynamics of shell with a cosmological constant

A. Eid

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ABSTRACT:

Spherically symmetric thin shell in the presence of a cosmological constant are constructed, applying the Darmois-Israel formalism. An equation governing the behavior of the radial pressure across the junction surface is deduced. The cosmological constant term slows down the collapse of matter. The spherical N-shell model with an appropriate initial condition imitates the FRW universe with non-zero cosmological constant, quite well.

Radiating shell dynamics in the presence of a central body

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ABSTRACT:

An idealized spherically symmetric relativistic model of an exploding object within the framework of the theory of surface layers in general relativity is constructed. A Vaidya solution for a radially radiating star is matched through a thin spherical shell with another Vaidya solution. The equations of the motion and the radiation density of the Vaidya solution as given by the matching conditions are reduced to a first order system and a general analysis of the characteristics of the motion is given. A post-Newtonian approximation is used to find the equation of motion of a spherically symmetric radiating shell moving in a central gravitational potential.

On the Impact of Relativistic Effects and Magnetic Shear on the Stochastic Heating of Particles

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ABSTRACT:

The impact of magnetic shear and relativistic effects on the nonlinear interaction of charged particles with electrostatic waves is considered. The object of this study is to evaluate how magnetic shear and relativistic effects can change the dynamics of the particle interaction with a single electrostatic wave, and with a wave packet, respectively, in the presence of a sheared magnetic field in the space plasma environment. The presence of magnetic shear is found to reduce the amount of particle acceleration when interacting with a single electrostatic wave. When the particle is subjected to an electrostatic wave packet in a homogeneous magnetic field, a stochastic web in the particle's phase space arises. The inclusion of magnetic shear, however, disconnects the stochastic web and reduces particle acceleration. When relativistic effects are introduced, a set of particles is found to be accelerated while a relativistic threshold is observed for as far as as particle acceleration is concerned. Moreover, in the sheared relativistic limit, using a Zaslavsky map, the phase space topology does not evolve into a stochastic web as is the case in the non-relativistic limit.

Numerical solvers for modelling ultrarelativistic fluid-flows in astrophysics

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ABSTRACT:

Numerical simulation of astrophysical fluid dynamics is a rapidly growing research field. In this talk I will review the important properties of the hydrodynamical solvers available in high energy astrophysics, address their efficiency and robustness, present a scenario for unifying grid-oriented solution methods and a strategy for converting explicit solvers into unconditionally stable implicit numerical solution procedure.

Solar Cell Model for Evaluating Degradation

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ABSTRACT:

The solar cells used in space environment are subjected to bombardment of charged particles of a wide energy range. This bombardment introduces defects in the constituent materials of the solar cells and, consequently, deteriorates its electronic properties. Radiation damage tests, performed under controlled and normalized conditions, allow studying the resistance of the photovoltaic (PV) devices to the space environment and predicting their performance at the end of life. Therefore, tests are very useful because they allow a proper design of the modules for a satellite mission. The space particle flux depends on the orbit of the mission. The radiation damage in satellites at low Earth orbits (LEO) and GEO is mainly produced by these particles. Hence, it is important to evaluate the damage production using these particles in terrestrial experiments. Under the particles fluence conditions of the present analysis (φ ≤1013 p/cm2) most of degradation is caused by recombination centers induced by radiation, reducing lifetime in the cell base. The lifetime decrease produces a degradation of the electrical parameters of the cell, open circuit voltage (Voc); maximum power point (Pmax); short circuit current (Isc(and fill factor (FF). Because of the wide range of energy of the particles in the space environment, it is necessary to define the concept of equivalent damage produced by particles of certain energy for laboratory test. For this purpose, it is commonly accepted that 1 MeV electrons or 10 MeV protons are suitable. We have studied experimentally and theoretically the radiation damage on monocrystalline silicon solar cells. In summation ten samples have been irradiated by two types of radiations (gamma rays and electron particles). Different doses are considered to study on silicon solar cells using a facility developed to measure in situ the I–V curve of the cell in a unique irradiation experiment using a tandem accelerator. A set of numerical simulations performed shows the correlation between experimental results and lifetime degradation in the base region of the cells. A new model to evaluate the radiation damage in silicon solar cells based on one diode model is developed.

Recent Observational & Theoretical Developments of Neutron Stars

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ABSTRACT:

Neutron stars were predicted in 1934 but it was not until 1968 where the first observational evidence of their existence was discovered in the form of radio pulsars. Since then, new classes of celestial objects have been associated with neutron stars including accreting pulsars in binary system, isolated cooling X-ray and gamma-ray emitters, and magnetically powered X-ray bursters (magnetars). Owing to their extreme properties and exotic physical environments, neutron stars are unique extraterrestrial objects that allow us to study the interaction of radiation and matter at the extreme limits of physical conditions that cannot be simulated in terrestrial laboratories. Indeed, they played a pivotal role in testing fundamental physics, including relativistic theories of gravity and the properties of matter at extreme densities. The observational and theoretical developments of our understanding of neutron stars have recently been enhanced by leaps and bounds, thanks to the advent of sensitive and high resolution space observatories like RXTE, Chandra, XMM-Newton. These missions opened a new era of discovery for neutron stars. High resolution spectroscopy gave important insight on the mass and radius estimate and allowed placing stringent constraints on the equation of state. High frequency Quasi Periodic Oscillations from accreting binaries and magnetar giant flares have also provided a deep insight onto the structure of the neutron star surface and atmosphere. This talk will provide a comprehensive review of our present understanding of neutron stars and the current and future research directions, especially those relevant to our region

Gamma Ray Burst 070714B and the Emerging New Class of "Long" Bursts with "Short" Properties

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ABSTRACT:

GRB 060614 was the first Gamma Ray Burst with long-duration light curve (T90=102 s) but otherwise short-duration properties. The nearby burst (z=0.125) showed a two component emission profile consisting of a short, hard spike followed by a long, soft tail. About a year later, the NASA mission Swift detected GRB 070714B that displays a number of similar properties. While classified as a long burst (owing to T90=64 s) the burst shows a short (T90=2.5 s), hard (Photon Index=1.0) initial spike followed by a long (T90=39 s), soft (Photon Index=2.12) tail. The hardness ratios of the soft tails of both bursts are comparable whereas 070714B's spike is harder than that of 060614. Both events exhibit negligible spectral lag, comparable tail-to-spike duration ratio, and faint host galaxy. GRB 070714B was recently confirmed to have come from a host galaxy with a redshift of z=0.92, higher than z=0.125 of GRB 060614. We will present a detailed analysis of the Swift observation of the burst and confront its properties with GRB 060614 and another handful of bursts that show similar characteristics. We will then discuss the implications of such bursts to the theoretical models of the progenitors of short GRBs as well as the classification scheme.

Gamma Ray Bursts in the Swift Era and Beyond

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ABSTRACT:

Gamma Ray Bursts (GRBs) are a remarkable cosmic phenomenon that occurs at a rate of about once a day and come from all directions of the sky. They originate at cosmological distance and hence provide important insight on the early universe. These intense flashes of high energy radiations last from a few milliseconds to several seconds and exhibit afterglows that have been traced from X-rays to the optical band, which allowed constraining the physical mechanisms responsible for their energetic emission. GRBs are the brightest explosions in the universe and are likely associated with the births of stellar size black holes or rapidly spinning, highly magnetized neutron stars. The bursts come in two classes: long bursts with duration longer than 2 s and short bursts with duration less than 2 s. The two classes have distinct spectral and timing properties and are though to originate from different physical mechanisms. Long bursts are fairly understood as to come from hypernovae whereas short bursts are believed to result from the collapse of a compact object binary system. The recent NASA mission Swift has revolutionized our observational and theoretical understanding of GRBs. Yet, it posed new questions and challenges. In recent years, GRB discoveries have been ranked several times among the "top-ten scientific breakthroughs of the year" by Science magazine. In this talk, I will review the recent development in our observational and theoretical understanding of GRBs and will point out the prospect of future missions such as GLAST. Related links: Swift http://swift.gsfc.nasa.gov GLAST http://glast.gsfc.nasa.gov

Discovery of Duration-Hardness Correlation in the High Energy Emission from SGR 1900+14 and SGR 1806-20

Alaa Ibrahim (1), Tarek Hussein (1), Jean Swank (2), William Parke (3), On Behalf of a Large Collaboration
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ABSTRACT:

We have studied the spectral and temporal properties of a large sample of of X-ray and Gamma-ray events from the soft gamma repeaters SGR 1900+14 and SGR 1806-20, using the NASA Rossi X-ray Timing Explorer, to investigate an underlying connection between the intrinsic spectral and temporal properties of the emission. We find a striking positive correlation between the burst duration and the spectral hardness (measured by the plasma temperature [kT] of the thermal bremsstrahlung spectral model). The duration distributions of the bursts from both sources show an asymmetric Gaussian profile that peaks at about 0.1 s with an excess of long bursts. The burst plasma temperature of both sources shows a symmetric Gaussian profile with well displaced peaks for the short (< 0.1 s) and long (> 0.1 s) events. We find that the long population of SGR 1900+14 bursts has a mean kT of 30.15+/-1.01 keV whereas the short population has a kT of 25.80+/-1.43 keV. On the other hand, SGR 1806-20 bursts are generally harder and exhibits larger contrast with a long bursts mean kT of 41.91+/-2.43 keV and short burst mean kT of 29.21+/-0.55 keV. We compare this behavior to that of cosmological Gamma Ray Bursts and discuss the implication of this new finding to the magnetar model of Soft Gamma Repeaters

A Complex enviroment around CIR X-1

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ABSTRACT:

I present the results of the spectral analysis of a long Chandra observation of the peculiar source Cir X--1. Cir X--1 is one of the most enigmatic sources present in the field of the accreting compact objects, and new clues for its understanding are presented from this analysis.

Artificial Radiation Effect on Spacecraft's Orbit Considering atmospheric beam attenuation

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ABSTRACT:

The perturbations produced by an artificial ground based radiation (e.g. the laser radiation), on the spacecraft's orbit is studied. The force model is developed by adopting the atmospheric attenuation on the laser beam propagation. The acceleration components due to the laser photon pressure are introduced. The orbital elements variations are obtained using Lagrange planetary equations in their Gaussian form. Numerical applications of the model are performed on satellite Ajisai using different ground based laser systems.

history of Neutron stars and current problems

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ABSTRACT:

Forty years have elapsed since the discovery of pulsars, on November 28,1967.In this introductory lecture I shall outline the history of the subject,up to the discovery of pulsars and compact X ray sources, starting from the early speculations in the 1930's concerning the end point of stellar evolution.Understanding the death of stars has been one of the great achievements of science in the past century, in a close interplay between astrophysics and physics.

X-Ray emission from radio pulsars.

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ABSTRACT:

Thermal X-ray emission is a quite common feature of the radio pulsars and its characteristics suggest the assumption that the pulsar magnetic field at the stellar surface essentially differs from the pure dipole field. We assume that in the polar gap particles (electrons and positrons) are accelerated in both directions: outward and toward the stellar surface. The backstreaming particles heat the surface beneath the open field lines and the size of the hot spot is defined by the geometry of the magnetic field lines at the stellar surface. We model various possible configurations of the surface magnetic field and demonstrate that the curvature and structure of the field lines can be of the kind that naturally allows interpretation of observations.

XMM-Newton observations of hot polar caps in radio pulsars

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ABSTRACT:

The polar cap of the radio pulsar is a small surface (of about a football field) on the neutron star above which a strong potential drop exists that can accelerate electrons and positrons to ultrarelativistic velocities. The relativistic electron flow can heat these small surfaces to KeV temperatures, implying thermal X-ray emission that can be potentially detected by the XMM-Newton satellite observatory. Such observations were performed for a number of radio pulsars. We review the results of these observations and argue that they are consistent with avalanche discharges occurring in superstrong non-dipolar surface magnetic field of neutron star polar caps

Space Based Laser Perturbation at Satellites' Closest approach

Khalifa, N. Sh. El-Saftawy, M.I Khalil, Kh. I. Abd El-Salam,F.A. and and Ahmed , M.K.M.
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ABSTRACT:

This paper points out the orbital elements variations produced by a laser beam fired from one satellite (carrying a laser transmitter) to another (the target) at their point of closest approach. The atmospheric beam attenuation can be assumed neglected and the dominant effect is that due to beam spreading through vacuum. The point of closest approach has been determined by successive scanning over the two orbits for one satellite revolution. Two satellites' orbits have been presumed to investigate the laser orbital variations (e.g. the orbits of Topex-Posidon spacecraft, as source, and the satellite Ajisai, as target, at certain epoch).

DARK ENERGY: IS IT OF TORSION ORIGIN?

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ABSTRACT:

"Dark Energy" is a term recently used to interpret supernovae type Ia observations. These observations imply that the Universe is in an accelerating expansion phase. This type of expansion gives rise to the existence of a repulsive force in the Universe. The present work represents an attempt to give a clear interpretation for this term in the context of the geometerization philosophy. It gives two arguments on a possible relation between dark energy and torsion of space-time. Assuming that curvature of space-time corresponds to a type of energy, it is shown that torsion is associated with another type of energy. The main difference between these two types is that, while the first is associated with an attractive force, the second is associated with a repulsive one. The two types have the same conservation law.

Lense -Thirring Field and Solar Limb Effect

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ABSTRACT:

Solar Limb Effect is an observational phenomena connected to the solar gravitational red-shift. It is the variation of the magnitude of the gravitational red-shift from the center to the limb of the solar disc. An attempt, for interpreting this phenomena using a general relativistic red-shift formula, is given . This formula takes into account the effect of the gravitational field, the effect of the solar rotation, the effect of the inclination of the line of sight and the motion of the observe. In this study the gravitational field of the Sun is assumed to be given by Lense-Thirring field and the Earth is assumed to move in an elliptic orbit. Comparison with previous relativistic study and with observation is given.

osmological and Astrophysical Implications of Nottale's Theory of Scale Relativity and El- Naschie's Cantorian Fractal Space-Time

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ABSTRACT:

he theory of scale relativity (ScR), as developed by Laurent Nottale [1, 2], consists of generalizing to scale transformations the principle of relativity, which has been applied by Einstein to motion laws. It is based on giving up the assumption of space-time coordinate differentiability, which is usually retained as an implicit hypothesis in current physics. To deal with the scale relativistic construction, one generally begins with a study of pure scale laws. Structures are therefore identified, which evolve in a so-called 'scale space' that can be described at the different levels of relativistic theories (Galilean, special relativistic, general relativistic) [3]. Space-time then becomes a fractal structure with Cantorian properties as envisaged by Mohammed El-Naschie [4]. The aim of the present paper is to review possible solutions to some cosmological and astrophysical problems in the framework of the theory of scale relativity (ScR) and Cantorian fractal space-time. Some of the problems that will be dealt with are: • Large scale stellar structures without any need for dark matter • The anomalous Pioneer acceleration. • Quantization of solar and extra solar planetary systems. • Prediction of the distribution of planets in extra solar systems. As we shall see, this approach also provides a solution for both the formation problem and the anomalous effects without needing any additional unseen matter. Moreover, it allows one to understand the morphogenesis of several structures at all scales and to theoretically predict the existence of new relations and constraints, which can be successfully checked from an analysis of the presently existing astrophysical data. [1]. Nottale, L., Fractal Space-Time and Microphysics: Towards a Theory of Scale Relativity, London: World Scientific; 1993. [2]. Nottale, L., Chaos, Solitons & Fractals, 16, 539 (2003). [3]. Nottale, L., J. Phys. A: Math. Theor., 40, 14471 (2007). [4]. El Naschie, M.S., Chaos, Solitons & Fractals, 35, 7 (2008).

osmological and Astrophysical Implications of Nottale's Theory of Scale Relativity and El- Naschie's Cantorian Fractal Space-Time

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ABSTRACT:

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Positron Annihilation Radiation from the Center of our Galaxy

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ABSTRACT:

The first part of this paper presents a brief overview of the galactic positron-electron annihilation radiation, which has yet to find a full explanation for its origin(s). With the detailed mapping of this gamma-ray line at 511 keV by the INTEGRAL satellite and its SPI instrument between 2002 and 2007, determining the sources of that radiation has become even more challenging. I will thus first review our current knowledge of that radiation, with what the spectroscopic analysis and spatial mapping tell us about the sources of positrons and the media of annihilation. The second part of the paper focuses on the Galactic Center (GC) and its potential contribution to explaining part, if not all, of the annihilation radiation observed at least in the galactic bulge. The capacity of the GC's supermassive black hole (SMBH) to produce positrons will be examined on general physical grounds. Several specific proposals have recently been made for the production of positrons by the GC's SMBH, and they will be critically reviewed on the basis of: a) the positrons' propagation away from the central point source given their initial kinetic energy; b) the Beacom & Yüksel (2006) constraint on MeV-range photon emission by the positrons; c) estimates of the rates of positron production and other plausibility considerations. The paper concludes with some pointers for near-future research on the problem.

The TAUVEX ultraviolet space telescope

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ABSTRACT:

The TAUVEX space telescope array constructed in Israel is scheduled to be launched in 2008 on-board the Indian geo-synchronous satellite GAST-4. TAUVEX will offer unparalleled capabilities of imaging a sky field almost one degree across in three simultaneous bands in the space ultraviolet (UV), a spectral region that does not penetrate the Earth's atmosphere. The three bore-sighted 20-cm telescopes are equipped with three filters and one shutter in each telescope. The detectors are photon-counting and imaging, and the final performance is similar to that of GALEX. The observations will be performed by scanning a constant-declination sky ribbon and telemetering to the ground station each detected photon with a time tag. The final products will allow deep photometry of all the objects observed as well as time-domain exploration of their variability up to a frequency of 4 Hz.

Opening the window on the Universe at very high energy gamma-rays

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ABSTRACT:

The High Energy Stereoscopic System (H.E.S.S.) in Namibia (Africa) is currently the most sensitive imaging gamma-ray telescope in the world. It openend a new window on the Universe, revealing a population of resolved gamma-ray sources along the Milky Way plane, with fluxes greater than about 1E-12 photons/cm^2/s above 1 TeV. These sources are mostly pulsar wind nebulae and a few supernova shells accelerating charged particles. A number of Active Galactic Nuclei (AGN) were also seen by H.E.S.S., which reveals the fastest variability timescales associated with supermassive black holes. These AGN observations also shed light on the opacity of the Universe at various redshifts. The H.E.S.S. transnational team (consisting of Europeans and Africans) were awarded with the 2006 Descartes Science Prize of the European Union for opening the window to the Universe at the highest energies.

SEARCH FOR POSSIBLE SYNCHROTRON-COMPTON HIGH ENERGY BLAZARS AMONG THE UNIDENTIFIED EGRET SOURCES

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ABSTRACT:

One of the discoveries of EGRET (Energetic Gamma-Ray Experiment Telescope) is that blazars (Flat Spectrum Radio Quasars and BL Lac objects) emit most of their luminosity in the high energy γ-ray (E>100MeV) range. Typical blazars are characterized by a double peak spectrum. The first peak (usually located between the infrared and UV bands) is interpreted as a result of synchrotron emission from relativistic electrons in the jet while the second peak (usually located in the X-ray to γ-ray region) is related to the inverse Compton scattering of the same electron population from synchrotron produced photons, or photons from the disc, producing hence high γ-ray photons. From the 271 sources observed by EGRET, about 131 are still unidentified and we believe that among them there are more blazars. In this study the possible contribution towards the unidentified population is investigated. A sample of 13 extragalactic radio sources was selected for further study due to their similarities with BL Lac sources in their broad band multi-wavelength properties. Using a conical jet model we predicted a possible synchrotron spectrum over a broad frequency range, which is used to predict a Inverse-Compton component of the emission at EGRET and H.E.S.S. (High Energy Stereoscopic System, Namibia) energies.

High Energy Astrophysics with SALT

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ABSTRACT:

Amongst current large telescope designs SALT has unique capabilities in terms of its UV throughput, its temporal resolution, its queue-scheduling and polarimetric performance. These make SALT particularly powerful in high energy astrophysics for the study of accretion discs, physical processes on or near accreting compact objects (white dwarfs, neutron stars and black holes), regions of high magnetic fields and ToO response to unpredictable phenomena. Examples of SALT's capabilities will be shown from its commissioning phase including the first resolution of the magnetic poles on a white dwarf, the follow-up spectroscopy of a GRB and time-resolved spectroscopy of accretion disc oscillations.

Opening the window on the Universe at very high energy gamma-rays

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ABSTRACT:

The High Energy Stereoscopic System (H.E.S.S.) in Namibia (Africa) is currently the most sensitive imaging gamma-ray telescope in the world. It openend a new window on the Universe, revealing a population of resolved gamma-ray sources along the Milky Way plane, with fluxes greater than about 1E-12 photons/cm^2/s above 1 TeV. These sources are mostly pulsar wind nebulae and a few supernova shells accelerating charged particles. A number of Active Galactic Nuclei (AGN) were also seen by H.E.S.S., which reveals the fastest variability timescales associated with supermassive black holes. These AGN observations also shed light on the opacity of the Universe at various redshifts. The H.E.S.S. transnational team (consisting of Europeans and Africans) were awarded with the 2006 Descartes Science Prize of the European Union for opening the window to the Universe at the highest energies.

Spectroscopy in NS LMXBs

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ABSTRACT:

We present the recent results regarding the neutron star Low mass X-ray Binaries obtained analysing Chandra and XMM data.

Studying the Total Ionizing Dose and Displacement Damage Dose effects for various orbital trajectories

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ABSTRACT:

The impact of radiation effects is growing more critical with the advent of newer technologies in space. The effects which are important to consider for spacecraft design fall into two categories, long term effects expressed in the Total Ionizing Dose (TID) and Displacement Damage Dose (DDD), and short term effects expressed in Single Event Effects (SEEs). Only, the long term effects will be discussed for the present work, in which, a comparative study of the TID and DDD for various orbital trajectories has been carried out. It is found that the level and type of hazard depend, to a great extent, on the orbit of a given spacecraft. Both TID and DDD levels vary widely with varying orbital altitude and inclination. In addition, it is found that spacecraft in Geo-Transfer Orbit (GTO) experiences the most intense doses of both effects in comparable to other spacecraft in other orbital trajectories.

Assessment of GaAs, InP, and GaInP/GaAs/Ge solar cells performance in different radiation environments

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ABSTRACT:

Degradation of solar cell performance due to radiation within different space environments is an important effect to assess when designing the power subsystems. The behavior of the solar cell in a radiation environment can be described in terms of the changes of the device engineering output parameters. As the compound solar cells based on III-V materials have received much attention recently, the present work studies the power degradation of GaAs, InP, and GaInP/GaAs/Ge solar cells due to both trapped and solar proton irradiation for different orbital trajectories. The power degradation is described as a function of the coverglass shielding thickness. The slowed down spectra emerging from the shielding material is obtained using the MULASSIS code and the End-Of-Life solar cell performance is evaluated using the Displacement Damage Dose method.

The Puzzle of Dark Matter

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ABSTRACT:

One of the great scientific enigmas still unsolved, the existence of dark matter, is reviewed. Simple gravitational arguments imply that most of the mass in the Universe, at least 90%, is some (unknown) non-luminous matter. Some particle candidates for dark matter are discussed with particular emphasis on the neutralino, a particle predicted by the supersymmetric extension of the Standard Model of particle physics. Experiments searching for these relic particles, carried out by many groups around the world, are also discussed. These experiments are becoming more sensitive every year and in fact one of the collaborations claims that the first direct evidence for dark matter has already been observed.

Current status of the ANTARES underwater neutrino telescope

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ABSTRACT:

The ANTARES telescope, presently at an advanced construction stage, at a depth of 2500 metres in the Mediterranean Sea near Toulon, aims at the detection of high energy cosmic neutrinos. The detector is a 3D array of photomultiplier tubes, designed to provide precise timing for Cherenkov pho¬tons emitted by relativistic charged particles in seawater and in particular from upward-going muons induced by neutrino inter¬actions in the matter underneath the detector. Muon track reconstruction, obtained using the time of photomulti¬plier hits, requires a knowledge of the position of photomultiplier tubes with a precision of about ten centimetres. This is provided by an acoustic positioning system. ANTARES is cur¬rently the biggest underwater neutrino telescope in the world. Data from five (ten) detection lines, in operation since January (December) 2007, allows not only to demonstrate that the nom¬inal time and space resolutions are achieved but also to reconstruct downgoing atmospheric muons (coming from cosmic ray interactions in the upper atmosphere) and the first upward-going neutrino-induced muons. Various models predict the emission of high energy neutrinos from galactic astrophysical sources such as Supernova Remnants, Micro-Quasars but also from extragalactic objects such as Active Galactic Nuclei and Gamma Ray Bursts. Detection of high energy neutrinos from these sources would provide unambiguous evidence for the source of acceleration of ultra-high energy cosmic rays. Gamma Ray Bursts are particularly interesting because of the presumed neutrino emission in coincidence with the short burst of gamma-rays. A custom designed data acquisition system, in combina-tion with the existing satellite alert systems, has been developed and provides increased sensitivity for neutrinos from Gamma Ray Bursts compared to conventional time independent sources.

Fluence Correlations for Cluster II and Cluster III Long Gamma-Ray Bursts

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ABSTRACT:

Gamma-ray bursts have been traditionally divided into short (T90 < 2 s) and long (T90 > 2 s) bursts. It has been recently claimed, through a study of the BATSE data, that long bursts may be further divided into two subclasses, Cluster II and Cluster III bursts, based on fluence. The BATSE catalog provides archival fluence data over four energy channels: 20–50, 50–100, 100–300, and > 300 keV. In this study, the fluence two-point correlation function was calculated across the four energy channels for each of the two long burst clusters; the purpose being to investigate whether the fluence correlations are distinct for the two clusters. Our preliminary analysis which included 603 Cluster II bursts and 610 Cluster III bursts indicates that the fluence correlations are indeed distinct for the two clusters, with Cluster III bursts having consistently tighter correlations.

Cosmic Ray Acceleration in Supernova Remnants? Early results from TeV Observatories

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ABSTRACT:

For more than fifty years, it has been believed that cosmic ray (CR) nuclei are accelerated to high energies in the rapidly expanding shockwaves created by powerful supernova explosions. Yet observational proof of this conjecture is still lacking. TeV telescopes have provided evidence for the acceleration of electrons to >10^12eV in some SNRs, but the case for nucleons is more confused. I review here how the recent results from TeV observatories paint a mixed picture for the conjectured acceleration of CRs in SNRs.

S3- Probing Solar and Stellar interiors

Path and Path Deviation Equations of Fractal Space-time: A Brief Introduction

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ABSTRACT:

Several authors have presented geodesic equations of fractal space time. In this approach, we obtain geodesic and geodesic deviations using the Bazanski method. We also extend this approach to include equations of motion for spinning and spinning charged particles of the above space in a similar way to their counterparts in Riemannian geometry.

Spectroscopic Analysis of the B/Be visual binary HR1847

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ABSTRACT:

we present results of recent spectroscopic observations of both component of the bright visual binary HR1847, Codes KOREL and FOTEL were used. Fiest solution of the spectroscopic orbit of HR 1847A is presented.

Orbital period changes in selected Algol close binaries

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ABSTRACT:

Abstract: Cyclic changes in mean brightness are common among known chromo-spherically active stars. In amplitude they range from about 0.1 to 0.5 mag, and the time scales range from about 10 to 50 yr (Hall, 1991). The origin of these changes may be due to mass loss, magnetic activity, apsidal motion, and the presence of a third body. The aim of the present paper is to discuss the cause of these period changes for two selected Algols and applying the Applegate mechanism which invokes changes in the gravitational quadrupole moment of the convective and rotating secondary star. References Hall, D. (1991): Ap.J. 380, L85.

The Light-time effect in Eclipsing Binaries:

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ABSTRACT:

New times of minima of the eclipsing binaries GK Cep and VY Cet, obtained at the Athens University Observatory, have been used together with all reliable timings found in the literature in order to study the period variation and search for the presence of a third body in the systems. Their O-C diagrams are presented and apparent period changes are discussed with respect to the possible light-time effect (LITE). New improved LITE elements, orbital periods and minimum masses of potential third bodies are given.

Seasonal light variations of the contact binary system V 839 Oph in 2007

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ABSTRACT:

New CCD BVRI light curves of the W UMa system V839 Oph, obtained in June and July 2007, are presented. The within-season changes in the light curves over monthly, weekly and even daily time-scales are presented and possible mechanisms for such variations are discussed.

The Algol-type system IU Per: A photometric study and search for pulsating components

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ABSTRACT:

Complete CCD light curves of the Algol-type eclipsing binary IU Persei have been obtained in the B, V, R and I filters during 7 nights in 2006 and one night in 2007 with the 40-cm telescope of the Gerostathopoulion Observatory of the University of Athens. The light curves are analyzed with the W-D program in order to determine the geometrical and photometric elements of the system. Moreover, the outside eclipses light variations have been used for search of pulsating component(s)in the system.

APROACH OF A DEEP MINIMUM IN CYCLE 26 AND EFFECT ON CLIMATE

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ABSTRACT:

Based on the evolution of the 'rest-latitudes' (during solar minimum) of the boundaries of the global magnetic unipolar field regions since cycle 12, it was previously argued by Callebaut and Makarov (e.g. Callebaut, D. K., Makarov, V. I. and Tlatov, A. G., in Wilson, A. (ed.), Proc. 10th Eur. SPM 'Solar Variability: from Core to Outer Frontiers', Prague, Chech Rep;, ESA SP-506, Dec. 2002, p.113) that a deep minimum may be approaching and will start in cycle 26+/-1. Several supplementary arguments have meanwhile accumulated, in particular in cycle 23. A survey will be given.

EXACT SOLUTION IN IDEAL MHD FOR GIVEN RADIAL POLOIDAL OR TOROIDAL FLOWS: PIECES OF A DYNAMO

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ABSTRACT:

In a previous paper (Callebaut and Khater, IAUS 233, 'Solar Activity and its Magnetic Origin', Eds. V. Bothmer and A. A. Hady, Cambridge UP, 2006, p.9) we gave the exact solution in spherical coordinates of the ideal MHD evolution equation provided the velocity is purely toroidal. The toroidal flow generates a toroidal field from the poloidal components of the magnetic field as a result of the differential rotation. The relevance for the solar dynamo is obvious. However, several dynamo theories attempt (as a second step) to regenerate a poloidal field from the new field (or from its remains after losing energy in sunspots, etc.). Hence we consider here purely poloidal and purely radial flows and obtain the corresponding exact solutions. Again the main feature is that the growth is linear in time and proportional to a Jacobian constructed from the velocity and the flux function of the components of the magnetic field perpendicular to the flow. The result may be applied to the meridional motion (first its surface latitudinal part and next its radial part, then its inner latitudinal part and again a radial part) or to (the inward part of) convective cells. The main difficulty is to combine the various parts in one continuous motion.

EXACT SOLUTION IN IDEAL MHD FOR GIVEN RADIAL, POLOIDAL OR TOROIDAL FLOWS: PIECES OF A DYNAMO POLAR FACULAE CYCLES

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ABSTRACT:

Makarov and co-authors have established several relations (duration, intensity, peaks, secular evolution) between a polar faculae cycle and the following sunspot cycle: the latter repeats roughly the polar faculae cycle with a time shift of about half a cycle. Moreover those findings are confirmed by CaII-K bright spots and by the global magnetic regions, again preceding the sunspot cycle by about half a cycle. These relations (some expressed in approximate equations) imply adaptations for various dynamo theories: Babcock-Leighton, Choudhury et al., Dikpati et al., Callebaut and coworkers, etc. The theory of Callebaut allows the polar faculae and the sunspots to be generated by the same mechanism. However, the delay between them is attributed to the meridional motion which near the tachocline splits in two components, one turning at higher latitudes and evolving toward the poles and giving polar faculae, the other moving toward the equator and yielding the sunspots, automatically implying a suitable time shift. The total number of polar faculae, somewhat representative for the solar interplanetary flux, does not stand in a simple relation to the Wolf number. In fact their number increased by a factor more than 3 during the last four cycles, while the Wolf number did not vary drastically. However, during the (fifth) very last cycle the total number of the polar faculae dropped to half of the preceding cycle. This may be attributed to the combination of several effects.

NLTE Facular Physical Model in the Wavelengths of Ca II IR Triplet Lines

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ABSTRACT:

The observed emergent intensities at different frequencies of Ca II triplet line profiles (λ 8498.023Å , λ 8542.091Å and λ8662.141Å) in solar faculae are used to determined NLTE facular physical model. Depth variations of excitation and electronic temperatures, gas and electronic pressures have been determined. The physical parameters of the determined model are compared with those given by other models. The temperature curve of the electronic temperature K) at optical depth°in our model deviates from other models by about (150 5000 =-0.04. The deduced values of excitation temperature in our model aretlog generally higher than the temperature curves of the electronic temperature in different models. This consequence clearly demonstrates the deviation from LTE conditions in the layers of the solar atmosphere, where the lines are originated.

NLTE Synthetic and Observed Profiles of Ca II IR Triplet Lines in Faculae

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ABSTRACT:

A new NLTE facular physical model is applied to calculate synthetic profiles of Ca II IR triplet lines (8498.023Å, 8542.091Å and 8662.141Å) in solar faculae at difference angular distances from the center of the solar disk. A reasonable congruency of calculated and observed contours of the lines is achieved in the wings and outer shoulders of the lines. Evident deviations are noted in the line cores. These results confirm the conclusions abut the NLTE effects in the higher sub solar layers where the cores of the lines are formed, as indicated by the temperature curves of the electronic and excitation temperatures of our model. Values of Ca abundance are deduced in the cores of calculations, and compared with the photospheric values and other references, i.e. solar wind.

What Can We Learn About the Sun From Neutrino Physics?

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ABSTRACT:

The Sun is the largest source of neutrinos around us and it produce them at a very steady pace through the nuclear reactions taking place in its core. This correlation between the energy output and the neutrino production has been checked successfully since the seventies thanks to pioneering Chlorine experiments in detectors deep underground, after doubts were emitted concerning a particle physics solution to the observed deficit in neutrinos at detectors on Earth. It culminated in 1998 with the results of the Super-Kamiokande in Japan experiment vindicating neutrinos flavour oscillation. Further details of this particle physics scenario were unravelled at the SNO (Sudbury Neutrino Laboratory) in Canada in 2002 using a heavy water detector. We wish to review all epoch making developments constitute a most beautiful chapter of solar physics as well as bring give an update on solar neutrino physics in the wake of new discoveries in neutrino detectors worldwide.

Probing the solar sub-surface: the leptocline and its physical properties.

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ABSTRACT:

Variations of the diameter, shape and irradiance are ultimately related to solar activity, but a further investigation of how a weak magnetic field might cause variations in the irradiance amplitude, combined with a shrinking or an expanding shape is still needed. Indeed, accurate measurements of the solar diameter started by Jean Picard showed that the solar diameter might be greater during the Maunder minimum of the solar activity. After Picard (and some other heirs), there has been a lot of other measurements, ground-based or from space. In this lecture we will review the question, extending diameter variability to shape changes. We will show how helioseismology results allow us to look at the variations below the surface, where changes are not uniform, and putting in evidence a new shallow layer, the leptocline. We will review here the physical properties and we will base our discussion on physical grounds, showing why it is important to get accurate measurements from space (SDO–Solar Dynamics Observatory or Dynamiccs). Such measurements will provide us a unique opportunity to study in detail changes of the global solar properties and their relationship to changes in the Sun's interior.

A Code for Calculating Static Model Stellar Atmospheres

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ABSTRACT:

In this paper we present an independent, simple FORTRAN code for calculating LTE-plane-parallel model atmospheres. The transfer equation has been solved using Avrett and Loeser method. It is shown that, using an approximate non-gray temperature distribution together with the iteration factors method (Simonneau and Crivellari) for correcting the temperature distribution reduce the number of iteration required to achieve the condition of radiative equilibrium. Preliminary results for pure helium model atmospheres are presented.

Model Atmosphere Parameters of the Spectroscopic CrB an dAlpah Vir Binaries Alpha

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ABSTRACT:

Our aim in the present paper is to model the atmospheric parameters of the spectroscopic binaries Alpha CrB and Alpha Vir. Synthetic spectral analysis of the total and individual spectrum has been performed and yielding effective temperatures (Te), surface gravities (log g) and rotational velocities for the two systems. The derived effective temperature of Alpha CrB reveals that, the spectral type near B9 instead of A0 as derived by earlier investigations. For Alpha Vir, our result confirms the conclusion of the comparison with IUE observations which revealed that the effective temperature is 20-30 % larger than that estimated by models. Comparison on theoretical Te and log g plan with Granada evolutionary tracks, isochrones for the masses and empirical mass-radius relation provides good match.

Chemical modeling of ζ Persei

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ABSTRACT:

The physical and chemical conditions that probably influence the chemistry of the diffuse cloud toward ζ Persei have been followed. We have constructed a reaction systems containing the chemical families of H,C, O, N, S, D and metals (Me: Mg, Na, Fe, and Si). A total of 235 species have been included and a network of 2303 reactions has been used. The gas-phase chemical evolution is studied using pseudo-time dependent. The evolution of the different chemical species are followed in models of density equal 100 cm-3 , different temperatures and different cosmic ray ionization. Our results of model three of group one and group two are reasonable agreement with observations at early time.

Seething Below the Surface: Global Simulations of Solar Convection

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ABSTRACT:

Convection is of fundamental importance to the physics of the solar interior. Not only does it transport energy to the surface to be radiated into space, but it also redistributes momentum and entropy, establishing the mean flows known as differential rotation and meridional circulation. These mean flows work together with turbulent convection to generate the rich display of magnetic activity evident in solar observations. Enabled by continuing advances in high-performance computing technology and inspired by helioseismology, high-resolution simulations are providing unprecedented insights into the nature of solar convection, the maintenance of mean flows, and the origins of solar magnetism. I will review some of these recent insights and discuss the future promises and challenges of solar convection and dynamo modeling.

LTE-plane-parallel model atmospheres

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ABSTRACT:

In this paper we present an independent, simple code for calculating LTE-plane-parallel model atmospheres. The transfer equation has been solved using Avrett and Loeser method. It is shown that, using an approximate non-gray temperature distribution together with the iteration factors method (Simonneau and Crivellari) for correcting the temperature distribution reduce the number of iteration required to achieve the condition of radiative equilibrium. Preliminary results for pure helium model atmospheres are presented.

V/R variation as key parameter for understanding Be stars

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ABSTRACT:

Violet-to-red peak intensity ratio (V/R) variations is one of the most striking features of the emission lines. V/R variations and their correlations in some Be stars are discussed.

SOLAR CONTROL OVER NILE SOURCES, AFRICAN LAKES AND THE

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ABSTRACT:

The status of Nile floods has been studied since about 9000 B.C and proved to be relevant to the solar stimuli. This influence can be explained through the effect of sun on El Ninos and La Ninas. It is well known that La Ninas cause high precipitation over Ethiopia while El Ninos cause drought conditions. Seven successive drought El Nino years have caused the famous Egyptian famine starting 2200 BC at the time of the prophet Joseph as recorded in lake Quarun level which geologically reflected the status of Nile floods over the ages. Another bunch of El Nino years that ended in 1200 BC marked the Egyptian famine contemporary with the Prophet Moses. A complete list of La Nina and El Nino years has been compiled by the author. Right now, we are in special weak solar activity period which has caused a solar induced climate change starting 1997 and could last for about three more decades. This climate change was marked by the 1997-98 El Nino event and followed by three La Ninas. Those four El Nio events were successfully predicted by the author in 1996. During the present very special period of solar activity, it was forecasted that El Nino events would occur at the bottom of weak solar cycles with about 11 years separation. Thus a prediction for El Nino was made in 1996 as 1997± 1, 2007±1, 2018±1 and 2029±1. Because the length of the solar cycles varies between 10 and 12 years, and because the duration of the El Ninio event can extend from one calendar year to the other, then it is better to extend the uncertainty in prediction of El Nino years to ±2 years. Thus it can be seen that the 2006-2007 El Nino was successfully predicted. Weak solar cycles cause cooling in the earth's oceans. Consequently, we have to expect cooling of the Pacific Ocean after 4-5 years and thus there is a high rank of probability that about 5 or perhaps 7 successive La Ninas will occur after about five years with increasing strength from the maximum of the present weak solar cycle number 24 towards its end leading to dangerous flooding. This prediction is crucial for the safety of the High Dam and other Dams and bridges in the stream. It is also important for the safety of human and animals in Ethiopia and Sudan. Water managements ought to be then at its very best in order to make the maximum use of the wealth of water perhaps in Tushka and El Salaam project with increasing cultivation of crops of large water consumption like rice and sugarcane in other places. In the case of the Equatorial Lakes. The Ugandan Government was informed earlier of the continuous drop of Lake Victoria after its 1.3 m rise in 1997 in response to the solar induced climate change with the start of the first weak solar cycle of the series, namely cycle 23

ANALYSIS OF SUPERGRANULAR FRACTAL STRUCTURE

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ABSTRACT:

We employ fractal analysis to study the complexity of supergranulation structure using the Solar and Heliospheric Observatory (SOHO) Dopplergrams obtained during the Solar minimum phase. Our data consists of 200 visually selected supergranular cells, for which we find a broad, slightly asymmetric dispersion in the size distribution, with the most probable size around 31.9 Mm. The Area 'A' and Perimeter 'P' are well correlated with a relation P μ AD/2. From the area – perimeter relation, we deduce a fractal dimension 'D' of about 1.25, consistent with that for isobars, and suggests a possible turbulent origin of supergranulation. By relating this to the variances of kinetic energy, temperature and pressure, it is concluded that the supergranular network is close to being isobaric and that it has a possible turbulent origin. Also we have explored the dependence of the supergranular fractal dimension on the solar maximum phase using Kodaikanal data and noted a diminished complexity.

S4- The Dynamic Sun and Heliosphere

Analysis of the seasonal variation of Dst and AE indices indices at different activity levels

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ABSTRACT:

Seasonal variations in geomagnetic activities were studied for the period of 1990-2007 using Dst and AE indices. Over 150 events characterised by the increased in geomagnetic activity of varying strength (from -90 up to -1800nT) were statistically analysed. Although Russell- McPherron effect plays major role in the equinoctial asymmetry in the geomagnetic activity, other effect may also take place. During this study we found a statistically significant October-November peak in geomagnetic activity for Northern Hemisphere, which is sufficiently larger than March-April peak. Several hypotheses for the causes of such effect are discussed.

Analysis of seasonal variation od Dst and AE indices at different activity levels

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Space Science Centre, University of Sussex, UK.
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ABSTRACT:

Seasonal variations in geomagnetic activities were studied for the period of 1990-2007 using Dst and AE indices. Over 150 events characterised by the increased in geomagnetic activity of varying strength (from -90 up to -1800nT) were statistically analysed. Although Russell- McPherron effect plays major role in the equinoctial asymmetry in the geomagnetic activity, other effect may also take place. During this study we found a statistically significant October-November peak in geomagnetic activity for Northern Hemisphere, which is sufficiently larger than March-April peak. Several hypotheses for the causes of such effect are discussed.

Ionospheric Scintillation as a means of Tracking Solar Activities

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ABSTRACT:

The sun apart from providing the energy that makes all life possible on earth is also a source of immense volume of energy. This energy in the form of X-rays and Extreme Ultra Violet (EUV) radiation can be dangerous to man and equipment. Thus, detecting such violent solar activities is of paramount importance. This work utilizes the ionospheric scintillations caused by solar activities to track solar events and features. A procedure was developed for tracking solar activities with a view for future solar flare prediction using sudden ionospheric disturbance monitor at Obafemi Awolowo University, Ile-Ife in Nigeria . This is with a view of creating a data base from which solar flare predictions could be made. Preliminary results showed a transitional period from night time to day time between 0645hours and 0800hours and from day time to night time, between 1845 hours and 2030 hours. Possible flare signatures were also observed.

LONG-PERIOD OSCILLATIONS OF SUNSPOTS DETECTED BY DOPPLER SHIFTS AND ZEEMAN BROADENING ON DIGITAL SPECTROHELIOGRAMS

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ABSTRACT:

The new method developed in Central (Pulkovo) Astronomical Observatory of direct registration of Doppler shifts, as well as Zeeman broadening of spectral lines, on optical digital spectrograms of active regions on the Sun was used to study the oscillation of sunspots and magnetic elements in their vicinity. Besides the well known 3-5 minutes oscillations, the long-term oscillations with a period about 80 min were found in sunspots and magnetic elements of surroundings: the last effect reveals only on rather long (more than 4 hours) consequent series of observations. These oscillations are interpreted in the frame of "shallow" sunspot model as vertical-radial periodical displacements of the entire sunspot (or magnetic element). They are the eigen oscillations of the system and are exited by perturbations of surrounding turbulent medium (i.e. photosphere and convective zone).

Examination of the solar cycle variation of foF2 for cycles 22 and 23

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ABSTRACT:

The variations of monthly median noon values of foF2 at Slough and Rome are examined by using different solar activity indices (solar flare index, relative sunspot number, solar flux at 2800 MHz, and Mg II index) for solar cycles 22 and 23 (1986–2006). We compared the dependence of foF2 on solar activity indices by using a single regression analysis, and showed that qualitative similarity of the ionospheric foF2 with the solar indices depends on the solar cycle. We found that hysteresis effect shows generally lower foF2 for the rising branches compared with the falling branches of the two solar cycles, and the strength of the hysteresis effect varies from index to index as well as from cycle to cycle.

Evident stratified structure of the Solar Corona and Prominence Activity During Salloam Total Solar Eclipse

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ABSTRACT:

A set of well resolved photographs have been taken in white light for the corona during the total solar eclipse of March 29, 2006 at Saloam, Egypt. The secured pictures distinctly display the existence of different zones in the corona. The brightness of these zones systematically decreases outwards from the solar limb, and their extensions are, 0.5 R - 1 R , 0.7 R and 1.5 R respectively. The prominence activity is not prominent, but exhibits remarkable stratified structures. It seems that, small prominences are simply protrusions of the solar photosphere surrounded by a layer of Hydrogen seen as a red envelope of the prominence

THE DYNAMICS OF TWISTED MAGNETIC TUBES AND MECHANISM OF CME FORMATION

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ABSTRACT:

The dynamical properties of twisted magnetic ropes in coronal plasma are discussed, regarding possible construction of basic model of coronal mass ejection (CME). The conditions of emerging of magnetic fields into the photosphere, as well as their expanding (propagating) properties, do not allow the external magnetic field (descending as 1/r) to emerge around the twisted magnetic rope in cosmic plasma (as it normally forms around the current wire in vacuum or in the air). Due to this, all electric currents in cosmic plasma are being screened: full longitudinal current through the cross-section of twisted magnetic rope is always equal to zero. This property of screened currents is well-known (Parker, 1979, Kadomtsev 1984 et al.). It changes dramatically the condition of equilibrium and stability of magnetic ropes in plasma. At the same time, all theoretical models of CME are solved in "laboratory" approach, as if around every quasi-stationery current in cosmic plasma we had an external potential field (that should emerge with the speed of light and be somehow maintained in the surroundings). The consistent taking into account of screened character of magnetic ropes on the Sun allows us to approach from absolutely different point of view to the problem of CME dynamics and to match the theory with the contemporary observational data (like TRACE), regarding the manner CME can move; also, this new approach can serve as a solid base to develop new basic model of CME.

kink wave oscillations in solar spicules

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ABSTRACT:

UV spectroscopic data obtained with the SUMER (Solar Ultraviolet Measurements of Emitted Radiation) spectrograph aboard SOHO (Solar and Hemispheric Observatory) have been analyzed using wavelet transform to detect oscillations in spicular structures. We analyze temporal variations in the spectra intensity of O II 833.33A , C III 977.02A , Si IV 1122.49 A, and simultaneously show emission lines which are formed at the chromospheric and transition region (TR) temperatures. We find that the vertical extension of the spicular structures in the coronal hole (south pole cap) have a periodicity in the radiance of 5 min, repeated for three distinguishable separated levels at solar atmosphere. Finally, we have used wavelet phase difference method to find a typically coherency between main oscillations.

Interrelation of solar radiation components over Tripoli, Libya

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ABSTRACT:

Despite the recognized importance of the solar radiation components, its measurement has found little emphasis in developing countries. Therefore, the main objective of his manuscript is to test the applicability of using the available records for some parameters (global solar radiation (G), Direct (I), and diffuse (D) components) to predict and express the values of the available data. The results reveal the following conclusions: (a) UV monthly mean variation radiation, associated with the 290–385 nm wavelength region having absolute values varying from a maximum of 38 W/m2 in May to a minimum of 13.2 W/m2 in January and December. Kuv (UV/UVo) monthly mean value is 0.406, while UV/G monthly mean value is 4.59%. The annual mean values of G, I and D are561, 639 and 153 W/m2 respectively. Annual mean value of clearness index (Kt) and diffuse fraction (Kd) are 0.705 and 0.289 respectively. Therefore, Tripoli atmosphere is considered to be an urban sky atmosphere. Using the linear least-square regression analysis, positive correlations are found between UV against G and D, while negative correlation is found between UV against R.H. Also, there are positive correlations between G against D, while, negative correlation between relative humidity (R.H) and G and D and between Kt and Kd and K which is the diffuse coefficient.

Solar Flares of Different Types and their Influence on Formation of Interplanetary Medium Disturbances.

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ABSTRACT:

Reasons for statistical relation observed between duration of nonstationary processes on the Sun and power of disturbances relevant in the interplanetary medium are studied. Homogeneous data on soft X – ray radiation of more than 50000 flares make it possible to study their number distribution with duration for four ranges of event powers. Three event types are separated, namely, impulse flares of the total duration less than 30 minutes, typical (two – ribbon) flares of less than 1 – 2 hours in duration, and very long – term events including in phenomena in activity complexes and dynamical flares. These results are in good agreement with expected phenomena durations determined from the energy balance in the flare source of the soft X - ray radiation. In particular, free leaking of hot plasma generated takes place in impulse flares, while heating near a coronal - loop top is significant in two – ribbon flares and determines a whole process in prolonged flares. Comparison between data on soft and hard X – rays demonstrated rather powerful impulses are followed as a rule by formation of a coronal loop system. In an impulse phase of these typical flares, upward plasma flows appear near each footpoint with the increase of the total event duration resulting in CMEs and subsequent disturbance of the interplanetary medium. In the most prolonged flares, CMEs often give rise new flares formation, the ejection of substance from coronal levels continuing and increasing the CMEs and disturbances in the interplanetary space for a long time.

APROACH OF A DEEP MINIMUM IN CYCLE 26 AND EFFECT ON CLIMATE

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ABSTRACT:

Based on the evolution of the 'rest-latitudes' (during solar minimum) of the boundaries of the global magnetic unipolar field regions since cycle 12, it was previously argued by Callebaut and Makarov (e.g. Callebaut, D. K., Makarov, V. I. and Tlatov, A. G., in Wilson, A. (ed.), Proc. 10th Eur. SPM 'Solar Variability: from Core to Outer Frontiers', Prague, Chech Rep;, ESA SP-506, Dec. 2002, p.113) that a deep minimum may be approaching and will start in cycle 26+/-1. Several supplementary arguments have meanwhile accumulated, in particular in cycle 23. A survey will be given.

CASCADE OF SMALL NONLINEAR OSCILLATIONS TRIGGERING FLARES

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ABSTRACT:

The Callebaut-Fourier analysis studies the whole family of higher order terms associated first for a single first order wave and then nonlinearly for several first order perturbation waves. This family becomes divergent for certain phases if the sum of the amplitudes of the first order terms exceeds a critical limit. This convergence limit has been calculated analytically in some cases and numerically in many cases. Thus a combination of small oscillations may yield local divergences, leading to an explosive situation and instability. In thin singular stripes (periodic in space and time) the speeds become very large, theoretically even infinite, creating runaway electrons explaining part of the high energetic particles in flares. The formation of the 'singular stripes' results in a fine filamentation of the magnetic field for which much shorter dissipation times apply even in ordinary MHD. This triggering mechanism may explain The beginning, the flash and the further decay of flares. Of course the most appropriate regions for this triggering are those where present day reconnection models apply. Moreover, a cascade reaction may occur: sound waves at the solar surface may combine to trigger a bright point, several bright points may combine to trigger a prominence or a solar flare or a coronal mass ejection (CME), each time involving a much larger energy output. An extension for the case when the waves are not parallel is now proposed too.

Solar and Geomagnetic Activities & Related Effects on Human Physiological & Cardio-Health State: Results of Azerbaijani and Collaborative Studies

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ABSTRACT:

The possibility that solar activity variations and related changes in the Earth's magnetosphere can affect human life and health has been debated for many decades. This problem is being studied extensively in the late 20th and early 21st centuries. Much work has been conducted in the former soviet and/or socialist countries, mostly in Russia and therefore has not been accessible to non-Russian-speaking scientists, although there were some reviews and original papers on the subject. Moreover, much of the literature published on the subject of heliobiology is ambiguous and sometimes contradictory. Possible mechanisms of influence of variations of solar and geophysical parameters on human health are still discussed. The relations between solar and geomagnetic activity changes and the human health have global implications, but they are especially important for habitants living at high geomagnetic latitudes where the geomagnetic disturbances have larger amplitudes. Nevertheless, the relevant researches are also important for humans living at any geomagnetic latitudes. Unfortunately, limited comparison of results of investigations on possible effects to humans from geomagnetic activity exists between studies conducted in high, middle and low latitudes. Knowledge about the relationship between solar and geomagnetic activity and the human health would allow to get better prepared beforehand for any future geomagnetic event and its impacts anywhere. For these purposes there are conducted collaborative (jointly with scientists from Bulgaria, Russia, Israel and Belgium) and cross-disciplinary space weather studies in the Azerbaijan National Academy of Sciences for the revealing possible effects of solar, geomagnetic and cosmic ray variability on certain technological, biological and ecological systems. This paper describes some recently obtained results of the complex (theoretical, experimental and statistical) studies of influence of the periodical and aperiodical changes of solar, geomagnetic and cosmic ray activities upon human cardio-health state as well as human physiological and psycho-emotional state. It also covers the conclusions of studies on influence of violent solar events and severe geomagnetic storms of the solar cycle 23 on the mentioned systems in middle-latitude location. We have studied the possible impact of geomagnetic storms of various strengths on the human brain's bioelectrical activity and its functional state for healthy adults in different physiological states; the electroencephalographic (EEG) investigations were used as the most objective research method.

CMES Speed as a Multifractal phenomenon

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ABSTRACT:

A wide variety of phenomena in nature show a Multifractal behaviour. In particular, some of the main characteristics of solar features, related to the solar cycle, like flares and sunspots are related with multifractal phenomena. We study the distribution of speed for all the CMEs detected by LASCO, covering a complete solar cycle, and compare with previous analysis reported for SMM and MK3 missions. We applied Higuchi's method to CMEs speeds and show that for fast events (speeds greater than 400 km/s), speed can be identified as a multifractal phenomenon.

The origin and the model of the global topology of solar magnetic field.

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ABSTRACT:

Observations of the large scale magnetic field in the photosphere taken at Wilcox Solar Observatory since 1976 up to 2007 have been analyzed to deduce its latitudinal and longitudinal structures, its differential rotation, and their variability in time. It was studied whether the structure of the magnetic field calculated as a mean around the Sun at different latitudes is a component of a basic background field or the result of the misbalance of the strong magnetic field mainly concentrated in active regions. The contribution of the weak and strong magnetic fields on its topology has been studied, and it was established that the topology is determined mainly by the magnetic field of middle intensity. Such complex approch permits to reveal where the longitudinal structure is originated from, the rotation rate of this source level, and possible influence on the modulation of the counting rate of neutrino flux generated in the Sun. Short and long term variability of the neutrino flux has been compared with the magnetic field dynamics over the last three cycles of solar activity N 21, 22 and 23. The main results are the following: 1) The latitudinal topology of the photospheric magnetic field is composed of a four zonal 20-22-year periodical structure and polarity's waves running from the equator to the poles with periods of 2-3-years about. The boundaries of the four zones are located at the equator and at +/-25 degrees (where the solar activity has the highest amplitude). The polarities of the pre-equatorial zones coincide to the polarities of leading sunspots and have opposite signs in the Northern and Southern hemispheres. The polarity's waves have different periods in the Northern and Southern hemispheres, but they are synchronized by solar activity cycle. The velocity of the meridional flows of the magnetic field was calculated. 2) A longitudinal structure quasi-stable over 30 years exceptionally regular and symmetric in the both hemispheres has been found without any assumption about the rotation of the Sun. This structure is originated from the tachocline zone under the convective envelope. Comparison between the rotational rate of the large scale magnetic field and helioseismological findings of omega as a function of latitude and radius was performed. 3) Differential rotational rate of the magnetic field and its temporal dependence has been evidenced at different latitudes through activity cycles. Rotational rate of the large scale magnetic field at the latitudes above 55 degrees doesn't getting slower. The time of emergence was estimated. Torsional waves are clearly seen in the magnetic field rotation. Rotation is slower where and when the magnetic field is getting stronger. The models of latitudinal and longitudinal structures are suggested.

Electron temperature and density in a coronal streamer

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ABSTRACT:

The temperature of the solar corona has been determined by various methods. Differences in the results exist. Hence, we have considered interesting to use a method, different from those used in the past, based on the intensity of the hydrogen Lyman-alpha and Lyman-beta lines. The intensity data of these two lines yield two equations which permit to obtain the number density of the electrons and of the neutrals, and, by their ratio, the electron temperature. Hence, the electron temperature determined in this way is a combination of the excitation and ionization temperatures of hydrogen. We discuss this method and, in particular, its reliability, since absolute calibrations are not very accurate in the wavelength range of the lines used.

Coronal Mass Ejections: general characteristics and recent developments.

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ABSTRACT:

Coronal Mass Ejections (CMEs), hurling billion tons of plasma from the Sun into interplanetary space, originate from the disruption of a closed magnetic field that is torn open and allows plasma to be released into space. CMEs are interesting phenomena for a number of reasons. "Per se", as they provide a large scale example of magnetic field disruption, making it easier for scientists to build models and compare them with observations. Also, for further prompting an interest in the science of CME predictions, because of their impact on Space Weather. In this talk, after giving some general information on CME morphology, rate of occurrence and physical parameters, I will focus on the physics of CMEs, describing the most popular models envisaged so far and showing how they reproduce the observed characteristics of the events. All models invoke magnetic reconnection as a necessary process to understand the temporal evolution of CMEs. Conversely, the study of CMEs is contributing to our understanding of reconnection in astrophysical plasmas and I'll illustrate advancements in this field that have been achieved via the analysis of UV and White Light data acquired by space experiments over the last few years.

High Beta Plasma Disruptions in Near Space and Astrophysical Plasmas

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ABSTRACT:

Explosive magnetohydrodynamic (MHD) instabilities in neutron star magnetosheres, the solar corona magnetosphere, the Earth's magnetosphere and laboratory plasmas, play a major role in disrupting configurations associated with magnetic confinement and plasma energy storage. Central to our approach to this problem is the fact that the presence of resonances in Hamiltonian systems can have a destabilizing effect on the system as a whole. In Tokamaks, toroidally localized, high-n (toroidal) ballooning modes are driven to instability due to toroidally localized changes in the pressure gradient caused by low frequency, low-n modes. As an example of generic high beta disruptions we shall examine the nonlinear stability of the magnetic field topology and possible nonlinear plasma instabilities that might occur in the near Earth magnetotail (8-10 RE) during the substorm growth phase. These nonlinear instabilities lead to the initiation of the substorm intensification at the Earthward edge of the plasma sheet. Central to our model are ultralow frequency (1-4 mHz), normal modes (shear Alfven waves). The work we present is based, in part, on a Lagrangian-Hamiltonian approach, with possible further refinements on measures of nonlinear instability in MHD systems. We shall also discuss applications in neutron star magnetospheres.

solar telescope to survey full-diskαEconomic H chromospheric activity

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ABSTRACT:

Several rather expensive but not sufficient attempts have been made in the past to have a worldwide network of full-disk telescope to permit observations of the main chromospheric phenomena determining and/or resulting from the coronal activity. This phenomena play a determining role in Solar-Terrestrial relationship: all kind of flares spending many orders of magnitude in radiative fluxes, the chromospheric network including magnetic faculae, filaments eruptions and prominence activity, short transient brightenings, Moreton waves, dimmings, depletions, etc. etc. all related to both the CMEs and the SEPs. Unfortunately, the basic chromospheric layers are not yet measured in space, although new 1G$ missions are planned to be in operation since 2007-2008 to mainly see and/or cover the results of this chromospheric filtergrams are found to be the mostαubiquitous activity. From the ground, H useful imaging diagnostic to reveal the chromospheric activity. An other application of such routinephotometric quality observations is related to variabilities at bothe the chromospheric levels, like the analysis of the chromospheric shell and its prolateness, and the levels of the high photosphere, were the solar irradiance is highly variable. Standard ground-based photometric quality instruments do not yet exist to assure a reliable coverage of the chromospheric activity with a good cadence, which is not an easy task but now greatly benefit from recent technological progresses like CCD imaging and computer controlled data collecting systems. We experienced several different set-ups to define and qualify an optimal instrument to be duplicated at limited cost (typically 15 to 20 KEuros/instrument, depending of the chosen CCD camera and without the cost of the dome). We will describe our automatic H-alpha instrument, including the data-collecting system, and will show some typical results collected recently with these instruments operated until last year at IAP, now at the Luanda Solar Observatory, and at the Pic du Midi Observatory. The limitation of the instrument will be discussed and some remedies suggested, including the wish to put such instruments at low latitude sites (Angola, between 8° to 16° of latitude south) to exclude effects of the Earth atmospheric distorsion. The ultimate goal is to have such instrument in space with then, the HI Lyman alpha line chosen to have an improved diagnostic.

Chromosphere and Corona for Research and Education

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ABSTRACT:

I report on a series of our observations of the solar corona from total eclipses, most recently from the Pacific in 2005 and from Greece in 2006, and describe how eclipse observations advance our scientific understanding of the solar corona and how eclipses provide an opportunity to carry out public education in the wide areas of Earth in which partial or total phases are visible. I show eclipse observations over a span of Earth that shows some dynamic motions in the corona. I also describe observations of the solar chromosphere made simultaneously from the Swedish 1-m Solar Telescope on La Palma, NASA's Transition Region and Coronal Explorer (TRACE), and the SUMER experiment on the Solar and Heliospheric Observatory, and their use for scientific research and for public education.

Chromosphere and Corona for Research and Education

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I report on a series of our observations of the solar corona from total eclipses, most recently from the Pacific in 2005 and from Greece in 2006, and describe how eclipse observations advance our scientific understanding of the solar corona and how eclipses provide an opportunity to carry out public education in the wide areas of Earth in which partial or total phases are visible. I show eclipse observations over a span of Earth that shows some dynamic motions in the corona. I also describe observations of the solar chromosphere made simultaneously from the Swedish 1-m Solar Telescope on La Palma, NASA's Transition Region and Coronal Explorer (TRACE), and the SUMER experiment on the Solar and Heliospheric Observatory, and their use for scientific research and for public education.

Solar activity: One of the driving mechanisms for ionospheric TEC variations

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ABSTRACT:

The ionosphere's dynamic variability is not easily quantifiable due to unpredictable continuous processes caused among others by the solar-magnetosphere-thermosphere system behaviour over time. This paper presents a study of total electron content (TEC) changes using the South African dual frequency Global Positioning System (GPS) receiver network during solar cycle 23. Solar cycle 23 achieved its maximum in 2000-2001. GPS TEC values for high solar activity periods were analysed and compared to TEC values during the low solar activity periods. Results show that diurnal and seasonal variations cause more significant fluctuations in TEC compared to the geographic position of the GPS receiver stations considered within South Africa, with the predominant driver of TEC changes being the solar activity. TEC values can reach a maximum of at least 80 total electron content units, TECU (where 1 TECU is equivalent to 10^{16} electrons per m^2) and about 40 TECU in equinoxes and solstices, respectively during high solar activity periods. On the other hand, TEC values have magnitudes of about 35 TECU and 25 TECU in equinoxes and solsices respectively, during low solar activity periods. For both high and low solar activity periods, maximum TEC values occur in the time range approx. 10h00-12h00 UT.

Imaging the solar interior in three dimensions

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ABSTRACT:

The Sun vibrates in many different modes of acoustic oscillations that are stochastically excited by turbulent convection. These modes are sensitive to the internal properties of the Sun and thus inferences can be drawn about the interior from the surface observations of wave motions. Such observations have been recorded at high spatial resolution over more than a decade by the GONG network and by the SOHO/MDI space telescope. Linear inversions of the frequencies of the normal modes of oscillation have led to many exciting discoveries, such as the internal rotation as a function of depth and unsigned latitude. More recent techniques of local helioseismology are being developed to obtain a truly three-dimensional picture of the solar interior. In particular, an important goal is to image the subsurface structure and dynamics of magnetically active regions, including sunspots. I will present recent results based the interpretation of the correlation functions of seismic noise.

Multiparticle statistical modeling of two- and multi-component solar plasma flow

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ABSTRACT:

Classical description of plasma flows is based on systems of one-particle kinetic equations for each species. The interaction between particles is considered by collision integrals and self-consistent electric and magnetic fields. This approach is based on assumption about distinguishability of particles coordinates and therefore produces linearized description. By assuming particles coordinates are indistinguishable on instrumental resolution scales we come to consideration of joint probability that n particles have coordinates within a probe volume [1,2]. Correspondingly macroscopic parameters of plasma (gas) are calculated on the base of n-particle probability functions f in contrast with the classical model. Also the very definition of n-particle probability functions f differences from the classical one because by reducing a probability function F of a total system of N particles to n dimensions we have to exclude probe volume from integration domains of N-n particles. This model provides description of plasma (gas) in terms of fluctuations of macroscopic parameters. Under some simplifying assumptions this approach yields polynomial distributions of fluctuations for multi-component plasma and is reduced to multiparticle probability functions which dimensions are determined by scales of interparticle interactions. For instance in case of stationary spherically symmetric flow of collisionless quasineutral plasma, parameter fluctuations have binomial distributions which averages coincide with results of two-particle kinetic model [3] and are consistent with observational data. For k-component quasineutral plasma flow the suggested approach produces fluctuations with mean values that correspond to a K-particle kinetic model (where K is equal to the sum of particle charges of all k species of plasma). The suggested approach is based on n-particle probability functions which dimensions n are variable and depend on location (mean coordinate) of probe volume in nonhomogenous flow. Thus formulation of corresponding kinetic equations meet significant controversial points and reduced functions f are calculated according to their definitions on the base of a total distribution F derived from Liouville theorem. To form subsystems governed by Liouville theorem within infinite stationary plasma (gas) flows, the hypothesis of detailed dynamic equilibrium between separated open systems and surroundings is assumed.

The Variation of Daily Critical Frequency foF2 with Daily Sunspot Number R at Mid-Latitude Region

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ABSTRACT:

Ionosonde data recorded at Kokubunji, Japan (Latitude 35.7 N; Longitude 139.5 E) during years of high solar activities (1990, 1991, 1992) and low solar activities (1993, 1994, 1995) were used in our research work to study the correlation between daily sunspot numbers (R) and the daily mid-latitude F-region critical frequency (foF2) for four seasons (Spring, March; Summer, June; Autumn, October; Winter, December). There is a diurnal variation of (foF2) with (R), trends found over years of solar maximum are more positive in March and December but, negative in June and October except there is positive trends in October of year 1992. For years of solar minimum there are positive trends in June and October but, negative trends at night and positive trends at day in March and December. For year (1989) which is very high solar activity (Ri=157.6) there are negative trends in June and positive in December but in March and October there are positive trends at night and negative at day.

NET SOLAR RADIATION OVER HIGH POLLUTED SITES

NET SOLAR RADIATION OVER HIGH POLLUTED SITES
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ABSTRACT:

A major influence controlling the water loss from irrigated crops is the net radiation intensity Qn, but measurements of this are not normally available, and so attempts are often made to deduce it from other climatic data. The use of a set of empirical predictors such as sunshine, temperature and humidity in the arrangement shown by Linacre (1968) is very common. Studying of the net solar radiation correlation against the meteorological parameters has been done using the least square fitting. The data used are one complete year data as daily variations for two high polluted sites, Tabbin and Abbasseya, for the year of 2003. A high correlation found between the net radiation against the meteorological parameters (Temperature, Relative humidity and wind direction). The root mean square error RMSE and the mean bias error MBE have been calculated.

Ionospheric foF2 data and its response to solar activity cycles 21, 22, and 23

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ABSTRACT:

For solar activity cycles 21, 22, and 23 (1976 - 2006) the variations of monthly mean values of noon-time foF2 at Slough and Rome are studied. Several markers of the solar cycle activities in terms of the daily sunspot numbers and solar flare index and the daily magnetic index of Ap were then used to seek the possible influences of the solar and ionospheric activities on the critical frequencies observed at the two stations. It is found that the solar flare index, as a solar activity index, is more reliable in determining quiet ionospheric days. We conclude that instead of the ascending and descending branches of the solar activity, it would be advisable to use the extreme epoch values as the solar activity index for predicting and modeling the daily ionosphere during magnetically quiet periods as characterized by the daily magnetic activity index of Ap < 6.

Sensitivity of the Earth's magnetosphere to solar wind activity:

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ABSTRACT:

A new approach is proposed to study the sensitivity of the Earth's magnetosphere to the variability of the solar wind bulk velocity. The study was carried out using a three-dimensional electromagnetic particle-in-cell code, with the microphysics interaction processes described by Maxwell and Lorentz equations, respectively, for the fields and particles. Starting with a solar wind with zero interplanetary magnetic field (IMF) impinging upon a magnetized Earth, the formation of the magnetospheric cavity and its elongation around the planet were modeled over time until a steady state structure of a magnetosphere was attained. The IMF was then added as a steady southward magnetic field. An impulsive disturbance was applied to the system by changing the bulk velocity of the solar wind to simulate a decrease in the solar wind dynamic pressure, followed by its recovery, for both zero and southward IMF. In response to an imposed drop in the solar wind drift velocity, a gap (air pocket) in the incoming solar wind plasma appeared moving toward Earth. The orientation of the cusps was highly affected by the depression of the solar wind for all orientation of IMF. The magnetotail lobes flared out with zero IMF due to the ''air pocket'' effect. With the nonzero IMF, as soon as the gap hit the initial shock of the steady magnetosphere, a reconnection between the Earth's magnetic field and the IMF was noticed at the dayside magnetopause. During the expansion phase of the system, the outer boundary of the dayside magnetopause broke up in the absence of the IMF, yet it sustained its bullet shape when a southward IMF was included. The expansion/ contraction of the magnetopause nose is almost linear in the absence of the IMF but evolves nonlinearly with a southward IMF. The system recovered its initial state on the dayside soon after the impulsive disturbance was beyond Earth for both cases of zero and nonzero IMF. Comparison with existing observations from Cluster and Interball-1 seems to confirm many of our simulation results.

INNER GRAVITATIONAL WAVES EXITED OVER OSCILLATING SUNSPOT

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ABSTRACT:

The inner gravitational waves exited in the atmosphere over the sunspot by the vertical oscillation of the sunspot as a whole are studied by method of numerical calculations. In the proposed model, the oscillations of the sunspot are studied as the boundary conditions: the periodic variations of vertical velocity of the gas into some horizontal circle located at initial level. The radius of the oscillating circle is chosen to be equal to the sunspot radius, while the frequency equals to the frequency of the observed eigen long-term oscillations of the real sunspots. The results of numerical calculations are presented. The inner gravitational waves over the sunspot are shown to have quasi horizontal propagation. Therefore, the energy of the waves over the sunspot decreases exponentially. As the radial distance from the axes of sunspot grows, the high of the level of temperature and wave energy maximum increases slowly.

Solar eruptions disturbance of the lower ionosphere (D region), Measurements made by the Algerian VLF receiver

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ABSTRACT:

Very Low Frequencies (VLF) are used to probe the lower layer of the ionosphere (D layer). It is well known that solar eruptions are one of the powerful perturbations which cause changes in the ionosphere electron density. In our contribution we will present a result of the recent solar eruptions disturbances during year 2007 using different frequencies. The results show a different shape of the signal amplitudes and phases. The electron density is determined using phase velocity of each frequency.

The Sun's photospheric magnetic field

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ABSTRACT:

The magnetic field of the Sun, produced in its interior, exercises its major influence on the corona of the Sun. However, the layer at which it is measured most reliably and in greatest detail is the solar photosphere. Here the magnetic field is found to be structured on very small scales and to be highly dynamic. There is strong evidence that much of the field's fine structure is still unresolved even by the highest resolution observations currently available. An overview of some of the major observational and theoretical results will be given.

Expected Ozone Hole Recovery Due to Weak Solar Cycles

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ABSTRACT:

A prolonged period of reduced solar activity of the order of few decades is expected owing to the presence of weak solar cycles series like those around 1800 and 1900 AD. Reduced UV flux is forecasted. The multitude of phytoplankton in the Antarctic ocean which are harmed by excessive UV passing through the ozone hole are expected to recover owing to the reduced solar UV doze even with the existence of ozone hole. An increase of only 10% of the phytoplankton would remove about 5 gigatons of carbon dioxide from the atmosphere annually (which is equal to the amount of carbon dioxide emitted currently by fossil fuel utilization) and sink it into the ocean. Reduction of carbon dioxide from the atmosphere will lead to cooling of the troposphere and hence warming of Antarctic stratospheric clouds which are the sight of ozone destruction. Eventually, this procedure will hopefully lead to Antarctic ozone hole closure. The paper also discuss the implication of the 1997 solar induced climate change on the appearance of the Arctic ozone hole and the reduction of the Antarctic ozone hole.

Cooling of the Earth, A verified Expectation

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ABSTRACT:

Owing to the present presence of weak solar cycles on the sun, I have published several papers in international and national journals and conference proceedings since 1995 warning of the expected cooling of the earth. This cooling is expected in air and sea surface temperatures in all Oceans. The weak solar cycles are accompanied by fast photospheric rotations but slow tachocline spin rate where the solar dynamo is located. This induces a drop in solar irradiances in all wavelengths. Hence the solar energy budget drops leading to cooling of the earth. The snow storms over Jerusalem, Jordan and Lebanon, China and elsewhere bares witness for truth of the expected cooling of the earth. Such cooling is expected to last at least with cycle 24. The cooling of the Pacific Ocean is expected to lead to perhaps to about seven successive years of La Nina and will thus lead to excessive destructive Nile floods as well as other parts of other parts of the world which are teleconnected such as North of Brazil and North of China and Indonesia. Some other parts of the world at which La Nina causes drought are expected to face several years of severe droughts which will intensify near the end of cycle 24. Serious implications on plantations and crops are to be expected. Sernaios for warming the earth ought to be abonded and give way for cooling of the earth senarios.

Study of high-resolution observations of chromospheric fine structures seen in the Ha 6563 A and Ca II 8542 A lines

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ABSTRACT:

Observations of the solar chromosphere were obtained with the Multichannel Subtractive Double Pass (MSDP) spectrograph installed at the focus of the VTT on Tenerife (Canary islands). The very high spatial resolution observations were performed in the Ca II 8542A and the H\alpha 6563A lines over a two dimensional field-of-view (FOV) and at several wavelengths within these lines. We analyzed the morphological properties of distinct solar features, such as quiet region mottles, active region fibrils and penumbral fibrils as seen in the two different lines. We also applied the cloud model in every pixel of the FOV for both line profiles and obtained several physical parameters of the distinct solar features, such as velocities, Doppler widths, optical depths, etc. The values of these parameters are compared in order to determine the similarities and differences between different structures believed to belong in the same family.

Current trends in coronal seismology

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"Nakariakov, Valery"

ABSTRACT:

Coronal seismology is a new, rapidly developing branch of Astrophysics, aiming remote diagnostics of solar and stellar coronal plasmas by means of magnetohydrodynamic (fast and slow magnetoacoustic and Alfven) oscillations and waves. Theoretical foundation of Coronal Seismology - the magnetic cylinder model - successfully predicted the presence and properties of kink, sausage and longitudinal modes of coronal plasma structures. The analysis of observationally determined properties of these modes allows us to estimate the key physical parameters of the coronal plasmas which are not open to the direct measurement by other methods: the magnetic field, transport coefficients, heating function, characteristic scale of sub-resolution structuring. The recent advances in coronal seismology include the multi-modal approach, the analysis of shorter periodicities associated with quasi-periodic pulsations in flares, multi-instrumental and multi-wavelength observations, and the application of automated wave-detection algorithms.

S5- Astronomical Data Management, Handling, Processing and Software

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IYA2009 Radio and Video Conferencing in Africa 2009

Mr. Lebohang Kompi* (MD EML 2007/103, Commncng BSc Ed Phys & Maths NUL), Phakamile Xingwana, Seeiso Maama, Sello Mpota, Fumane Tsekoa, Ithateleng Sesinyi, Letsie Bokang, Leseli Leseli, Tlali Kamoho, Petlane Sebili, 'Mulane Pofane, and Kori Shoaepane. Associates: Dr. Spirit Tlali (NUL) einsteinsmindlesotho (EML)2007/103, Lesotho, Southern Africa kompilw@yahoo.com

ABSTRACT:

IYA2009 Radio and Video Conferencing in Africa 2009 For the 1st Africa and Middle East IUA Meeting, Cairo, Egypt: 05-10th April 2008 Lesotho's Amateur Astronomy for Youths By: Mr. Lebohang Kompi* (MD EML 2007/103, Commncng BSc Ed Phys & Maths NUL), Phakamile Xingwana, Seeiso Maama, Sello Mpota, Fumane Tsekoa, Ithateleng Sesinyi, Letsie Bokang, Leseli Leseli, Tlali Kamoho, Petlane Sebili, 'Mulane Pofane, and Kori Shoaepane. Associates: Dr. Spirit Tlali (NUL) The IYA2009 activities will take place locally, regionally and nationally. National Nodes in each country have been formed to prepare activities for 2009 and EML is one of such bodies in Lesotho. These Nodes establish collaborations between professional and amateur astronomers, science centres and science communicators. The vision of the International Year of Astronomy (IYA2009) is to help the citizens of the world rediscover their place in the Universe through the day- and night time sky, and thereby engage a personal sense of wonder and discovery. All humans should realize the impact of astronomy and basic sciences on our daily lives, and understand better how scientific knowledge can contribute to a more equitable and peaceful society. The International Year of Astronomy (IYA2009) will be a global celebration of astronomy and its contributions to society and culture, highlighted by the 400th anniversary of the first use of an astronomical telescope by Galileo Galilei. The aim of the Year is to stimulate worldwide interest, especially among young people, in astronomy and science under the central theme "The Universe, Yours to Discover".

Science projects with the Armenian Virtual Observatory

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ABSTRACT:

The Armenian Virtual Observatory (ArVO) is created to develop efficient methods for science projects based on the digitized famous Markarian survey (Digitized First Byurakan Survey, DFBS) and other large astronomical databases, both Armenian and international. Two groups of projects are especially productive: search for new interesting objects of definite types by low-dispersion template spectra, and optical identifications of new gamma, X-ray, IR and radio sources. The first one is based on modeling of spectra for a number of types of objects: QSOs, Seyfert galaxies, white dwarfs, subdwarfs, cataclysmic variables, planetary nebulae, C stars, etc. Each kind of object appears in the DFBS with its typical SED and spectral lines (for objects having broad lines only), however affected also by its brightness, so that each template works for definite range of magnitudes. The search criteria define how many objects will be found for further study, and may restrict these numbers leaving with the best candidates. At present, three projects of search for new objects have been started: search for blue stellar objects, search for extremely red objects, and search for variable objects. Optical identifications have been proven to be rather efficient for IR sources from IRAS PSC and FSC. Tests have been carried out for X-ray and radio sources as well.

TEACHING ASTRONOMY USING ARTIFICIAL INTELLIGENCE "AI":A FUZZY LOGIC CASE STUDY

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"Ali Hussain Abdullah"

ABSTRACT:

Advanced topics in Astronomy / Astrophysics live in a fuzzy world where uncertainty, huge data of various types, inaccurately pointed telescopes, and new unpredicted discoveries are its main ingredient. These topics are in most cases difficult to teach and require specific background and skills. The main goal of this paper is to introduce AI / Fuzzy Logic as an effective and dynamic, yet enjoyable teaching tool for such advanced topics of uncertain nature. The paper uses Astrophysics classification of stars as a case study that shows how the new trend of AI technology, named Fuzzy Logic can be used in teaching Astronomy and Astrophysics.

A Catalog of previously unstudied clusters of Dias and King.

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ABSTRACT:

The main physical parameters of previously unstudied open star clusters of Dias and King are investigated here. The Naval Observatory Merged Astrometric Dataset (NOMAD) of Zacharias et al (2004) is used. The clusters' centers, angular diameters, ages, distances, metallicities, and color excesses for these clusters are estimated for the first time.

The simulation of the performance of a photovoltaic system in the tropics using heliophysical variables

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ABSTRACT:

THE SIMULATION OF THE PERFORMANCE OF A PHOTOVOLATIC SYSTEM IN Rabiu, A. B.+THE TROPICS USING HELIOPHYSICAL VARIABLES Bolaji, O. S., and Department of Physics, Space Physics Laboratory Federal University of Technology, AKURE, Nigeria Abstract A method of estimating the performance of photovoltaic systems is presented in this paper. A catalogue of heliophysical data from Eleven Nigerian meteorological stations spanning through a decade was employed in obtaining the performance of a photovoltaic plant. The system studied composed of photovoltaic array, power tracker, battery storage, inverter and load. Utilizability of PV systems and some other PV array parameters were estimated by simulation using the monthly averages of Nigerian meteorological data. Appropriate models were developed for estimating performance of the photovoltaic system. Typical results obtained were observed to satisfy expectation. Spatial and temporal variations of the estimated performance of PV systems are explicable in terms of traditional atmospheric conditions in the localities of measurements. Keywords: photovoltaic systems, utilizability, performance, atmospheres

A CCD Photometric Search for Pulsation in EG Cep

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ABSTRACT:

In a recent comprehensive catalogue of Delta Scuti type pulsating stars there are 86 objects to binary or multiple stellar systems (Rodriguez et al., 2000). Recent surveys revealed a few more eclipsing binaries with pulsating components (e.g. Kim et al., 2003). These stars are desired compound for asteroseismology in order to identify pulsation modes through determination of fundamental physical parameters. Another interesting possibility is the study of tidal effects on oscillation (Willems & Aerts, 2002). Inspired by this importance, we started a photometric survey of Algol and Beta Lyr type eclipsing binaries for pulsating components. Since Delta Scuti stars are main-sequence or slightly evolved A-F type stars in the lower parts of the instability strip, our targets were selected according to the spectral type of the components. Basic data were extracted primarily from the Hipparcos database (ESA 1997). In this paper we present the results obtained for EG Cep (V (max) =9.36, mean spectral type A5V). The system was observed with the 40-cm Cassegrain telescope of the Observatory of the University of Athens, equipped with the ST8XMEI CCD camera and with Bessell BVRI-filters. Oobservations were carried out during five nights in July 2007. Our light curves have been analysed with the PHOEBE program (Prša and Zwitter, 2005) which uses the 2003 version the Wilson-Devinney code (Wilson and Devinney, 1971; Wilson, 1979, 1990). To each filter individually we applied the code in MODE 5 which solves the light curve of semi-detached eclipsing binaries where the secondary (cooler) component fills its Roche lobe, while the primary (hotter) one is well inside its Roche lobe. The effective temperature of the primary component was taken from Poper (1980) as 8500 K, correspoding to A4-5V star. The gravity darkening coefficients g1, g2 and the albedos A1, A2 of the primary and secondary components, respectively, were set to the theoretical values. The limb darkening coefficients x1, x2 were supplied by the code. The results of light curves analysis showed that physical and geometrical parameters of EG Cep are nearly the same as reported by (Erdem et al., 2005). The light curves didn't show discernible light variation due to short period oscillation of any of the components

STUDY OF THE RAINFALL OVER THE CAPITAL KUWAIT

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ABSTRACT:

The present paper investigates the monthly and seasonal rainfall over the Capital Kuwait through the period of (1994-2006). The actual observed monthly data of the meteorological elements (rainfall, temperature, relative humidity, wind speed) at the surface and the number of days of thunderstorms on Kuwait International Airport (K.I.A) meteorological station through that period had been used in the present study. The results revealed that the rainfall amounts varied dramatically from month to month and from season to season. In addition to that there are two rainy seasons, winter and autumn seasons. The total rainfall exceeded 120 mm in winter and 75 mm in autumn. Meanwhile there is a little amount of rain during spring season through the study period.

S6- Ground and Space Instrumentations and Telescopes

Model for Evaluation of Silicon Solar Cell Degradation at LEO and GEO Orbits

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ABSTRACT:

The solar cells used in space environment are subjected to bombardment of charged particles of a wide energy range. This bombardment introduces defects in the constituent materials of the solar cells and, consequently, deteriorates its electronic properties. Radiation damage tests, performed under controlled and normalized conditions, allow studying the resistance of the photovoltaic (PV) devices to the space environment and predicting their performance at the end of life. Therefore, tests are very useful because they allow a proper design of the modules for a satellite mission. The space particle flux depends on the orbit of the mission. The radiation damage in satellites at low Earth orbits (LEO) and GEO is mainly produced by these particles. Hence, it is important to evaluate the damage production using these particles in terrestrial experiments. Under the particles fluence conditions of the present analysis (φ ≤1013 p/cm2) most of degradation is caused by recombination centers induced by radiation, reducing lifetime in the cell base. The lifetime decrease produces a degradation of the electrical parameters of the cell, open circuit voltage (Voc); maximum power point (Pmax); short circuit current (Isc(and fill factor (FF). Because of the wide range of energy of the particles in the space environment, it is necessary to define the concept of equivalent damage produced by particles of certain energy for laboratory test. For this purpose, it is commonly accepted that 1 MeV electrons or 10 MeV protons are suitable. We have studied experimentally and theoretically the radiation damage on monocrystalline silicon solar cells. In summation ten samples have been irradiated by two types of radiations (gamma rays and electron particles). Different doses are considered to study on silicon solar cells using a facility developed to measure in situ the I–V curve of the cell in a unique irradiation experiment using a tandem accelerator. A set of numerical simulations performed shows the correlation between experimental results and lifetime degradation in the base region of the cells. A new model to evaluate the radiation damage in silicon solar cells based on one diode model is developed.

Seeing monitor: new concept

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ABSTRACT:

We present in this communication, a new instrument to monitor the atmospheric seeing. It's based on small telescope and ccd camera. The seeing is one of the most important parameters used by the astronomers to measure the perfomence expected in imagery from the ground based observational sites. The instrument presented here is based on very new concept and will simplify the new generation of seeings monitors.

VARIATIONS AND TRENDS IN LONG TERM ANNUAL MEAN AIR TEMPERATURES OVER SOME SELECTED CITIES IN NIGERIA

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ABSTRACT:

ABSTRACT This study looks into the climate change in 5 five Nigerian cities in the past 20 years, Lagos, Ibadan, Calabar, Sokoto and Port Harcourt. The purpose of this study is to investigate the variations and the trends in long term annual mean air temperatures by using graphical and statistical time series methods. The study covers a 20 year period starting from 1981 and uses data from 5 different stations. Spatial distribution of the annual mean temperatures and coefficients of variation were studied in order to show normal conditions of the long term annual mean temperatures. Some nonparametric tests were used to detect abrupt changes and trends in the long term long term mean temperatures of all the locations. Only Lagos and Ibadan show significant warming trends, Calabar and Port Harcourt show a cooling trend of no significance. The uncertainties surrounding global warming arguments have been reflected in studies of climatic change of Nigeria. Key Words: Temperature, warming, trends, climate change, Calabar, Ibadan, Port Harcourt, Lagos, annual mean.

A Multi-Fiber Spectrograph to evaluate Radial Speed of Halo CMEs

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ABSTRACT:

Coronal Mass Ejections (CMEs) are the most important events responsible for disturbances to space weather. The dynamical parameters of CMEs are measured on images obtained by ground based and space Coronagraphs. Most of them, white light images from Thomson scattering showing the changes on structures as projected on the plane of the sky. LASCO C1, MICA and some other Coronagraphs implemented Fabry-Perot spectrographs to observe the low Corona but not significant data of Halo CMEs have been acquired in this way. In this work we present the design of a Spectrograph with a broad spectral coverage around the green line at 530.3 nm, in order to evaluate radial speeds of Halo CMEs. The multi-fiber-fed spectrograph will give individual spectra for each fiber to reconstruct the spectral features of the whole focal plane, improving temporal and spatial resolution of coronal images.

An Update the 74-inch Telescope of Kottamia Astronomical Observatory in Egypt

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ABSTRACT:

Recently an upgrade stage for Kottamia Astronomical Observatory (KAO) including a new optical system and a computer controlling of both the telescope and dome has been achieved. The current status of the telescope together with the available instrumentations is described. The specifications of a set of CCD cameras for direct imaging and spectroscopy are given. A grating spectrograph is recently gifted to KAO from Okayama Astrophysical Observatory, OAO, of the National Astronomical Observatories in Japan. This spectrograph is successfully tested and installed at the F/18 Cassegrain focus of the KAO 74" telescope. First light Observations at Newtonian focus (F/4.8) will be presented.

Economic H-alpha solar telescope to survey full-disk chromospheric activity

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ABSTRACT:

Several rather expensive but not sufficient attempts have been made in the past to have a worldwide network of full-disk telescope to permit observations of the main chromospheric phenomena determining and/or resulting from the coronal activity. This phenomena play a determining role in Solar-Terrestrial relationship: all kind of flares spending many orders of magnitude in radiative fluxes, the chromospheric network including magnetic faculae, filaments eruptions and prominence activity, short transient brightenings, Moreton waves, dimmings, depletions, etc. etc. all related to both the CMEs and the SEPs. Unfortunately, the basic chromospheric layers are not yet measured in space, although new 1G$ missions are planned to be in operation since 2007-2008 to mainly see and/or cover the results of this chromospheric filtergrams are found to be the mostαubiquitous activity. From the ground, H useful imaging diagnostic to reveal the chromospheric activity. An other application of such routinephotometric quality observations is related to variabilities at bothe the chromospheric levels, like the analysis of the chromospheric shell and its prolateness, and the levels of the high photosphere, were the solar irradiance is highly variable. Standard ground-based photometric quality instruments do not yet exist to assure a reliable coverage of the chromospheric activity with a good cadence, which is not an easy task but now greatly benefit from recent technological progresses like CCD imaging and computer controlled data collecting systems. We experienced several different set-ups to define and qualify an optimal instrument to be duplicated at limited cost (typically 15 to 20 KEuros/instrument, depending of the chosen CCD camera and without the cost of the dome). We will describe our automatic H-alpha instrument, including the data-collecting system, and will show some typical results collected recently with these instruments operated until last year at IAP, now at the Luanda Solar Observatory, and at the Pic du Midi Observatory. The limitation of the instrument will be discussed and some remedies suggested, including the wish to put such instruments at low latitude sites (Angola, between 8° to 16° of latitude south) to exclude effects of the Earth atmospheric distorsion. The ultimate goal is to have such instrument in space with then, the HI Lyman alpha line chosen to have an improved diagnostic.

Contribution of Remote sensing to the estimation of the daily diffuse solar irradiation from the treatment of images PDUS of visible canal of the satellite Meteosat in south of France

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ABSTRACT:

The satisfaction of an energetic demand(heat-cold-electricity...) by the use of the solar radiation (renewable and non polluting energy) can only but viewed if a probable evolution of the local solar radiation within the next years can be foreseen. it is in the concern of mastering the solar layer in the zone to be studied that we have adapted a processor of the assessment of the radiation which allows the access to that concern, from the PDUS images of the visible channel of METEOSAT and based on HELIOSAT Method and GISTEL Method. we have considered the data of a southern Station in France (ODEILLO,1999),located in latitude 42°29'North and longitude 02°07'Est,1580m of altitude.We have been able to improve the output from 50% to 82% between the measured values read by the Pyranomter and the estimated values read by the satellite. the direct application coming from those works was the production of an energic map of a given region for the economic,scientific needs and the validation of an assessment model.

Eclipsing Binary (EB) star studies

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ABSTRACT:

The importance of Eclipsing Binary (EB) star studies in better understanding stellar structure and evolution is underlined. The combined astrometric, photometric and spectroscopic data, obtained from ground-based and space observations, will be used to compute the physical parameters of the observed EBs. Moreover, the database of EB stars from ground-based surveys and the Gaia, COROT and Kepler space missions will provide light curves for many thousands new systems for which follow up ground-based observations can be carried out. In certain cases, light curves of superior quality will allow studies of fine effects of stellar activity and very accurate determination of stellar parameters. From a study of a small sample of EBs, based on Hipparcos (Gaia-like) observations, it is shown that the stellar parameters can be determined (in many cases) at about 2% accuracy level. Moreover, many new discoveries of interesting systems are expected from those space missions, including low mass binaries and star-planet binary systems.

The Southern African Large Telescope

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ABSTRACT:

The 10m-class Southern African Large Telescope (SALT) has been completed and is now in the commissioning phase. This new paradigm in low-cost, large-telescope construction is based on the HET prototype but with significant improvements to its optical design. I will describe the status of this queue-scheduled telescope, paying particular attention to its high time resolution and multi-mode spectrograph which can undertake imaging and spectropolarimetry, multi-slit and Fabry-Perot observations.

The Impact of Space Missions on Eclipsing Binary Star Studies

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ABSTRACT:

The importance of Eclipsing Binary (EB) star studies in better understanding stellar structure and evolution is underlined. The combined astrometric, photometric and spectroscopic data, obtained from ground-based and space observations, will be used to compute the physical parameters of the observed EBs. Moreover, the database of EB stars from ground-based surveys and the Gaia, COROT and Kepler space missions will provide light curves for many thousands new systems for which follow up ground-based observations can be carried out. In certain cases, light curves of superior quality will allow studies of fine effects of stellar activity and very accurate determination of stellar parameters. From a study of a small sample of EBs, based on Hipparcos (Gaia-like) observations, it is shown that the stellar parameters can be determined (in many cases) at about 2% accuracy level. Moreover, many new discoveries of interesting systems are expected from those space missions, including low mass binaries and star-planet binary systems.

SIMULATION OF ELECTRICAL CHARACTERISTIC AND EXTRACTION OF SOLAR CELL DEVICE PARAMETERS USING THE LAMBERT FUNCTION W

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ABSTRACT:

Extraction and optimization of solar cell parameters is an important area in electrical characterization of photovoltaic systems: simulation and modeling. A numerical procedure is described for computing respectively the series resistance, the ideality factor, the saturation current the photo current and the shunt conductance in solar cells using the called Lambert function. In this study, we have also extracted the cell parameters from our curves using the same function. The method is based on calculating the current values explicitly with voltage. It is applied to a commercial cell and a comparison is made between analysis and other known method. The results obtained for a solar cell are in good agreement with previously published data.

Space Missions to study Heliophysics

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ABSTRACT:

Starting with Yohkoh, SoHO, Coronas and Trace, several space missions already brought a lot of new data concerning the physics of the Sun, its corona and wind, up to 1 UA. Eruptive magnetic phenomena, including flares and CMEs, are studied from a new point of view, thanks to both W-L and EUV imaging. A new field of sciences did appear: Heliophysics. More recently new generation missions were launched: Stereo with 2 orbiting at 1 AU space-crafts, before and after the Earth, Solar-B call now Hinode, orbiting around the Sun, Coronas-Photon and soon (end of the Year), the large SDO on geosynchroneous orbit and permanently pointed towards the Sun. A short coverage of the rather complementary capabilities of all these missions will be given to present the opportunities offered for the researcher in Heliophysics and Solar-terrestrial physics.

Developing ways to efficiently use small telescopes for actual research and education

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ABSTRACT:

The progress of astrophysics is currently quite rapid. During a few last decades, the situation in ground-based and space astronomy has changed dramatically, to a certain degree thanks new observational facilities. However, not only new telescopes and new satellites or planet missions give the possibility to answer some of the fundamental questions. Telescopes with an aperture up to 2 m provide good enough opportunities for the study of celestial objects in a wide range of spectral regions. Ground-based networks of small optical telescopes equipped with CCD cameras are an important tool to investigate of ultra-rapid variability of stellar brightness, to search for optical afterglow of gamma ray bursts, etc. as synchronous observations can give information that cannot be obtained in other way (Nogami et al., 2000; Zhilyaev et al., 2003). The observations with the Synchronous Network of distant Telescopes (SNT), which involves telescopes in Ukraine, Russia, Bulgaria, and Greece, were started in the late 1990s. The most remarkable results obtained from observations of galaxies and flare stars are described in (Zhilyaev et al., 2006, 2007). The decade of successful research with SNT has yielded various analytical and numerical techniques to provide synchronous observations with distant telescopes. In 2006 the UNIT project (Ukrainian Network of Internet Telescopes) was initiated. It is aimed at the use of new technologies and systems to better demonstrate opportunities of modern astronomy and to create an interface between society and basic science. The philosophy of UNIT is to develop an instrument to perform observations through Internet from a PC at any location and to provide near-real-time access to data. The operations concept of UNIT would foster improvements in science and education process (Godunova et al., 2007). At present, the system of UNIT has been completed. There are three automatic telescopes (Celestron 11" & 14", 80-cm telescope), which are installed at two sites in Ukraine and at the Terskol Observatory in the Northern Caucasus. The number of telescopes in operation should increase in the near future, uppermost due to involving interested parties from Ukraine and abroad. The availability of robotic telescopes on the market gives many countries the opportunity to participate in international research. The UNIT instruments are sensitive down to MV ~ 18 and require about one minute to obtain the first images of transient object after the alarm or GCN notice (slew speed up to 3˚ per second).

Developing ways to efficiently use small telescopes for actual research and education

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ABSTRACT:

The progress of astrophysics is currently quite rapid. During a few last decades, the situation in ground-based and space astronomy has changed dramatically, to a certain degree thanks new observational facilities. However, not only new telescopes and new satellites or planet missions give the possibility to answer some of the fundamental questions. Telescopes with an aperture up to 2 m provide good enough opportunities for the study of celestial objects in a wide range of spectral regions. Ground-based networks of small optical telescopes equipped with CCD cameras are an important tool to investigate of ultra-rapid variability of stellar brightness, to search for optical afterglow of gamma ray bursts, etc. as synchronous observations can give information that cannot be obtained in other way (Nogami et al., 2000; Zhilyaev et al., 2003). The observations with the Synchronous Network of distant Telescopes (SNT), which involves telescopes in Ukraine, Russia, Bulgaria, and Greece, were started in the late 1990s. The most remarkable results obtained from observations of galaxies and flare stars are described in (Zhilyaev et al., 2006, 2007). The decade of successful research with SNT has yielded various analytical and numerical techniques to provide synchronous observations with distant telescopes. In 2006 the UNIT project (Ukrainian Network of Internet Telescopes) was initiated. It is aimed at the use of new technologies and systems to better demonstrate opportunities of modern astronomy and to create an interface between society and basic science. The philosophy of UNIT is to develop an instrument to perform observations through Internet from a PC at any location and to provide near-real-time access to data. The operations concept of UNIT would foster improvements in science and education process (Godunova et al., 2007). At present, the system of UNIT has been completed. There are three automatic telescopes (Celestron 11" & 14", 80-cm telescope), which are installed at two sites in Ukraine and at the Terskol Observatory in the Northern Caucasus. The number of telescopes in operation should increase in the near future, uppermost due to involving interested parties from Ukraine and abroad. The availability of robotic telescopes on the market gives many countries the opportunity to participate in international research. The UNIT instruments are sensitive down to MV ~ 18 and require about one minute to obtain the first images of transient object after the alarm or GCN notice (slew speed up to 3° per second). The study of variables at MU ~ 12 on a timescale of 1s could also be accomplished with UNIT. The telescopes are equipped with fast CCD cameras to study astrophysical events on the timescales up to tens Hz. By means of GPS technology, all exposures at the remote telescopes can be synchronized with an absolute accuracy of better than 1 ms. To observe transients, which are typically at magnitudes 10-14m, we can use the coincidence technique for synchronous observations within UNIT and in that way obtain a time resolution of about 0.1 s.

The Sun and Heliosphere in 3D – First Highlights from the NASA STEREO Mission

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ABSTRACT:

The NASA STEREO mission has been successfully launched in October 2006. The mission consists of two nearly identical satellites in heliosynchronous orbit at distances of 0.96 and 1.08 AU. In these orbits both satellites, STEREO A (Ahead) and STEREO B (Behind), are separating from the Sun-Earth line at a rate of 23° per year, i.e. their mutual angular distance increases per year by 46°. The unique orbit of the STEREO satellites and the dedicated imaging and in-situ payload provide the first ever remote sensing observations of the Sun and Heliospher in 3D and in later phases of the mission of the entire Sun-Earth system, making STEREO a milestone mission in the fields of solar and heliospheric, and space weather research. For the first time ever, coronal mass ejections (CMEs), the prime drivers of space weather, willbe directly imaged en route from Sun to Earth's magnetosphere simultaneously from two different vantage points, allowing to infer their 3D structure and evolution in the inner heliosphere. STEREO has excellently completed its first year of operations and the flawless operation of the instrument suites has provided spectacular new viewsof the Sun and heliosphere and its dynamics, including unprecedented observations of comets, planets and even stellar objects. This presentation summarizes STEREO's major observational highlights to-date.

S7- Astronomical Scientific Research&Education in MEA countries, IYA and IHY activities

THE STATUS OF AFRICAN PARTICIPATION IN THE INTERNATIONAL HELIOPHYSICAL YEAR (IHY)

1Rabiu, A. B., 2 Thompson, B. J., 3Amory-Mazaudier, C., 4 Potgieter, M., C., 5 Seghouani, N., 6Baylie Damtie, 7Obrou, O. K., 8 Rabello Soares, M.C., 9Yumoto, K., 10 Groves, K., 11 Umran, I., 12Scherrer, D.
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ABSTRACT:
This paper assesses the participation of Africa in the ongoing International Heliophysical Year (IHY). IHY fosters ties between traditional/cosmic geophysics and astronomy. Astronomical Telescopes, Atmospheric Weather Electromagnetic System for Observation Modeling and Education AWESOME, Magnetic Data Acquisition System MAGDAS, Scintillation Network Decision Aid SCINDA, AMMA GPS and IGS GPS research facilities are the IHY intervention facilities already installed in African countries. The facilities are being well utilized and coordinated. National Organising Committees are being formed in individual member nations and the African Regional Committee is being strengthening towards the sensitization of the member countries and ultimate actualization of the goals of the International Cooperation program. Three continental IHY workshops have been held so far in Africa with participants drawn from several African states. The African IHY summer school has been scheduled for the last quarter of 2008. We describe the outreach activities across African axis during the 2006 total solar eclipse sponsored by IHY. Capacity building and technological transfer are part of the spin-off being derived from IHY. IHY is capable of providing a perfect bridge between north and south. African scientists and research institutes are already benefiting from the IHY planned international collaboration and cooperation. IHY is fostering strong intra–continental partnerships amongst African scientists.

IHY Activities In Egypt

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ABSTRACT:

Current observations of white image solar phenomena are taken regularly at Helwan Solar Station and monthly reports are currently sent to W.C of S.A. lazer ranging of artificial satellites is also carried out and the data are regularly sent to EUROLAS Data Center in Munich, Germany. Egyptian Solar Observers took an active role in the IHY project "The Sun-Earth-Day of the 29th March Solar Total Eclipse, 2006". Excellent photographs of the solar corona up to 4RSun of the solar limb have been secured. Interesting features of the prominence activity at the solar limb have also been recorded. Egypt hosted the IAU symposium No 233" On Solar Activity and its Magnetic Origin, 31 March-4 April, 2006". Several scientific contributions are presented in this symposium and other IHY events held in Emirates, Japan, India, Ethiopia and Moscow. In the field of the Public Outreach, several one day symposia have been held in the Academy of Scientific Research and Technology during 2005- 2006, and the World Space Environment Forum (WSEF) was held in Bibliotheca Alexandria 20- 25 October 2007. Moreover a simplified encyclopedia on Astronomical and Space Sciences was published during 2007 in Souzan an Mubark Center of the Scientific Exploration. It is also published science 2005 in the site www.smsec.com.

IHY activities in Egypt

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ABSTRACT:

We present here the current status of IHY projects in Egypt. The first project is already started between Space Environment Research Center of Kyushu University in Japan and Helwan University in Egypt in order to conduct joint scientific investigations of the Earth's magnetic field. The parties will develop a network of ground-based monitoring system to monitor the geomagnetic field over southern and central Egypt. In order to expand the global monitoring of the Earth's magnetic field, a network of MAGnetic Data Acquisition System (MAGDAS) was deployed in Egypt in order to carry out space weather studies. The second project was by and between University of Texas at Austin in USA and Helwan University in Egypt in order to conduct joint scientific investigations of the Earth's ionosphere. The parties will develop a network of passive radio instruments to monitor the ionospheric weather associated with the equatorial fountain situated over southern and central Egypt. In order to better understand the spatial and temporal scales over which the equatorial fountain varies, a network of three Coherent Ionospheric Doppler Receiver (CIDR) systems will be deployed in a roughly north-south chain in Egypt. By analyzing the CIDR data set as a function of time and ionospheric drivers, this project will gain valuable new insights into the weather of the equatorial fountain and the radio environment over Egypt.

Mount Korek Observatory - Iraq

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ABSTRACT:

The Iraqi National Observatory, at Mount Korek in Iraqi Kurdistan, was built in the 1980's.The core facilities of the Observatory include a 3.5-meter and a 1.25-meter optical telescope, as well as a 30-meter radio telescope. At the time of construction, it was one of the largest observatory complexes in Asia. The Observatory was near to completion when it was damaged during the Iraq-Iran war and later during the Gulf war in 1991. Soon after the changes in Iraq in 2003, steps were taken to rebuild the Observatory. Visits were made to the site to assess the damage. The Kurdish regional government suggested forming an international committee to visit the site again, in order to put forward a plan for reconstruction, and to suggest additional telescopes and instruments. The Mount Korek Observatory, although built over 20 years ago, remains the largest such observatory in the Middle East. Plans to replace the 3.5m telescope with a 6m telescope is one of the options currently available. This proposal, together with a review of our latest efforts, forms the focus of this paper.

Astrophysics Rebirth in Algeria

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ABSTRACT:

Algeria is witnessing what could be described as rebirth of astronomy and astrophysics both at the Academic level as well as at the grass root one. We have set up a Constantine University a graduate program in astrophysics (Ecole Doctorale d'Astrophysique) which has just been agreed by the Algerian Ministry of Higher Education and will start next fall the year 2007/2008 and which is the first of its kind in Algeria. It is a consortium of four universities and research centres set up in Eastern Algeria, and contains a healthy part related to space science. It includes the CNTS (Centre National des Techniques Spatiales) which is responsible for the conception of AlSat1, the first Algerian micro satellite. It aims at establishing an astronomy culture in Algeria at an academic level since up to now no astronomy or astrophysics program exists at any University in Algeria. It will legitimize astrophysics as a worthy branch of physics among the physicists, following a world trend in that matter, and help make it no more legitimate that physicists to superbly ignore astrophysics in their education and research. Its existence will also be a tremendous boost for the popularisation of astronomy and space sciences at the public level by give it in particular a qualitative support. On the other hand, a project of a project of a small observatory in Algeria of the 0.60 to 0.80cm class linked to the graduate school has been proposed, to be tentatively situated in the Aurès mountain range in Western Algeria. We certainly hope the astrophysics community will help us identify a telescope of this class for lease. This to fill a gap before a national observatory of the 1-2m class be developed in the extreme South in the Ahaggar region. In the mean time, we wish to proceed with the training of our students through the virtual observatory concept and the use of the existing data bases as well as their training with the necessary software tools. At the grass root level, we wish to relate the success story of a highly successful Astronomy association, the Sirius Astronomy Association which has through its 10 years of existence raised the level of astronomy awareness at the general public level in Algeria through its well thought public programs and most notably the Yearly Fair in Popular Astronomy hold each year during the World Space Week. This Association located in Constantine has become a reference for serious amateur astronomy in the region and has won several international prizes. Through its web site, its internet forum, but most notably through its radio program which has been going on for eight consecutive years, devoted to science through debates with scientists, breaking news, and is heard weekly by tens of thousands listeners. Some 200 segment of 30mn to one hour has been produced till now by a team of young amateurs under academic supervision of senior members of the Association.

THE AFRICAN CULTURAL ASTRONOMY PROJECT

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ABSTRACT:

Indigenous, endogenous, traditional, or cultural astronomy focuses on the many ways that people and cultures interact with celestial bodies. In most parts of Africa, there is very little or no awareness about modern astronomy. However, like ancient people everywhere, Africans wondered at the sky and struggled to make sense of it. The African Cultural Astronomy Project aims at unearthing the body of traditional knowledge of astronomy possessed by peoples of the different ethnic groups in Africa and providing scientific interpretation to deserving cosmogonies and ancient astronomical practices. It is believed that this would be used to create awareness and interest in astronomy in most parts of Africa. This paper discusses the vision, challenges and prospects of the African Cultural Astronomy Project in her quest to popularize astronomy in Africa.

Infrared properties of B[e] stars from the 2MASS Catalog

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ABSTRACT:

We have selected a sample of 157 B[e] stars for which we were able to obtain all data required to correct their 2MASS measured fluxes for interstellar extinction. We have plotted the sample in a (J-H)-(H-K) diagram and compared the loci of stars with the main sequence. We note that, for a sample, there is no segregation of the different subclasses of B[e] stars in the color-color diagram. The loci of stars seem to be very well fitted by a linear fit. We also discuss the different methods used to correct for interstellar extinction and their implications to our results.

The International Year of Astronomy and the Developing World: From an African Perspective

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ABSTRACT:

In many developing countries, the stars have always been a part of people's everyday lives, be it in the form of folklore, superstition or even agricultural indicators. Modern astronomy, however, has not been very widespread, with only a few developing countries having sufficient facilities or academics to support a modern astronomical community. The International Year of Astronomy (IYA2009) serves not only as an opportunity to boost these astronomical communities, but also to celebrate the rich history and culture that has existed for thousands of years. 2009 is an opportunity not just to promote astronomy, but also to spark curiosity and spur a culture of learning, a vital need in developing countries, since education is probably the most sustainable form of development. The "Global Cornerstone Project" for IYA2009 titled "Developing Astronomy Globally" with be discussed as well as a plan for the development of astronomy in Africa (at all levels) with a focus on IYA2009. This presentation will also serve as a call for participation in the cornerstone project and to invite discussion on long term plans beyond 2009. More information: www.astronomy2009.org

Astronomy in Jordan

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ABSTRACT:

Jordan, as part of the Arab World, has a rich history in the foundation and development of astronomy and other related sciences. But during the latest centuries, these activities were almost completely stopped because of many different reasons. Nowadays, Jordan is pro-active in developing graduate courses in all fields of knowledge and science, in addition to community programs of education. Here on, I will describe the outreach programs and community participation in the field of astronomy.

Observing Facilities to Study the Solar Activity at Tam (Algerian Sahara)

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ABSTRACT:

Algeria has decided to develop an astronomical observatory in the region of Tamanrasset in the framework of a research program on the "Sun-Earth Relations" (Space Weather). The elevation of the Sun, the daly sunshine hours, seeing, longitude, acces to the southern sky and proximity of Europe make 'Tam' an exceptional place for routine observations that support heliophysical spatial missions (latitude 2000 m). In this program, Ha coronography is envisaged allowing the analysis of the coldest external layers of the Sun. As for CLIMSO (Pic du Midi), the study of the disc will give acces to informations on the origin of coronal parameters (ejections; eruptions; flares). A particular interest also is the study of climatology and the terrestrial atmosphere (transparency, inversion layer, OH emissions and Aurora, etc.). The main features of this Southern Observatory are presented.

ASTRONOMICAL RESEARCH AND EDUCATION IN NIGERIA

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ABSTRACT:

Nigeria is one of the few countries in sub-saharan African where modern astronomy is taught at both undergraduate and postgraduate levels. In this paper we present an update in astronomical research and education in Nigeria. The Astronomical community has been involved in mainstream research activities in modern astronomy and astrophysics. Between 1980 – 2007 Astronomers in Nigeria have made significant progress in the area of theoretical High Energy Astrophysics. Many researches have been done in compact sources, Extended sources, Galactic Objects, Extragaalctic Objects, Solar Physics, Cosmology, Particle Physics, Cosmic Rays, etc. In observational astronomy, there are astronomers who have been trained in Pulsar observation at HartRAO and some others are trained in various areas of astronomy at different observatories. So far we have an optical observatory for a 25cm optical telescope, a 15cm optical telescope for educational demonstrations, another optical telescope under construction, a planetarium and plans are underway for the acquisition of radio telescopes. Astronomy has not been reflected in the high schools' curriculum. . At the undergraduate level, the Universities offering courses in astronomy are University of Nigeria, Nsukka (UNN), Rivers State University of Science and Technology (RUST), Nnamdi Azikiwe University, Awka (UNIZIK), Ebonyi State University Abakaliki, and Abia State University Uturu. Astronomy is offered up to MSc and PhD at the University of Nigeria Nsukka, UNN only. In this paper we attempt to give details of the past, present and possible future situation of Astronomy program and research in Nigeria.

Asteroid observations at the Wise Observatory

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ABSTRACT:

Photometry is an effective tool to study the properties of asteroids. The asteroids' rotation periods and shapes are easily derived from the measured lightcurves, as well as other properties such as size, surface chemical composition and structure. Binarity of asteroids can be revealed by eclipses or by the detection of the presence of two or more periods in the lightcurve. Our research is focused on Near-Earth asteroids (NEAs), objects that orbit the Sun and approach Earth significantly. We use intensively the Wise Observatory 18'' telescope equipped with a wide field CCD (40.5' x 27.3') at its prime focus to derive lightcurves in the ''clear'' band. Follow-ups are done with another CCD at the 40'' telescope to derive the colors of the asteroids as a function of lightcurve rotation phase. The observations and image reduction are done semi-automatically using off-the-shelf software and specially tailored programs. By now more than fifty asteroids have been observed as main targets and ~50 other asteroids were photometrically measured while appearing in the main target fields. From this data set some binary asteroids were discovered, objects that can reveal the asteroid's density using Kepler's third law. The collected data will eventually be used to investigate correlations between the asteroids' spins and other parameters such as their locations and sizes.

The TAU AstroClub – Public Outreach in Astrophysics

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ABSTRACT:

TAU AstroClub (Tel Aviv University Astronomy Club) is a voluntary public outreach initiative of graduate students of the Raymond and Beverly Sackler Faculty of Exact Sciences in Tel Aviv University. Our aim is to provide opportunities for the community to learn about astronomy and astrophysics, and to make astronomy, physics and science in general more accessible to the general public. All of our activities are open to everyone, free of charge and require no prior scientific knowledge. Our activities include lectures in contemporary topics in astrophysics, planetary and space sciences, scientific demonstrations and sky observing events. On special occasions, such as the Venus transit of 2004, the major meteor showers, Solar and Lunar eclipses and more, we organized large-scale happenings with thousands of participants. TAU AstroClub also manages an astro-portal (http://astroclub.tau.ac.il/index_en.html) which includes various original educational resources, all written in Hebrew, an archive of video lectures, an on-line astronomy encyclopedia, a celestial and national activities calendar and many other utilities and informative sources. Since it was established in 1999, TAU AstroClub has become a major factor in community education in science, with thousands attending our activities annually, and tens of thousands visiting our educational internet portal every month. Our contribution to public education is well recognized by the media and official organizations.

Long Term Monitoring of Active Stars: The Lebanese Observer's Group

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ABSTRACT:

In the framework of a long term research project to monitor the spectroscopic variability of Be and AGB stars, we have gathered and trained a large group of amateurs in the operation of small astronomical equipment. The group has been organized to provide a regular coverage of target stars. Observations are gathered and reduced with IRAF. Data is formatted to make it possible to submit Be data to the BeSS database. We present the group, its organization, observational procedures, and preliminary results for some of our target stars. This work is part of a project funded by the Lebanese National Council for Scientific Research to study AGB and Be stars.

Teacher Training and Schools Networks at the Heart of IYA2009

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ABSTRACT:

The International Year of Astronomy will be an important opportunity to reawaken the interest of young students in science, to attract teacher's attention to new methodologies for education, to increase the scientific culture in the general audience. Global Hands-on Universe (Global HOU) is a project devoted to renewing the teaching and learning of science. It gathers teachers, educators, scientists and students in more than 20 countries around the world. More than 1500 teachers worldwide have already been trained in preliminary efforts. We plan to expand our network to at least 100 nations in 7 years. A very successful sub system of Global HOU is the international effort EUHOU, European Hands-on Universe, which was partly funded by the European Commission in a collaboration of 8 European Nations. Within the scope of this project a user-friendly image processing software was produced, Salsa-J. The software is already translated into Chinese and Arabic. EUHOU set the pace for the creation of future regional centres in all corners of the planet: North America, South America, Europe, Africa, Asia and Australia. For the IYA2009, Global HOU is involved in two major programs: Today I am Galileo – Tomorrow I am Darwin – a global project that intends to foster the interaction of schools around the globe. Series of activities are planned: historical research, reproduction of Galileo's observations, extra-solar planets studies...; a global inquiry will take place. Our main objective is to promote a deeper understanding, based on evidence, of our place in the Cosmos. The Galileo Teacher Training Program – As one of the cornerstone programs for the IYA2009, this project will be a fantastic effort of astronomy resources producers to engage teachers in a new era of science education. Institutions such as the Astronomical Society of the Pacific, US National Optical Astronomy Observatory and Global HOU are engaged in creating a world-wide network of certified teachers and schools around the planet. We want to renew the way we train our teachers and teach our students. IYA2009 will be a unique moment to set the understanding of science in a new pace. Our planet crosses a critical moment, now more than ever before it is important that new generations develop a critical thinking towards science, built in a solid basic scientific knowledge. We need to embark on the construction of new global community aware of their responsibilities towards our planet and their duties as future educators themselves.

Hands-on Universe Africa

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ABSTRACT:

We present a Status of research education in Africa with the presence of internet. With the advantage of modern technologies and international community we are able to use Hands-On Universe: astronomy and astrophysics tools in classrooms as a vehicle to promote Science Education. We have successfully set up the program in Kenya High school in Nairobi, established corporate partnerships and international Partnerships. This is possible, it is happening

S8- Training courses for young ME & Africa astronomers

IYA2009 and EML – NUL plan for 2007 – 2009

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ABSTRACT:

to make astronomical breakthroughs more in the lives of billions of people through all available means of communication; TV/RADIO DOCUMENTARIES, TV competitions, Radio competitions, SMS competition. All of his will be aimed at using astronomy as a tool to win a prize. This will be par of the awareness of astronomy to people in entering the competitions via listening to radio and watching TV. The SMS competitions will collaboration between service providers and EML documedia productions, this will done by placing questions on recharge vouchers hence enhancing awareness. TV will also be used to show case movies, dramas, cartoons, documentaries and talk shows regarding astronomy, climate, global warming. There will be recording of documentaries in Lesotho, Swaziland, Botswana and Republic of South Africa about indigenous knowledge of astronomy in all different languages spoken in those respective countries and all tribes found there. NEWSPAPER:This will be archived by monthly and weekly in all Lesotho based news papers and EML news letter this will incorporate stories about Basotho astronomical history, believes and interpretation of the sky and international projects like Mars rovers, Galaxies, Lesotho and RSA sky, Solar Stellar, use of telescopes and where to find them, NASA based information on ongoing, past and future planes for space missions on space. WEBPAGES: Updating of einsteinsmindlesotho website which has IYA2009 pages under construction this will include other web links directed to IYA2009 and events of astronomy and a proposed construction of a permanent EML website (www.eml.ls) EXHIBITIONS:Through EML Classroom.Edu tours and AYFST science clubs students construct astronomical based projects as well as conducting public presentations in national science week, AYFST/EML fairs collaboration with Lesotho science and math's teachers association (LSMTA) ADVERTISING CAMPAIGNS:Through stickers in public transport like taxis of Roma in collaboration with Roma Taxi Association. Using recharge vouchers in collaboration with Vodacom Lesotho and Econet Ezi Cell Lesotho. Use of flyers on streets and possible use of shopping catalogues. Radio and TV like national radio station radio Lesotho and its youth station Ultimate fm and possible use of stickers on Ministry of Science and Technology transports PUBLICATIONS:10 issues of EML scientific magazine, 20 issues of EML Journal of Astronomy, 10 issues of EML news letter EVALUATION ESTIMATE: The number of people 'touched'

Solar activities and Earth's climate changes

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ABSTRACT:

Analytical studies of world-wide geomagnetic data of the last six solar cycles were given. Geomagnetic indices variations and geomagnetic storms during last 6 solar cycles were given too. Historical study of peak and decline phase variability of the last twelve solar cycles and its effects on Earth's climatic changes. Geomagnetic storms have a good correlation with solar activity and solar radiation variability. The effects of solar activity variability on the earth's climate and global Earth's temperature have been studied. The global Earth's temperature variability during the last two thousand years was given. The forecasting for the next fifty years was estimated. Geomagnetic storms are correlated with the transparency of the earth's atmosphere. Detailed studies of the Geomagnetic storm during solar cycle 23, and the appearance of the second peaks during the decline phase of the last six solar cycles has been done. Theoretical treatment theory for solar activities and solar periodicities are very essential , specially after the appearance of second peaks during the declining phase of the solar cycles and the appearance of high energetic storms, and its effects on earth's atmosphere.

Sun Earth's System : The transient variations of the Earth's Magnetic Field

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ABSTRACT:

In this paper we review the sources and physical links in the Sun-Earth system at the origin of the transient variations of the Earth's magnetic field. We underline the key role by the magnetic fields in the Sun-Earth system (toroïdal and dipolar components of the solar magnetic field, interplanetary and Earth's magnetic fields). We privilege the historical approach.

Universe Awareness: Inspiring young children with the beautiful Universe

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ABSTRACT:

Universe Awareness (UNAWE) is an international programme that aims to inspire young disadvantaged children with the size, scale and beauty of the universe. UNAWE illustrates the multicultural origins of modern astronomy in an effort to broaden children's minds, awaken their curiosity in science and stimulate global citizenship and tolerance. Games, songs, hands-on activities, cartoons and live internet exchanges are devised in partnership with UNAWE communities throughout the world for children from the age of 4 onwards. UNAWE is one of the eleven Cornerstone Projects chosen to celebrate the International Year of Astronomy 2009. UNAWE is motivated by the premises that access to simple knowledge about the Universe is a birth right and that the formative ages of 4 to 10 years play an important role in the development of a human value system. Astronomy is an ancient and multidisciplinary field, an ambassador for all sciences and a driver for technology that the UNAWE initiative hopes to use to broaden children's perspectives. A dozen of countries worldwide are already participating in UNAWE, from Colombia to Indonesia and Tunisia. We present the global programme and opportunities for participation.

Monitoring Convective Systems Over the Zone of West African Monsoon

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ABSTRACT:

During the rainy season, storms of different intensities occur over the Central and West African region and most of the time they were accompanied by thunder and lightening of relatively large magnitude as was observed over Niamey. Three major kinds of storm formations were experienced during the period between July and September 2005. The first kind was a well-developed squall line resulting from the monsoon wind flow systems. This kind usually start as a well organised squall lines from vortices located over East Africa and propagates westward moving across cities in central and west Africa before decaying or reinvigorating as the case may be and proceeding to the Atlantic Ocean. These type of storms are usually more organised and tend to be fuelled by the presence of strong African Easterly Jets (AEJ) which are usually prominent at the mid level altitudes, i.e. 600hPa and 700hPa. The second kind of storms that were observed during the period, were those developed as a result of in-situ convective cloud development activities resulting from the presence of favourable instability conditions. The third kind were those that are actually generated as a result of Orgraphic effects which are informed by the presence of Mountains and high grounds over the continent obstructing the flow of monsoon wind and leading to convective cloud development. In this work, we looked at the best methods of making reliable, timely and accurate weather forecasts for such convective cloud developments and understanding the most favourable tracks that these storms followed during their westwards propagation into the Atlantic Ocean. The results from this work are being closely linked to the fact that most of the weather and climate-related disasters especially the occurrence of Hurricanes and Tropical Cyclones over the Southern coast of USA developed from some of these storms having their origins from either West or East Africa.

Astonomy For Young Children in Tunisia

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ABSTRACT:

Astronomy For Young Children in Tunisia Dans le cadre du programme international d'initiation des enfants à l'astronomie « UNAWE », la Cité des Sciences à Tunis, en tant qu'institution publique chargée de la diffusion de la culture scientifique, notamment en matière d'astronomie, a saisi cette opportunité pour vulgariser davantage auprès des jeunes des notions appréciables sur l'Univers, son immensité, sa richesse et sa beauté. Grâce à l'importante infrastructure disponible et aux compétences humaines existantes, la Cité des Sciences à Tunis s'est attelée depuis 2005 à initier des activités allant dans le sens des objectifs internationaux : sensibilisation, formation, encadrement, mobilisation. A cet effet, plusieurs ateliers et exposés ciblant des enfants et des soirées astronomiques pour un grand public ont été organisés, des conférences-débats animées par des spécialistes ont été inscrits dans le programme des rencontres mensuelles, une campagne médiatique a été menée, une couverture systématique sur tout le territoire national a été assurée par l'astro-bus, des supports didactiques ont été développés. Cet effort mobilisateur a suscité un intérêt particulier chez les partenaires de la Cité des Sciences à Tunis, aussi bien dans le secteur public que dans le tissu associatif, en sollicitant de plus en plus d'appui pour altérer la soif du savoir de leurs jeunes adhérents. En vue de mieux coordonner ses différentes actions et interventions, et afin de bien se préparer à l'échéance 2009, déclarée « Année Internationale de l'Astronomie », la Cité des Sciences à Tunis, en collaboration avec les départements ministériels en charge du secteur de l'enfance et de l'éducation nationale, a mis en place un Comité national d'action chargé d'établir un programme national de vulgarisation de l'astronomie pour les enfants âgés de 4-10 ans et de veiller au suivi de son exécution et de son évaluation. Astronomy for Young Children in Tunisia Within the framework of the international program of initiating children to astronomy "UNAWE", the Tunis Sciences City, as a public institution in charge of dissemination of scientific culture, notably astronomy, has seized this opportunity to expose children to the inspirational and captivating aspects of the universe. Thanks to the importance of its equipment and to the skills of its demonstrators, the Tunis Sciences City has strived since 2005 to initiate actions in compliance with the international objectives such as actions of raising public awareness to scientific issues, supervision, etc...

The South African National Astrophysics and Space Science Programme (NASSP)

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ABSTRACT:

South Africa faces the exciting challenge of preparing a new generation of scientists to use the international astronomy facilities which are now available (the Southern African Large Telescope (SALT) in South Africa and the High Energy Stereoscopic System (H.E.S.S.) in Namibia) or which will be constructed over the next few years (the Karoo Array Telescope (MeerKAT) and possibly even the Square Kilometre Array (SKA) radio telescope). The community has respond to this challenge by joining forces in a collaboration involving 9 universities and 3 national facilities: the National Astrophysics and Space Science Programme (NASSP). Since 2003 NASSP has produced 50 honours graduates from all over the continent (Botswana, Ethiopia, Gabon, Kenya, Madagascar, Mozambique, Rwanda, Sudan, Uganda, Zambia, Zimbabwe as well as South Africa), equipping them with skills that will be of use not only for careers in astrophysics, but also in many other scientific or technological occupations. The paper describes the rational behind NASSP and how it might evolve in the future.

What kind of Astronomy should be taught at the beginning of the 21st century?

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ABSTRACT:

Most people would love to know more about Astronomy. In the distant pre-history of humanity man began to ask himself questions such as "What are we doing here?, Where are we going?, Where are we from?". All these questions are open and are relevant for all of us. Young generations are interested in these topics too. Astronomy can help us to get close to several answers. It is good to present Astronomy as a science that can offer us some significant answers and can specially give us information about "How this process took place". It is important to consider which of these queries are of general interest. For instance, young students are very motivated to known more about modern Astronomy. Normally the curricula look as though it promotes the teaching of ancient astronomy. Of course it is necessary to explain the movements of the Sun and the Moon. But young people like these contents if they are presented by means of observation sessions. This is not difficult. Every school has an astronomy observatory: the "court" where the students play. Simple devices can be produced by students themselves in order to take some observations themselves. In other cases some remote telescopes can be used or some amateur's telescopes can help the teachers for some observation sessions about the Moon and planets. But Astronomy is not only the Sun, the Moon and the solar system. Students love to learn about black holes, extra-solar planets or Einstein rings. In these cases models are very interesting to show the young people more about their interest. Every teacher knows that answering the students' questions is not the same as trying to explain a topic that students do not find interesting. The internet offers us a set of models concerning modern astronomy which are very useful and illustrative. But teachers know that a model should be "well learnt" by students if we want them to properly assimilate the new ideas. It is not good to use a simulator such as a "black box" that makes the simulation without making sure we understand what it is actually doing. In this case this is not an experiment. This is something that students have to believe, but not necessarily understand. This is not a scientific approach. It is much better to add to the computer simulator some models that they hold in their hands. Hand made models are an advantage and it is better if the models have been made for the students themselves. This speech will include some example of the ideas previously mentioned.

The discovery of the Solar Corona: total solar eclipses and coronagraphs.

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ABSTRACT:

We review the legendary genesis of the scientific discovery of the solar corona, starting from the Egyptian antiquity period. We emphasize the important inference of cosmogonic models to interpret what was understood during solar total eclipses. The final discovery of the "out of natural eclipses" corona by B. Lyot at groundbased, and the today routine observations of the dynamical corona using spaceborne instruments will be described. To complete this review we will mention what are the today challenges in coronal researches.

S9- Presentation of National Astronomical Activities,

The present and future of Astronomy Eductation and Research in Lebanon

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ABSTRACT:

Astronomy in Lebanon was revived slowly in Lebanon following a long period of absence due to the civil war and the absence of astronomers. We review the progress of the situation since the mid nineties with an emphasis on the introduction of astronomy in higher education with the increase in the number of astronomers working in lebanese universities. Current research activities range from planetary dynamics to active galactic nucleii, passing by theoretical and observational studies of some classes of stars. Activities carried during the last few years have lead to an increase in the number of students going abroad to continue graduate studies in astronomy. They have also lead to an increased involvement of undergraduates and amateurs in research projects achievable with "very" small telescopes. Based on it, plans are outlined for the future in terms of man power, education and research.

Astronomical Observation and Researches in Egypt

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ABSTRACT:

The different historical epochs of astronomical observations and activities in Egypt have been reviewed in brief. The ancient Egyptian civilization have emphasized the role of the Egyptians in the progress of science and knowledge. The highly reputed Alexandria School (332 – 250 B.C) scientific activities encouraged many international Philosophers and Scholars to seek knowledge in Egypt. Distinguished Arab scientists appeared around the 10 th century and erected several astronomical observatories near to Cairo. Modern astronomy started in Egypt after the installation of 10-inch refractor at Abassyia in 1872. A 30 – inch reflector was gifted to Egypt in 1905 , and it was erected at Helwan area. The 74-inch Kottamyia refractor was erected and operated during 1961-1966. In addition a solar observing station and artificial satellite cameras including lazer ranging techniques are also installed and operated during the same period. The Egyptian astronomers shared in many local, regional, and international observing programs, i.e., observation of Halley,s comet in 1910 and 1986, discovery of Pluto in 1930, Total Solar Eclipses in Kartum, Sudan 1952 and at Salloum Egypt 2006, IGY, 1957, IQSY 1964-1965, World Data Solar Activity Centers, Spin and MERIT programs of artificial satellites, the Geodetic Network WEGNER,

National astronomical activities in Armenia

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ABSTRACT:

Armenia is one of the well-known "astronomical" countries in the Middle East region. The Byurakan Astrophysical Observatory (BAO) is the main centre for astronomical research (1m Schmidt and 2.6m telescopes). In addition, astronomy is active in the Yerevan State University (YSU), some departments of the Yerevan Physics Institute and elsewhere. The Armenian Astronomical Society (ArAS) was founded in 2001 to unify all Armenian astronomers working not only in Armenia but also abroad. It has now 66 members and is one of the affiliated societies of the EAS (European Astronomical Society). Armenia also has its Virtual Observatory project, ArVO (Armenian Virtual Observatory), a member of the International Virtual Observatory Alliance (IVOA) and maintains one of the largest spectroscopic databases in the world, the Digitized First Byurakan Survey (DFBS, or Markarian survey) with its 20,000,000 low-dispersion spectra. JENAM-2007, the joint annual meeting of the European and Armenian astronomical societies, was organizid in Yerevan State University in August 2007. BAO and ArAS jointly organize annual meetings and summer schools as well. Next summer school will be held in 2008 when V.A.Ambartsumian's 100th anniversary celebrations are planned. And an IAU summer school (ISYA) is planned for 2010.

International Heliophysical Year-Africa: Space Weather Research and Education in Africa

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ABSTRACT:

With funding obtained from the National Science Foundation the US Air Force, NASA, ICTP and the European Office of Aerospace Research Development, we conducted a successful workshop in Addis Ababa, Ethiopian during November 11-16, 2007. The scientific motivation of the workshop is to develop the tools and the collaborative platforms to study space weather phenomenon in the region. Much attention in space weather has been devoted recently to the large changes in TEC over the American sector during geomagnetic storms. The attention has been fueled by the ability to map the total electron content (TEC) using networks of ground-based, dual-frequency GPS receivers. There has been speculation that the large change in plasma density and electrodynamics in the American sector is related to the unusual configuration of the geomagnetic field. This speculation has spurred the need to target the African continent, which has a significantly different geomagnetic field configuration, with the magnetic equator parallel to the geographic equator. This region does not have the dense network of ground-based GPS receivers necessary to perform a complementary study, nor does it have sufficient magnetometer chains to monitor the electrodynamics. The sparse data availability from this region hinders scientific enquiry and the development of global data assimilation models. Data and models are required for mapping the plasma content and structure in the region, in order to address space weather science questions, and for specification and forecasting of deleterious effects on communication and navigation systems operating in the region. In this communication we will present the developments of space science programs in developing countries, a summary of the communiqués of the workshop, the development of space science research and education programs in specific African universities and sister institutions in the US.

The World at Night

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ABSTRACT:

The World At Night (TWAN) is a new program to create and present a collection of stunning photographs of the world's most beautiful and historic sites (primarily UNESCO World Heritage Sites) against a nighttime backdrop of stars, planets and celestial events. The eternally peaceful sky looks the same above all the symbols of different nations and regions, a testament to the truly unified nature of Earth as a planet rather than an amalgam of human-designated territories. Those involved in global programs learn to see humanity as a family living together on a single planet amidst the vast ocean of our Universe. This global perspective motivates us to work for a better, more peaceful planet for all the world's inhabitants. TWAN is an innovative new approach to expanding this global perspective. Behind the impression of TWAN scenic material there are educational targets too: 1. The Night Sky [The wonders of the night sky with un-aided eyes, constellations, celestial events, sky motions, twilight and atmospheric phenomenon, city-based skygazing, etc] 2. One People, One Sky/A Planet Embraced by the Sky [Naturally, our world is a unified planet under one sky. How different nations around the world inspire by the same sky. The concepts behind AWB] 3. The Beauty of Darkness [In contrary to what general people think of the "frightening darkness" it is full of hidden treasures. All about importance of preserving the night sky beauties as part of our surrounded natural environment. We might use thumbnails of NASA's The Earth at Night image on a corner of each page to show the location of the dark sky picture] 4. Our Nightly Heritage or The World Heritage at Night [All about World Heritages and most amazing sites of the planet at night, with approach to ancient astronomy] 5. Mountain Eyes [TWAN photos taken at the world's most rewarding observatories with a concept of where and how observational astronomers explore the cosmos] 8. The Events That Shake the World [How celestial events bring passion to astronomy, make world-wide attention to the night sky, from great comets to spectacular eclipses] 9. Night Sky Photography. How to cpature beauties of the night sky and ceelstial events using simple equipment. TWAN is recently announced as the special project of International Year of Astronomy by IAU and has already started planing for world-wide exhibition, lectures and educational workshop for 2009 and this aimed to include variety of events in Middle East ccountries too. More about TWAN is available at the project's official website/online galleries (www.twanight.org) and in February 2008 issue of IAU's journal Communicating Astronomy with the Public (http://www.capjournal.org/issues/02/02_17.php).

Astronomy in Morocco

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ABSTRACT:

Astronomy professional pains to develop in the Third World countries. Indeed, it, unfortunately, is still regarded as a luxury by the scientific decision makers of these countries which prefer to center their financial effort on the sectors known as vital such as agriculture, health, energy… In these countries some initiatives are from time to time crowned with a certain success. We propose to reporte here one experiment having ends to the realization of an astronomical observatory in Oukaimeden in the Moroccan high atlas. This realization is the fruit of a co-operation which can be regarded as a model for its reproduction in other countries with economic low income. It federated the means of a Moroccan university of a Moroccan association and an association of astronomy amateur from one northern country.

State of Astronomy in Tanzania and Challenges Ahead

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ABSTRACT:

In this paper, the past and ongoing astronomy activities are presented with a view to highlight progress, impediments and challenges in Tanzania. Very slow progress in making significant impact on developing astronomy is discussed. Future plans arising from recent contacts are expected to lead to significant developments in astronomy. The state of astronomy in Africa is compared from the point of view of a country in which this exciting field has stagnated for decades. It is concluded that the world astronomy community, through opportunities offered by the International Year of Astronomy 2009, can take proactive and concerted action to develop sustainable astronomy infrastructures as a catalyst to attract national recognition, investment and development of astronomy in Africa.

Interactive Astronomy over the Internet for Moroccan Secondary Schools

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ABSTRACT:

Interactive astronomy over the internet is the cheapest means of introducing pupils to making scientific observations and manipulating real data. Acquiring or directly doing observation through the internet and analyzing it, enables students to investigate the universe while applying simple tools and concepts from science, math, and technology. Interactive astronomy over the internet is thus suitable to most schools in developing countries that cannot have access to a telescope and would like to have their students experience the basics of astronomy. Towards such objectives, we propose an interactive astronomy educational program for Moroccan secondary schools that is based on Hands on Universe (HOU - http://www.handsonuniverse.org/). These schools must have access to the internet. HOU permits students to request observations from different automated telescopes all over the world and analyze them with user-friendly image processing software. Because of the time difference between countries, students could observe night skies during their daytime school period. In order to allow our students overcome the language barrier of using most of the tools and software developed by the HOU community, we translated into Arabic the image processing software SalsaJ. This software was initially developed to handle most European languages. It's been developed for the European Hands On Universe (EU-HOU). SalsaJ is particularly dedicated to handling professional astronomy images and analysis in the classroom. Arabic SalsaJ will open new perspectives for Arab pupils who desire to study astronomy.

Keeping Ma'at: an astronomical approach to the orientation of the temples in ancient Egypt

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ABSTRACT:

For various reasons, Archaeoastronomy has not been one of the favourite disciplines of the Egyptologists in the past. Probably because of that, important questions such as the orientation of Egyptian temples and the relevance of astronomy in this respect had never been afforded with the necessary seriousness and deepness. The Egyptian-Spanish Mission for the Archaeoastronomy of ancient Egypt has, among its various priorities, the solution of this problem. In order to achieve that, we have measured the orientation of some 330 temples in the Valley, the Delta, the Oases and the Sinai so far. The aim is to find a correct and almost definitive answer to the question of whether the ancient Egyptian sacred constructions were astronomically aligned or not. Our data seem to answer this question in the affirmative sense. Besides, they offer a very interesting new perspective in the field of landscape archaeology, a new discipline hardly worked in Egypt so far, in which terrestrial landscape, dominated by the Nile, and celestial landscape, dominated by the sun and the stars, would combine in order to permit the establishment of Ma'at, the Cosmic Order, on Earth.

IYA2009 and EML – NUL plan for 2007 – 2009

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ABSTRACT:

IYA2009 and EML – NUL plan for 2007 – 2009 IYA2009 objective 01 to make astronomical breakthroughs more in the lives of billions of people through all available means of communication; TV/RADIO DOCUMENTARIES TV competitions Radio competitions SMS competition All of his will be aimed at using astronomy as a tool to win a prize. This will be par of the awareness of astronomy to people in entering the competitions via listening to radio and watching TV. The SMS competitions will collaboration between service providers and EML documedia productions, this will done by placing questions on recharge vouchers hence enhancing awareness. TV will also be used to show case movies, dramas, cartoons, documentaries and talk shows regarding astronomy, climate, global warming. There will be recording of documentaries in Lesotho, Swaziland, Botswana and Republic of South Africa about indigenous knowledge of astronomy in all different languages spoken in those respective countries and all tribes found there. NEWSPAPER This will be archived by monthly and weekly in all Lesotho based news papers and EML news letter this will incorporate stories about Basotho astronomical history, believes and interpretation of the sky and international projects like Mars rovers, Galaxies, Lesotho and RSA sky, Solar Stellar, use of telescopes and where to find them, NASA based information on ongoing, past and future planes for space missions on space. WEBPAGES Updating of einsteinsmindlesotho website which has IYA2009 pages under construction this will include other web links directed to IYA2009 and events of astronomy and a proposed construction of a permanent EML website (www.eml.ls) EXHIBITIONS Through EML Classroom.Edu tours and AYFST science clubs students construct astronomical based projects as well as conducting public presentations in national science week, AYFST/EML fairs collaboration with Lesotho science and math's teachers association (LSMTA) FIGURE 1. EML's Astronomy exhibition project through Girls and Science program ADVERTISING CAMPAIGNS Through stickers in public transport like taxis of Roma in collaboration with Roma Taxi Association. Using recharge vouchers in collaboration with Vodacom Lesotho and Econet Ezi Cell Lesotho. Use of flyers on streets and possible use of shopping catalogues. Radio and TV like national radio station radio Lesotho and its youth station Ultimate FM and possible use of stickers on Ministry of Science and Technology transports. FIGURE 2. EML's classroom.Edu tour sponsored by Roma Taxi Association PUBLICATIONS 10 issues of EML scientific magazine 20 issues of EML Journal of Astronomy 10 issues of EML news letter EVALUATION ESTIMATE The number of people 'touched';

Development of astronomy research and education capacity in Africa

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ABSTRACT:

About 1.5% of the world's professional astronomers are based Africa, yet in terms of research output, African astronomers produce less than 1% of the world's astronomical research. The advent of new large-scale facilities such as SALT and HESS provides African astronomers with tools to pursue their research on the continent. Such facilities also provide unprecedented training opportunities for the next generation of African astronomers. This paper discusses recent efforts to develop astronomy education and research capacity on the continent. Various capacity-building initiatives are discussed, as well as the lessons learnt from those initiatives.

Public Astronomy in Iran

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ABSTRACT:

In the recent year, new age of astronomy have begin in Iran. Peoples and specially young peoples interested in sky and observation. Now in some cities (and town) we have small or great astronomical societies. Public Observation, Street astronomy, monthly astronomy lectures, teaching and training of astronomy concept and phenomena are the main programs of this clubs. In this poster, you can see these acivities and some other about Astronomy in Iran. (Adib Astronomical Society won the 8th Iranian popularization of Sciences award in 2004.)

Scientific Activities of the National Research Institute of Astronomy and Geophysics (NRIAG), Cairo Egypt

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ABSTRACT:

National Research Institute of Astronomy and Geophysics has been established in 1903 with the aim to perform observations, theoretical, and applied studies in the fields of Astronomy, Solar and Space Researches, Geomagnetism, Geoelectricity, Seismology, Gravity and Geodesy together with other subjects. Besides, the institute serves as a consultant agency in its field of specializations to different national firms and institutions in their plans for the development of the country. The Institute is divided into five departments including 9 Laboratories besides the National Data Centre (N D C) for monitoring the Nuclear explosions .

Diagnostic Study of a Sever Upper Level Cut off Cyclonic Circulation over Eastern Mediterranean Part 2: Vorticity and Potential Vorticity Budgets

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ABSTRACT:

A diagnostic study for a case of a quasi-stationary upper cut off subtropical cyclone is made which initiated over North East Europe and then displaced towards south persisting over Eastern Mediterranean. This case study was dominated for long period, began from 27 Feb. till 15 March 1987 which divided into three stages (development, mature, and decay stages) according to its intensification and weakness. The vorticity budget and potential vorticity budget were computed for both area average and cyclone vicinity. For area average and cyclone vicinity, results showed that absolute vorticity had maximum values in jet stream layer. Also, the local change of absolute vorticity had small values and was oscillated between positive and negative values in association with cyclone activities. The vertical advection term, divergence of absolute vorticity and tilting term had small values and acted as sources. On the other hand, the horizontal advection and residual terms had greatest values and they were compensated each other. On the other side, results showed that the potential vorticity had negative values in the boundary layer and lower layers of the stratosphere. Also, the horizontal advection term was nearly compensated with the residual term. The vertical advection term had small and acted as a source of potential vorticity.

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