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Abstracts and the descriptions of works in
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July 2012

Abstracts and the descriptions of works in Art and Science submitted to www.IntellectualArchive.com in July 2012

ID #: 509   **Natural Sciences / Physics / Particle physics**

Submitted on: Jul 02, 2012

Author: **Kh. Beshtoev**

Title: **Is neutrino produced in standard weak interactions a Dirac or Majorana particle?**

Abstract: This work considers the following problem: what type (Dirac or Majorana) of neutrinos is produced in standard weak interactions? It is concluded that only Dirac neutrinos but not Majorana neutrinos can be produced in these interactions. Then neutrino interacts with W± and Z bosons but neutrinoless double beta decay is absent. It means that this neutrino will be produced in another type of interaction. Namely, Majorana neutrino will be produced in the interaction which differentiates spin projections but cannot differentiate neutrino (particle) from antineutrino (antiparticle). Then neutrino will interact with W± bosons and neutrinoless double beta decay will arise. But standard interaction with Z boson will be absent. Such interaction has not been discovered yet. Therefore experiments with very high precision are important to detect the neutrinoless double decay if they are realized in the Nature.

Web link: *www.IntellectualArchive.com/getfile.php?file=GT0gx9leUoj&orig_file=Dirac-Major-2.pdf*

ID #: 510   **Natural Sciences / Mathematics / Combinatorics**

Submitted on: Jul 02, 2012

Author: **Leva Beklaryan**

Title: **The classification theorem for groups of homeomorphisms of the line. Nonamenability of Thompson`s group F**

Abstract: This paper allows one to obtain a criterion for the existence of a projectively invariant measure formulated in terms of combinatorial properties of a group (amenability of some canonical quotient group). Such necessary and sufficient condition is a basis of the classification scheme for groups of homeomorphisms of the line. In particular, a nonamenability of Thompson`s group F follows from the obtained criterion.

Web link: *www.IntellectualArchive.com/getfile.php?file=9m3sfKYJiNm&orig_file=Leva_Beklaryan__groups_of_homeomorphisms.pdf*

ID #: 511   **Natural Sciences / Mathematics / Algebra**

Submitted on: Jul 02, 2012

Author: **Christian Pierre**

Title: **Generalized modular forms including the weak Maass forms, the Ramanujan`s Theta functions and the Tau function**

Abstract: The modular forms are revisited from a geometric and an algebraic point of view leading to a geometric interpretation of the weak Maass forms connecting them to the Ramanujan Mock Theta functions and to the cusp forms generated from the Langlands global program.

Web link: *www.IntellectualArchive.com/getfile.php?file=VuImMSN1dRI&orig_file=Christian_Pierre__gen_mod_forms.pdf*

ID #: 512   **Natural Sciences / Mathematics / Algebra**

Submitted on: Jul 02, 2012

Author: **Christian Pierre**

Title: **Higher algebraic K-theories related to the global program of Langlands**

Abstract: The paper revisits concretely the algebraic K-theory in the light of the global program of Langlands by taking into account the new algebraic interpretation of homotopy viewed as deformation(s) of Galois representations given by compactified algebraic groups. More concretely, we introduce higher algebraic bilinear K-theories referring to homotopy and cohomotopy and related to the reducible

bilinear global program of Langlands as well as mixed higher bilinear KK-theories related to dynamical geometric bilinear global program of Langlands.

Web link: *www.IntellectualArchive.com/getfile.php?file=7W8FnTJmNKY&orig_file=Christian_Pierre__higher_alg_K_theories.pdf*

ID #: 513   **Natural Sciences / Mathematics / Algebra**

Submitted on: Jul 02, 2012

Author: **Christian Pierre**

Title: **Random matrices and Riemann hypothesis**

Abstract: The curious connection between the spacings of the eigenvalues of random matrices and the corresponding spacings of the non trivial zeros of the Riemann zeta function is analyzed on the basis of the geometric dynamical global program of Langlands whose fundamental structures are shifted quantized conjugacy class representatives of bilinear algebraic semigroups.The considered symmetry behind this phenomenology is the differential bilinear Galois semigroup shifting the product,right by left,of automorphism semigroups of cofunctions and functions on compact transcendental quanta.

Web link: *www.IntellectualArchive.com/getfile.php?file=2YWxtq3xjNs&orig_file=Christian_Pierre__random_matrriemann_hyp.pdf*

ID #: 515   **Natural Sciences / Mathematics / Graph theory**

Submitted on: Jul 03, 2012

Author: **Greg Cohen**

Title: **A new algebraic technique for polynomial-time computing the number modulo 2 of Hamiltonian decompositions and similar partitions of a graph`s edge set**

Abstract: In Graph Theory a number of results were devoted to studying the computational complexity of the number modulo 2 of a graph`s edge set decompositions of various kinds, first of all including its Hamiltonian decompositions, as well as the number modulo 2 of, say, Hamiltonian cycles/paths etc. While the problems of finding a Hamiltonian decomposition and Hamiltonian cycle are NP-complete, counting these objects modulo 2 in polynomial time is yet possible for certain types of regular undirected graphs. Some of the most known examples are the theorems about the existence of an even number of Hamiltonian decompositions in a 4-regular graph and an even number of such decompositions where two given edges e and g belong to different cycles (Thomason, 1978), as well as an even number of Hamiltonian cycles passing through any given edge in a regular odd-degreed graph (Smith`s theorem).

Web link: *www.IntellectualArchive.com/getfile.php?file=HOlQZaqeE0k&orig_file=Greg_Cohen__polynomial-time_computing.pdf*

ID #: 519   **Natural Sciences / Physics / Particle physics**

Submitted on: Jul 06, 2012

Author: **Mario Novello**

Title: **Mach or Higgs? The mechanisms to generate mass**

Abstract: With the imminent confirmation or disproof of the existence of Higgs boson by LHC experiments it is time to analyze in a non-dogmatic way the proposals to understand the origin of the mass. Here we analyze a new version of Mach`s principle according to which gravity is what is really responsible for the generation of mass of all bodies. The condition for this is the existence of an energy distribution represented by the vacuum or the cosmological constant term. The great novelty of this mechanism is that the gravitational field acts merely as a catalyst, once the final expression of the mass depends neither on the intensity and particular properties of the gravitational field nor on the value of Newton`s constant. It was precisely the wrong belief that the value of the mass obtained through any gravitational scheme must depend on Newton`s constant which was responsible for not considering gravity as an important actor in the mechanism of generating mass. We review briefly the alternative Higgs mechanism in order to compare both processes.

Web link: *www.IntellectualArchive.com/getfile.php?file=Xo7GBYlKSex&orig_file=Mario_Novello__A_mechanism_to_generate_mass.pdf*

ID #: 520   **Social Sciences / Psychology / Neuropsychology**

Submitted on: Jul 06, 2012

Author: **Claudius Gros**

Title: **Emotional control - conditio sine qua non for advanced artificial intelligences?**

Abstract: Humans dispose of two intertwined information processing pathways, cognitive information processing via neural firing patterns and diffusive volume control via neuromodulation. The cognitive information processing in the brain is traditionally considered to be the prime neural correlate of human intelligence, clinical studies indicate that human emotions intrinsically correlate with the activation of the neuromodulatory system. We examine here the question: Why do humans dispose of the diffusive emotional control system? Is this a coincidence, a caprice of nature, perhaps a leftover of our genetic heritage, or a necessary aspect of any advanced intelligence, being it biological or synthetic? We argue here that emotional control is necessary to solve the motivational problem, viz the selection of short-term utility functions, in the context of an environment where information, computing power and time constitute scarce resources.

Web link: *www.IntellectualArchive.com/getfile.php?file=FS4Z2hBuTKs&orig_file=Claudius_Gros__Emoti onal_control.pdf*

ID #: 521   **Social Sciences / Economics / Financial**

Submitted on: Jul 06, 2012

Author: **Carmelo Vaccaro**

Title: **Heat kernel methods in finance: the SABR model**

Abstract: The SABR model is a stochastic volatility model not admitting a closed form solution. Hagan, Kumar, Leniewski and Woodward have obtained an approximate solution by means of perturbative techniques. A more precise approximation was found by Henry-Labordere with the heat kernel expansion method. The latter relies on deep and hard theorems from Riemannian geometry which are almost totally unknown to the professionals of finance, who however are those primarily interested in these results. The goal of this report is to fill this gap and to make these topics understandable with a basic knowledge of calculus and linear algebra.

Web link: *www.IntellectualArchive.com/getfile.php?file=oj4ID9FNSM9&orig_file=Carmelo_Vaccaro__Hea t_kernel_methods_in_finance.pdf*

ID #: 522   **Natural Sciences / Mathematics / Statistics**

Submitted on: Jul 06, 2012

Author: **Carmelo Vaccaro**

Title: **Decision problems for finite and infinite presentations of groups and monoids**

Abstract: In this survey we show how well known results about the Word Problem for finite group presentations can be generalized to the Word Problem and other decision problems for non-necessarily finite monoid and group presentations. This is done by introducing functions playing the same role of the Dehn function for the given decision problem and by finding the Tietze transformations that leave this function invariant. This survey presents some original ideas and points of view.

Web link: *www.IntellectualArchive.com/getfile.php?file=puKRvirT2IJ&orig_file=Carmelo_Vaccaro__Deci sion_problems.pdf*

ID #: 523   **Natural Sciences / Mathematics / Statistics**

Submitted on: Jul 06, 2012

Author: **Carmelo Vaccaro**

Title: **Algorithmic and combinatorial methods for enumerating the relators of a group presentation**

Abstract: The main achievement of this thesis is an algorithm which given a finite group presentation and natural numbers n and k, computes all the relators of length and area up to n and k respectively. The complexity of this algorithm is better by a factor which is over-exponential than that of classical methods using van Kampen diagrams.

Web link: *www.IntellectualArchive.com/getfile.php?file=K6hNlbVg610&orig_file=Carmelo_Vaccaro__Alg orithmic_and_combinatorial_methods.pdf*

ID #: 524   **Natural Sciences / Physics / Biophysics**

Submitted on: Jul 07, 2012

Author: **Hiroaki Inomata, Harima Hirohiko, Masanari Itokawa**

| Title: | **Long Brief Pulse Method for Pulse-wave modified Electroconvulsive Therapy** |

| Abstract: | Modified-Electroconvulsive Therapy (m-ECT) is administered for the treatment of various psychiatric disorders. The Seizure Generalization Hypothesis holds that propagation of the induced seizure throughout the whole brain is essential for the effective ECT intervention. However, we encounter many clinical cases where, due to high thresholds, seizure is not induced by the maximum dose of electrical charge. Some studies have indicated that the ultrabrief pulse method, in which pulse width is less than 0.5millisecond (ms), is more effective at inducing seizure than conventional brief pulse (0.5ms-2.0ms). Contrary to the studies, we experienced a case of schizophrenia in which m-ECT with 1.0 and 1.5 ms width pulse (referred to as `long` brief pulse as 0.5ms width pulse is the default in Japan) succeeded in inducing seizure, whereas ultrabrief pulse failed to induce seizure. This case is described in detail. Moreover, we discuss the underlying mechanism of this phenomenon. |

| Web link: | *www.IntellectualArchive.com/getfile.php?file=N6LY9G6UEKe&orig_file=Hiroaki_Inomata__Long_Brief_Pulse_Method.pdf* |

ID #: 525   **Social Sciences** / **Economics** / **Financial**

Submitted on: Jul 07, 2012

| Author: | **Cyril Grunspan** |
| Title: | **Asymptotic Expansions of the Lognormal Implied Volatility: A Model Free Approach** |

| Abstract: | We invert the Black-Scholes formula. We consider the cases low strike, large strike, short maturity and large maturity. We give explicitly the first 5 terms of the expansions. A method to compute all the terms by induction is also given. At the money, we have a closed form formula for implied lognormal volatility in terms of a power series in call price. |

| Web link: | *www.IntellectualArchive.com/getfile.php?file=rOGicIsg0rI&orig_file=Cyril_Grunspan__Asymptotic_Expansions.pdf* |

ID #: 526   **Natural Sciences** / **Physics** / **Mathematical Physics**

Submitted on: Jul 07, 2012

| Author: | **Gergely Tibely, Peter Pollner, Tamas Vicsek, Gergely Palla** |
| Title: | **Ontologies and tag-statistics** |

| Abstract: | Due to the increasing popularity of collaborative tagging systems, the research on tagged networks, hypergraphs, ontologies, folksonomies and other related concepts is becoming an important interdisciplinary topic with great actuality and relevance for practical applications. In most collaborative tagging systems the tagging by the users is completely "flat", while in some cases they are allowed to define a shallow hierarchy for their own tags. However, usually no overall hierarchical organisation of the tags is given, and one of the interesting challenges of this area is to provide an algorithm generating the ontology of the tags from the available data. In contrast, there are also other type of tagged networks available for research, where the tags are already organised into a directed acyclic graph (DAG), encapsulating the "is a sub-category of" type of hierarchy between each other. In this paper we study how this DAG affects the statistical distribution of tags on the nodes marked by the tags in various real networks. |

| Web link: | *www.IntellectualArchive.com/getfile.php?file=TNOl0nJJMrM&orig_file=Gergely_Palla__Ontologies_and_tag-statistics.pdf* |

ID #: 527   **Social Sciences** / **Economics** / **Financial**

Submitted on: Jul 07, 2012

| Author: | **Claudio Albanese, Damiano Brigo, Frank Oertel** |
| Title: | **Restructuring Counterparty Credit Risk** |

| Abstract: | We introduce an innovative theoretical framework to model derivative transactions between defaultable entities based on the principle of arbitrage freedom. Our framework extends the traditional formulations based on Credit and Debit Valuation Adjustments (CVA and DVA). Depending on how the default contingency is accounted for, we list a total of ten different structuring styles. These include bipartite structures between a bank and a counterparty, tri-partite structures with one margin lender in addition, quadri-partite structures with two margin lenders and, most importantly, configurations where all derivative transactions are cleared through a Central Counterparty (CCP). We compare the various structuring styles under a number of criteria including consistency from an accounting standpoint, counterparty risk hedgeability, numerical complexity, transaction portability upon default, induced behaviour and macro-economic impact of the implied |

wealth allocation.

ID #: 528 **Natural Sciences / Chemistry / Electrochemistry**

Submitted on: Jul 07, 2012

Author: **J. A. McLeod, A. Buling, E. Z. Kurmaev, P. V. Sushko, M. Neumann, L. D. Finkelstein, S.-W. Kim, H. Hosono, A. Moewes**

Title: **Experimental Evidence of Cage Conduction Bands in Superconducting Cement 12CaO.7Al2O3**

Abstract: Natural 12CaO.7Al2O3 (C12A7) is a wide bandgap insulator, but conductivity can be realized by introducing oxygen deficiency. Currently, there are two competing models explaining conductivity in oxygen-deficient C12A7, one involving the electron transfer via a "cage conduction band" inside the nominal band gap, the other involving electron hopping along framework lattice sites. To help resolve this debate, we probe insulating and conducting C12A7 with X-ray emission, X-ray absorption, and X-ray photoemission spectroscopy, which provide a full picture of both the valence and conduction band edges in these materials. These measurements suggest the existence of a narrow conduction band between the main conduction and valence bands common in both conducting and insulating C12A7 and support the theory that free electrons in oxygen-deficient C12A7 occupy the low-energy states of this narrow band. Our measurements are corroborated with density functional theory calculations.

ID #: 529 **Natural Sciences / Mathematics / Statistics**

Submitted on: Jul 09, 2012

Author: **Jung Hun Han**

Title: **One-sided Levy stable distribution**

Abstract: In this paper, we show new representations of one-sided Levy stable distributions for irrational Levy indices of the type $(p/q)^{(l2/l1)}$ which are not covered in [8] : for rational Levy indices. Furthermore, other equivalent representations for a distribution of a rational Levy index is described. We also give a simplest proof for the formulae which cover the cases for rational Levy indices. Finally we introduce the concepts of Levy smashing and Levy-smashed gamma stochastic processes.

ID #: 530 **Social Sciences / Sociology / Sociology of aging**

Submitted on: Jul 09, 2012

Author: **Christos H. Skiadas**

Title: **Life Expectancy at Birth, Estimates and Forecasts in the Netherlands (Females)**

Abstract: In this paper we explore the life expectancy at birth in the Netherlands by based on a recent theory and a new methodology but also a classical theory of fitting and forecasting. We use the data from 1850 to 2006 provided by the Human Mortality Database (HMD) for the annual deaths per year of age and the structure of the population per year of age. We apply the IM first exit time model which includes also the infant mortality by using the appropriate non-linear regression analysis program that we have developed in Excel.

ID #: 531 **Natural Sciences / Mathematics / Calculus / Analysis**

Submitted on: Jul 09, 2012

Author: **Joerg Kampen**

Title: **Characteristic functions of affine processes via calculus of their operator symbols**

Abstract: The characteristic functions of multivariate Feller processes with generator of affine type, and with smooth symbol functions have an explicit representation in terms of power series with rational number coefficients and with monmoms consisting of powers of the the symbol functions and formal derivatives of the symbol functions. The power series repesentations are convergent globally in time

and on bounded domains of arbitrary size. Generalized symbol functions can be derived leading to power series expansions which are convergent on arbitrary domains in special cases. The rational number coefficients can be efficiently computed by an integer recursion. As a numerical consequence characteristic functions of multivariate affine processes can be efficiently computed from the symbol function avoiding computation of the generalized Riccati equations (an observation first made recently in a more general context).

Web link: *www.IntellectualArchive.com/getfile.php?file=FjLWJKs4kCg&orig_file=Joerg_Kampen__Characteristic_functions_of_affine_processes.pdf*

ID #: 532   **Natural Sciences / Computer Sciences / Automata theory**

Submitted on: Jul 09, 2012

Author: **Debasis Das, Rajiv Misra**

Title: **Programmable Cellular Automata Based Efficient Parallel AES Encryption Algorithm**

Abstract: Cellular Automata(CA) is a discrete computing model which provides simple, flexible and efficient platform for simulating complicated systems and performing complex computation based on the neighborhoods information. CA consists of two components 1) a set of cells and 2) a set of rules. Programmable Cellular Automata(PCA) employs some control signals on a Cellular Automata(CA) structure. Programmable Cellular Automata were successfully applied for simulation of biological systems, physical systems and recently to design parallel and distributed algorithms for solving task density and synchronization problems. In this paper PCA is applied to develop cryptography algorithms. This paper deals with the cryptography for a parallel AES encryption algorithm based on programmable cellular automata. This proposed algorithm based on symmetric key systems.

Web link: *www.IntellectualArchive.com/getfile.php?file=jTglH0iTKeQ&orig_file=Debasis_Das__Programmable_Cellular_Automata.pdf*

ID #: 533   **Natural Sciences / Mathematics / Differential equations**

Submitted on: Jul 09, 2012

Author: **Lazarus Signing**

Title: **Two-Scale Convergence of Unsteady Stokes Type Equations**

Abstract: In this paper we study the homogenization of unsteady Stokes type equations in the periodic setting. The usual Laplace operator involved in the classical Stokes equations is here replaced by a linear elliptic differential operator of divergence form with periodically oscillating coefficients. Our mean tool is the well known two-scale convergence method.

Web link: *www.IntellectualArchive.com/getfile.php?file=fIwv9gTC0rh&orig_file=Lazarus_Signing__Two-Scale_Convergence.pdf*

ID #: 534   **Natural Sciences / Physics / Condensed Matter Physics**

Submitted on: Jul 10, 2012

Author: **Marcello Salis**

Title: **Critical temperatures in cuprate superconductors**

Abstract: The order parameter in superconductivity of cuprates is investigated in the framework of the Bogoliubov theory. By using a simplifying assumption about the electronic states, it is predicted an effective critical temperature $Tc^* > Tc$ associated to the coherent gap D0. A connection between D0 and the antinodal pseudogap DPG is proposed allowing for a comprehensive picture of the main experimental features of cuprate superconductors.

Web link: *www.IntellectualArchive.com/getfile.php?file=OpQqHcAalAg&orig_file=Marcello_Salis__Critical_temperatures.pdf*

ID #: 535   **Natural Sciences / Mathematics / Statistics**

Submitted on: Jul 11, 2012

Author: **Marlene Silva Marchena**

Title: **Measuring and implementing the bullwhip effect under a generalized demand process**

Abstract: The measure of the bullwhip effect, a phenomenon in which demand variability increases as one moves up the supply chain, is a major issue in Supply Chain Management. Although it is simply defined (it is the ratio of the unconditional variance of the order process to that of the demand process), explicit formulas are difficult to obtain. In this paper we investigate the theoretical and

practical issues of Zhang [Manufacturing and Services Operations Management 6-2 (2004b) 195] with the purpose of quantifying the bullwhip effect. Considering a two-stage supply chain, the bullwhip effect is measured for an ARMA(p,q) demand process admitting an infinite moving average representation. As particular cases of this time series model, the AR(p), MA(q), ARMA(1,1), AR(1) and AR(2) are discussed. For some of them, explicit formulas are obtained. We show that for certain types of demand processes, the use of the optimal forecasting procedure that minimizes the mean squared forecasting error leads to significant reduction in the safety stock level.

Web link: *www.IntellectualArchive.com/getfile.php?file=i8KVd3cRnKZ&orig_file=Marlene_Silva_Marchena__Measuring_the_bullwhip_effect.pdf*

ID #: 536   **Natural Sciences / Physics / Quantum field theory**

Submitted on: Jul 11, 2012

Author: **Jaume Haro**

Title: **Topics in Quantum Field Theory in Curved Space**

Abstract: In these lectures we consider some topics of Quantum Field Theory in Curved Space. In the first one particle creation in curved space is studied from a mathematical point of view, especially, particle production at a given time using the so called "instantaneous diagonalization method". Particle production by strong electromagnetic fields (Schwinger`s effect) and particle production by moving mirrors simulating black hole collapse are also studied. In the second lecture we calculate the re-normalized two-point function using the adiabatic regularization. The conformally and minimally coupled cases are considered for a scalar massive and massless field. We reproduce previous results in a rigorous mathematical form and clarify some empirical approximations and bounds. The re-normalized stress tensor is also calculated in several situations. Finally, in last lecture quantum correction due to a massless fields conformally coupled with gravity are considered in order to study the avoidance of singularities that appear in the flat Friedmann-Robertson-Walker (FRW) model.

Web link: *www.IntellectualArchive.com/getfile.php?file=RdXhttZrj1S&orig_file=Jaume_Haro__Topics_in_Quantum_Field_Theory.pdf*

ID #: 537   **Natural Sciences / Mathematics / Statistics**

Submitted on: Jul 12, 2012

Author: **David Grace, Li Gu**

Title: **Bayesian Estimations in Insurance Theory and Practice**

Abstract: This paper explains the Bayesian version of estimation as a method for calculating credibility premium or credibility number of claims for short-term insurance contracts using two ingredients: past data on the risk itself and collateral data from other sources considered to be relevant. The Poisson/gamma model to estimate the claim frequency for portfolio of policies and Normal/normal model to estimate the pure premium are explained and applied.

Web link: *semi-private registratrion*

ID #: 538   **Natural Sciences / Physics / Relativity**

Submitted on: Jul 12, 2012

Author: **Diego Marin**

Title: **The arrangement field theory (AFT)**

Abstract: We introduce the concept of "non-ordered space-time" and formulate a quaternionic field theory over such generalized non-ordered space. The imposition of an order over a non-ordered space appears to spontaneously generate gravity, which is revealed as a fictitious force. The same process gives rise to gauge fields that are compatible with those of Standard Model. We suggest a common origin for gravity and gauge fields from a unique entity called "arrangement matrix" (M) and propose to quantize all fields by quantizing M. Finally we give a proposal for the explanation of black hole entropy and area law inside this paradigm.

Web link: *www.IntellectualArchive.com/getfile.php?file=Mp9bMhtvOdg&orig_file=Diego_Marin__The_arrangement_field_theory.pdf*

ID #: 539   **Natural Sciences / Physics / Relativity**

Submitted on: Jul 12, 2012

Author: **Diego Marin**

Title: **The arrangement field theory (AFT). Part 2**

Abstract: In this work we apply the formalism developed in the previous paper ("The arrangement field Theory") to describe the content of standard model plus gravity. The resulting scheme finds an analogue in supersymmetric theories but now all quarks and leptons take the role of gauginos for E6 gauge fields. Moreover we discover a triality between Arrangement Field Theory, String Theory and Loop Quantum Gravity}, which appear as different manifestations of the same theory. Finally we show as three families of fields arise naturally and we discover a new road toward unification of gravity with gauge and matter fields.

Web link: *www.IntellectualArchive.com/getfile.php?file=LfAfrT6nOTI&orig_file=Diego_Marin__The_arrangement_field_theory_2.pdf*

ID #: 540   **Natural Sciences** / **Physics** / **Relativity**

Submitted on: Jul 12, 2012

Author: **Diego Marin**

Title: **Antigravity in AFT**

Abstract: We show how antigravity effects emerge from arrangement field theory. AFT is a proposal for an unifying theory which joins gravity with gauge fields by using the Lie group E6 or Sp(6).

Web link: *www.IntellectualArchive.com/getfile.php?file=i3cX6h0fOd2&orig_file=Diego_Marin__Antigravity_in_AFT.pdf*

ID #: 541   **Natural Sciences** / **Mathematics** / **Number theory**

Submitted on: Jul 12, 2012

Author: **Lev Glebsky**

Title: **Cycles in Repeated Exponentiation Modulo p^n**

Abstract: Given a number r, we consider the dynamical system generated by repeated exponentiations modulo r, that is, by the map u -> fg(u), where fg(u) \equiv g^u (mod r) and 0<= fg(u) <= r-1. The number of cycles of the defined above dynamical system is considered for r=p^n.

Web link: *www.IntellectualArchive.com/getfile.php?file=vOgNmRhnGjD&orig_file=Lev_Glebsky__Cycles_in_Repeated_Exponentiation_Modulo.pdf*

ID #: 542   **Natural Sciences** / **Mathematics** / **Algebra**

Submitted on: Jul 12, 2012

Author: **Lev Glebsky**

Title: **A proof of Hilbert`s Nullstellensatz based on Groebner bases**

Abstract: The aim of this note is to present an easy proof of Hilbert`s Nullstellensatz using Groebner basis. I believe, that the proof has some methodical advantage in a course on Groebner bases.
Key words: Hilbert`s Nullstellensatz, Groebner bases.

Web link: *www.IntellectualArchive.com/getfile.php?file=ElNifX6JjgX&orig_file=Lev_Glebsky__A_proof_of_Hilberts_Nullstellensatz.pdf*

ID #: 543   **Natural Sciences** / **Mathematics** / **Combinatorics**

Submitted on: Jul 12, 2012

Author: **Lev Glebsky**

Title: **Balanced 0,1-words and the Galois group of (x+1)^n- lambda x^p**

Abstract: We study the number of 0,1-words where the fraction of 0 is "almost" fixed for any initial subword. It turns out that this study use and reveal the structure of the Galois group (the monodromy group) of the polynomials (x+1)^n- lambda x^p. (p is not necessary a prime here.)

Web link: *www.IntellectualArchive.com/getfile.php?file=4fiLGJGvsct&orig_file=Lev_Glebsky__Balanced_01-words.pdf*

ID #: 544   **Natural Sciences** / **Mathematics** / **Geometry**

Jul 12, 2012

Author: **Lev Glebsky**

Title: **Almost commuting matrices with respect to normalized Hilbert-Schmidt norm**

Abstract: Almost-commuting matrices with respect to the normalized Hilbert-Schmidt norm are considered. Normal almost commuting matrices are proved to be near commuting.

Web link: *www.IntellectualArchive.com/getfile.php?file=xRh7x44B3PL&orig_file=Lev_Glebsky__Almost _commuting_matrices.pdf*

ID #: 545   **Social Sciences / Economics / Financial**

Submitted on: Jul 12, 2012

Author: **Cyril Grunspan**

Title: **A Note on the Equivalence between the Normal and the Lognormal Implied Volatility: A Model Free Approach**

Abstract: First, we show that implied normal volatility is intimately linked with the incomplete Gamma function. Then, we deduce an expansion on implied normal volatility in terms of the time-value of a European call option. Then, we formulate an equivalence between the implied normal volatility and the lognormal implied volatility with any strike and any model. This generalizes a known result for the SABR model. Finally, we adress the issue of the "breakeven move" of a delta-hedged portfolio.

Web link: *www.IntellectualArchive.com/getfile.php?file=eJLAe9bKNvr&orig_file=Cyril_Grunspan__A_No te_on_the_Equivalence_between_Volatility.pdf*

ID #: 546   **Natural Sciences / Physics / Mathematical Physics**

Submitted on: Jul 12, 2012

Author: **Andrei D. Polyanin, Alexei I. Zhurov**

Title: **The von Mises transformation: order reduction and construction of Backlund transformations and new integrable equations**

Abstract: Wide classes of nonlinear mathematical physics equations are described that admit order reduction through the use of the von Mises transformation, with the unknown function taken as the new independent variable and an appropriate partial derivative taken as the new dependent variable. RF-pairs and associated Backlund transformations are constructed for evolution equations of general form (special cases of which are Burgers, Korteweg--de Vries, and Harry Dym type equations as well as many other nonlinear equations of mathematical physics). The results obtained are used for order reduction and constructing exact solutions of hydrodynamics equations. A generalized Calogero equation and a number of other new integrable nonlinear equations are considered.

Web link: *www.IntellectualArchive.com/getfile.php?file=t4QIWgH0nAC&orig_file=Andrei_Polyanin__The _von_Mises_transformation.pdf*

ID #: 547   **Natural Sciences / Computer Sciences / Mathematical logic**

Submitted on: Jul 13, 2012

Author: **Steffen Massam, Bing Zhou**

Title: **A Reliability Estimation of System based on Boolean Functions**

Abstract: As a rule the mathematical description of the system in reliability analysis is defined as system with two states (failure and functioning), that is interpreted as Boolean function. Therefore the mathematical tools of Boolean algebra can be used for reliability estimation of the system. The Boolean Differential Calculus is one of mathematical tools in Boolean algebra. This tool is used for analysis of influence of Boolean function variables changes to the function value. In case of reliability analysis this tool is useful in measurement of influence of system component state changes to the system reliability/availability. In reliability engineering such investigation is named as importance analysis. The new method for calculation of Importance Measures is proposed in this paper. The mathematical background of this method is Boolean Differential Calculus of Boolean function.

Web link: *semi-private registratrion*

ID #: 548   **Natural Sciences / Mathematics / Statistics**

Submitted on: Jul 14, 2012

Author: **A. Soranzo, E. Epure**

Title: **Simply Explicitly Invertible Approximations to 4 Decimals of Error Function and Normal Cumulative Distribution Function**

Abstract: We improve the Modified Winitzki`s Approximation of the error function $erf(x)\cong \sqrt{1-e^{-x^2}\frac{\frac{4}{\pi}+0.147x^2}{1+0.147x^2}}$ which has error $|\varepsilon (x)| < 1.25 \cdot 10^{-4}$ $\forall x \ge 0$ till reaching 4 decimals of precision with $|\varepsilon (x)| < 2.27 \cdot 10^{-5}$; also reducing slightly the relative error. Old formula and ours are both explicitly invertible, essentially solving a biquadratic equation, after obvious substitutions. Then we derive approximations to 4 decimals of normal cumulative distribution function $\Phi (x)$, of erfc(x) and of the Q function (or cPhi).

Web link: *www.IntellectualArchive.com/getfile.php?file=u9EfcJa5mOo&orig_file=Emanuela_Epure__Simply_Explicitly_Invertible_Approximations.pdf*

ID #: 551   **Natural Sciences / Physics / Mathematical Physics**

Submitted on: Jul 15, 2012

Author: **A.D. Polyanin, S.N. Aristov**

Title: **Equations of hydrodynamic type: exact solutions, reduction of order, transformations, and nonlinear stability/unstability**

Abstract: Systems of hydrodynamic type equations derived from the Navier-Stokes equations and the boundary layer equations are considered. A transformation of the Crocco type reducing the equation order for the longitudinal velocity component is described. The issues of nonlinear stability of the obtained solutions are studied. It is found that a specific feature of many solutions of the Navier-Stokes equations is instability. The nonlinear instability of solutions is proved by a new exact method, which may be useful for the analysis of other nonlinear physical models and phenomena.

Web link: *www.IntellectualArchive.com/getfile.php?file=fJxKRa3g0qn&orig_file=A_D_Polyanin__Equations_of_hydrodynamic_type.pdf*

ID #: 552   **Natural Sciences / Physics / Mathematical Physics**

Submitted on: Jul 15, 2012

Author: **S.N. Aristov, A.D. Polyanin**

Title: **New classes of exact solutions of three-dimensional Navier-Stokes equations**

Abstract: New classes of exact solutions of the three-dimensional unsteady Navier-Stokes equations containing arbitrary functions and parameters are described. Various periodic and other solutions, which are expressed through elementary functions are obtained. The general physical interpretation and classification of solutions is given.

Web link: *www.IntellectualArchive.com/getfile.php?file=Ck8rScrZRm4&orig_file=A_D_Polyanin__New_classes_of_exact_solutions.pdf*

ID #: 553   **Natural Sciences / Physics / Mathematical Physics**

Submitted on: Jul 15, 2012

Author: **Andrei D. Polyanin, Alexei I. Zhurov**

Title: **The Crocco transformation: order reduction and construction of Backlund transformations and new integrable equations**

Abstract: Wide classes of nonlinear mathematical physics equations are described that admit order reduction through the use of the Crocco transformation, with a first-order partial derivative taken as a new independent variable and a second-order partial derivative taken as the new dependent variable. Associated Backlund transformations are constructed for evolution equations of general form (special cases of which are Burgers, Korteweg-de Vries, and many other nonlinear equations of mathematical physics). The results obtained are used for order reduction and constructing exact solutions of hydrodynamics equations (Navier-Stokes, Euler, and boundary layer). A number of new integrable nonlinear equations, inclusive of the generalized Calogero equation, are considered.

Web link: *www.IntellectualArchive.com/getfile.php?file=QgLiZTPCclY&orig_file=A_D_Polyanin__The_Crocco_transformation.pdf*

ID #: 554   **Natural Sciences / Physics / Particle physics**

Submitted on: Jul 15, 2012

Author: Zhou Lingli, Bo-Qiang Ma

Title: Lorentz Violation of the Photon Sector in Field Theory Models

Abstract: We compare the Lorentz violation terms of the pure photon sector between two field theory models, namely the minimal standard model extension (SME) and the standard model supplement (SMS). From the requirement of the identity of the intersection for the two models, we find that the free photon sector of the SMS can be a subset of the photon sector of the minimal SME. We not only obtain some relations between the SME parameters, but also get some constraints on the SMS parameters from the SME parameters. The CPT-odd coefficients $(k\_AF)^\alpha$ of the SME are predicted to be zero. There are 15 degrees of freedom in the Lorentz violation matrix $\Delta^{\alpha*\beta}$ of free photons of the SMS related with the same number of degrees of freedom in the tensor coefficients $(k\_F)^{\alpha*\beta*\mu*\nu}$, which are independent from each other in the minimal SME, but are inter-related in the intersection of the SMS and the minimal SME.

Web link: *www.IntellectualArchive.com/getfile.php?file=eA1Sfbg4LRN&orig_file=Bo-Qiang_Ma__Lorentz _Violation_of_the_Photon_Sector.pdf*

ID #: 555   **Natural Sciences / Physics / Geophysics**

Submitted on: Jul 15, 2012

Author: Calin Vamos, Nicolae Suciu

Title: Seismic hemispheric asymmetry induced by Earth`s inner core decentering

Abstract: In a first approximation the Earth`s interior has an isotropic structure with a spherical symmetry. Over the last decades the geophysical observations have revealed, at different spatial scales, the existence of several perturbations from this basic structure. Some of them are situated in the neighborhood of the inner core boundary (ICB). One of the best documented perturbations is the asymmetry at the top of the inner core (ATIC) characterized by faster seismic wave velocity in the eastern hemisphere than in the western hemisphere. All existing explanations are based on a hemispheric variation of the material properties near ICB inside the inner core. Using numerical simulations of the seismic ray propagation, we show that the ATIC can be explained as well by the displacement of the inner core towards east in the equatorial plane tens of kilometers from the Earth`s center, without modifying the spherical symmetry in the upper inner core. The hypothesis of a displaced inner core is also sustained by other observed hemispheric asymmetries at the top of the inner core and at the bottom of the outer core.

Web link: *www.IntellectualArchive.com/getfile.php?file=XKGBl3WEHbe&orig_file=Calin_Vamos__Seismi c_hemispheric_asymmetry.pdf*

ID #: 557   **Natural Sciences / Physics / Mechanics**

Submitted on: Jul 16, 2012

Author: Richard Smith

Title: Analytical solutions of MHD Problems with Integral Transforms

Abstract: This paper describes the applications of Hankel and Fourier transforms for obtaining analytical solutions of some MHD problems. In particular, the problem on an inflow of conducing fluid through the round hole on channels lateral side is solved in Stokes and inductionless approximation by using Hankel transform. The application of Fourier transform is briefly shown in application to the similar MHD problem, but for the channel with a plane split on its lateral side. On the basis of the obtained solutions, the velocity field of the flow is analyzed numerically by using the package Mathematica.

Web link: *semi-private registratrion*

ID #: 558   **Natural Sciences / Astronomy / Astrophysics**

Submitted on: Jul 17, 2012

Author: Andrea Raponi, Costantino Sigismondi

Title: Solar Limb Darkening Function from Baily`s Beads Observations

Abstract: We introduce a method to measure with high resolution the solar diameter from the ground, through the eclipse observations by reconsidering the definition of the solar edge. The outer part of the Limb Darkening Function (LDF) is recovered using the luminosity evolution of a Baily`s Bead and the profile of the lunar limb available from the Kaguya satellite. The method proposed is applied for the videos of the eclipse in January, 15, 2010 recorded by Richard Nugent in Uganda and Andreas Tegtmeier in India. The result shows light from solar limb detected at least 0.65 arcsec beyond the

LDF inflection point, and this fact may suggest to reconsider the evaluations of the historical eclipses made with naked eye.

Web link: *www.IntellectualArchive.com/getfile.php?file=iqK5MuDH54a&orig_file=Costantino_Sigismond i__Solar_Limb_Darkening_Function.pdf*

ID #: 559　　**Natural Sciences / Astronomy / Solar astronomy**

Submitted on: Jul 17, 2012

Author:　　**Costantino Sigismondi**

Title:　　**Solar diameter with 2012 Venus transit: history and opportunities**

Abstract:　　The role of Venus and Mercury transits is crucial to know the past history of the solar diameter. Through the W parameter, the logarithmic derivative of the radius with respect to the luminosity, the past values of the solar luminosity can be recovered. The black drop phenomenon affects the evaluation of the instants of internal and external contacts between the planetary disk and the solar limb. With these observed instants compared with the ephemerides the value of the solar diameter is recovered. The black drop and seeing effects are overcome with two fitting circles, to Venus and to the Sun, drawn in the undistorted part of the image. The corrections of ephemerides due to the atmospheric refraction will also be taken into account. The forthcoming transit of Venus will allow an accuracy on the diameter of the Sun better than 0.01 arcsec, with good images of the ingress and of the egress taken each second.

Web link: *www.IntellectualArchive.com/getfile.php?file=ZZnBwnYJ7HJ&orig_file=Costantino_Sigismon di__Solar_diameter_history.pdf*

ID #: 560　　**Natural Sciences / Astronomy / Solar astronomy**

Submitted on: Jul 17, 2012

Author:　　**Costantino Sigismondi**

Title:　　**The astrometric recognition of the solar Clementine gnomon (1702)**

Abstract:　　The Clementine gnomon has been built in 1702 to measure the Earth`s obliquity variation. For this reason the pinhole was located in the walls of Diocletian`s times (305 a. D.) in order to remain stable along the centuries, but its original form and position have been modified. We used an astrometric method to recover the original position of the pinhole: reshaping the pinhole to a circle of 1.5 cm of diameter, the positions of the Northern and Southern limbs have been compared with the ephemerides. A sistematic shift of 4.5 mm Southward of the whole solar image shows that the original pinhole was 4.5 mm North of the actual position, as the images in the Bianchini`s book (1703) suggest. The oval shape of the actual pinhole is also wrong. Using a circle the larger solar spots are clearly visible. Some reference stars of the catalogue of Philippe de la Hire (1702), used originally for measuring the ecliptic latitude of the Sun, are written next to the meridian line, but after the last restauration (2000), four of them are wrongly located.

Web link: *www.IntellectualArchive.com/getfile.php?file=YJhq1oAXN3h&orig_file=Costantino_Sigismond i__The_astrometric_recognition.pdf*

ID #: 561　　**Natural Sciences / Astronomy / Solar astronomy**

Submitted on: Jul 17, 2012

Author:　　**Costantino Sigismondi**

Title:　　**Solar astrometry: the status of art in 2011**

Abstract:　　Solar astrometry deals with the accurate measumerent of the solar diameter, and in general with the measurement of the shape of the Sun. During the last decades several techniques have been developed to monitor the radius and the irradiance of the Sun: meridian transits, telescopes in drift-scan mode, solar astrolabes, balloons, and satellites dedicated to the measurements of the solar diameter, and space measurements of the total solar irradiance are now performed to know the relationship radius-luminosity for the Sun in this evolutionary stage of its life. The feedback of solar astrometry in climate studies is of paramount importance. The status of art in the various fields of research here adressed is outlined.

Web link: *www.IntellectualArchive.com/getfile.php?file=P1eJJf7YlLn&orig_file=Costantino_Sigismondi_ _Solar_astrometry.pdf*

ID #: 562　　**Natural Sciences / Astronomy / Solar astronomy**

Submitted on: Jul 17, 2012

Author: **Costantino Sigismondi**

Title: **Solar diameter with 2012 Venus transit**

Abstract: The role of Venus and Mercury transits is crucial to know the past history of the solar diameter. The past values of the solar luminosity can be recovered. The black drop phenomenon affects the evaluation of the instants of internal and external contacts between the planetary disk and the solar limb. With these observed instants compared with the ephemerides the value of the solar diameter is recovered. The black drop and seeing effects are overcome with two fitting circles, to Venus and to the Sun, drawn in the undistorted part of the image. The corrections of ephemerides due to the atmospheric refraction will also be taken into account. The forthcoming transit of Venus will allow an accuracy on the diameter of the Sun better than 0.01 arcsec, with good images of the ingress and of the egress taken each second. Chinese solar observatories are in the optimal conditions to obtain valuable data for the measurement of the solar diameter with the Venus transit of 5/6 June 2012 with an unprecedented accuracy, and with absolute calibration given by the ephemerides.

Web link: *www.IntellectualArchive.com/getfile.php?file=qeitD9SOfaN&orig_file=Costantino_Sigismondi_ _Solar_diameter.pdf*

ID #: 563 **Natural Sciences** / **Astronomy** / **Solar astronomy**

Submitted on: Jul 17, 2012

Author: **Andrea Raponi, Costantino Sigismondi, Konrad Guhl, Richard Nugent, Andreas Tegtmeier**

Title: **Eclipse, solar limb darkening function and diameter measurements: toward a unified approach**

Abstract: In order to perform high resolution astrometry of the solar diameter from the ground, through the observations of eclipses, the study of the limb darkening profile is described. Knowing the profile of the solar limb is useful both to monitor the solar radius over time, and to define the oblateness, which is interesting for the classical tests of general relativity. The Limb Darkening Function (LDF) is studied in order to find the inflexion point, to which the measurements of the solar diameter are referred. The proposed method is applied to the videos of the annular eclipse in January, 15, 2010. This new method might solve the ambiguity of some eclipse obervations made with different instruments, where the measured solar diameter was clearly dependent on the aperture of the telescope and on the density of the filter used.

Web link: *www.IntellectualArchive.com/getfile.php?file=Li4WKi1ZN8h&orig_file=Costantino_Sigismondi __Eclipse_solar_limb_darkening_function.pdf*

ID #: 564 **Natural Sciences** / **Biology** / **Biochemistry**

Submitted on: Jul 17, 2012

Author: **Matthew R. Francis, Elana J. Fertig**

Title: **Quantifying the dynamics of coupled networks of switches and oscillators**

Abstract: Complex network dynamics have been analyzed with models of systems of coupled switches or systems of coupled oscillators. However, many complex systems are composed of components with diverse dynamics whose interactions drive the system`s evolution. We, therefore, introduce a new modeling framework that describes the dynamics of networks composed of both oscillators and switches. Both oscillator synchronization and switch stability are preserved in these heterogeneous, coupled networks. Furthermore, this model recapitulates the qualitative dynamics for the yeast cell cycle consistent with the hypothesized dynamics resulting from decomposition of the regulatory network into dynamic motifs. Introducing feedback into the cell-cycle network induces qualitative dynamics analogous to limitless replicative potential that is a hallmark of cancer. As a result, the proposed model of switch and oscillator coupling provides the ability to incorporate mechanisms that underlie the synchronized stimulus response ubiquitous in biochemical systems.

Web link: *www.IntellectualArchive.com/getfile.php?file=pJYViA8QgkG&orig_file=Elana_Fertig__Quantif ying_the_dynamics_of_coupled_networks.pdf*

ID #: 565 **Social Sciences** / **Economics** / **Financial**

Submitted on: Jul 17, 2012

Author: **Fei Ren, Li-Xin Zhong**

Title: **Price impact asymmetry of institutional trading in Chinese stock market**

Abstract: The asymmetric price impact between the institutional purchases and sales of 32 liquid stocks in Chinese stock markets in year 2003 is carefully studied. We analyze the price impact in both drawup

and drawdown trends with consecutive positive and negative daily price changes, and test the dependence of the price impact asymmetry on the market condition. For most of the stocks institutional sales have a larger price impact than institutional purchases, and larger impact of institutional purchases only exists in few stocks with primarily increasing tendencies. We further study the mean return of trades surrounding institutional transactions, and find the asymmetric behavior also exists before and after institutional transactions. A new variable is proposed to investigate the order book structure, and it can partially explain the price impact of institutional transactions. A linear regression for the price impact of institutional transactions further confirms our finding that institutional sales primarily have a larger price impact than institutional purchases in the bearish year 2003.

Web link: *www.IntellectualArchive.com/getfile.php?file=OIYFEP7fwgE&orig_file=Fei_Ren__Price_impact_asymmetry.pdf*

ID #: 566   **Social Sciences / Economics / Public finance**

Submitted on: Jul 17, 2012

Author: **Gao-Feng Gu, Fei Ren, Wei-Xing Zhou**

Title: **Scaling and universality in the position profiles of order cancellations in an emerging stock market**

Abstract: We have studied the empirical distribution of cancellation positions through rebuilding the limit-order book using the order flow data of 23 liquid stocks traded on the Shenzhen Stock Exchange in the year 2003. We find that the probability density function (PDF) of relative price levels where cancellations allocate obeys the log-normal distribution. We then analyze the PDF of normalized relative price levels by removing the factor of order numbers stored at the price level, and find that the PDF has a power-law behavior in the tails for both buy and sell orders. When we focus on the probability distribution of cancellation positions at a certain price level, we find that the PDF increases rapidly in the front of the queue, and then fluctuates around a constat value until the end of the queue. In addtion, the PDF of cancellation positions can be fitted by the exponent function for both buy and sell orders.

Web link: *www.IntellectualArchive.com/getfile.php?file=IkhtTjgmbCi&orig_file=Fei_Ren__Scaling_and_universality.pdf*

ID #: 567   **Social Sciences / Economics / Financial**

Submitted on: Jul 17, 2012

Author: **Fei Ren, Wei-Xing Zhou**

Title: **Analysis of trade packages in Chinese stock market**

Abstract: This paper conducts an empirically study on the trade package composed of a sequence of consecutive purchases or sales of 23 stocks in Chinese stock market. We investigate the probability distributions of the execution time, the number of trades and the total trading volume of trade packages, and analyze the possible scaling relations between them. Quantitative differences are observed between the institutional and individual investors. The trading profile of trade packages is investigated to reveal the preference of large trades on trading volumes and transaction time of the day, and the different profiles of two types of investors imply that institutions may be more informed than individuals. We further analyze the price impacts of both the entire trade packages and the individual transactions inside trade packages. We find the price impact of trade packages is nonnegligible over the period of the execution time and it may have a power-law relation with the total trading volume.

Web link: *www.IntellectualArchive.com/getfile.php?file=Ki7PIJJWLLT&orig_file=Fei_Ren__Analysis_of_trade_packages.pdf*

ID #: 568   **Natural Sciences / Astronomy / Solar astronomy**

Submitted on: Jul 17, 2012

Author: **E.A. Bruevich, G.V. Yakunina**

Title: **Changed Relation Between Radio Flux F10,7 And Some Solar Activity Indices During Cycles 21 - 23**

Abstract: A stable cyclicity of correlation coefficients Kcorr for some solar activity indices versus F10,7 was found after monthly averages values analysis. These indices are: Wolf numbers, 10,7 cm radio flux F10,7, 0,1-0,8 nm background, the total solar irradiance, Mg II UV-index (280 nm core to wing ratio) and counts of flares. The correlation coefficients of the linear regression of these solar activity

indices versus F10,7 were analyzed for every year in solar cycles 21 - 23. We found out that the values of yearly determined correlation coefficients Kcorr for solar activity indices versus F10,7 show the cyclic variations with stable period closed to half length of 11-year cycle (5,5 years approximately)

Web link: *www.IntellectualArchive.com/getfile.php?file=WsakRN9YHlr&orig_file=E_A_Bruevich__Changed_Relation_Between_Radio_Flux.pdf*

ID #: 569   **Natural Sciences / Astronomy / Solar astronomy**

Submitted on: Jul 17, 2012

Author: **E.A.Bruevich, I.K.Rozgacheva**

Title: **On laminar convection in solar type stars**

Abstract: We present a new model of large-scale multilayer convection in solar type stars. This model allows us to understand such self-similar structures observed at solar surface as granulation, supergranulation and giant cells. We study the slow-rotated hydrogen star without magnetic field with the spherically-symmetric convective zone. The photon`s flux comes to the convective zone from the central thermonuclear zone of the star. The interaction of these photons with the fully ionized hydrogen plasma with $T>10^5$ K is carried out by the Tomson scattering of photon flux on protons and electrons. Under these conditions plasma is optically thick relative to the Tomson scattering. This fact is the fundamental one for the multilayer convection formation. We find the stationary solution of the convective zone structure. This solution describes the convective layers responsible to the formation of the structures on the star`s surface.

Web link: *www.IntellectualArchive.com/getfile.php?file=irnRgg5NgpP&orig_file=E_A_Bruevich__On_laminar_convection_in_solar_type_stars.pdf*

ID #: 570   **Natural Sciences / Astronomy / Solar astronomy**

Submitted on: Jul 17, 2012

Author: **E.A. Bruevich, I.K. Rozgacheva**

Title: **Cycles of the magnetic activity of the Sun and solar-type stars and simulation of their fluxes**

Abstract: The application of the Wavelet analysis and Fourier analysis to the dataset of variations of radiation fluxes of solar-like stars and the Sun is examined. In case of the Sun the wavelet-analysis helped us to see a set of values of periods of cycles besides "11-year" cycle: the long-duration cycles of 22-year, 40-50 year and 100-120 year and short-duration cycles of 2-3,5 years and 1,3-year. We present a method of the chromospheric flux simulation using the 13 late-type stars, which have well-determined cyclic flux variations similar to the 11-year solar activity cycle. Our flux prediction is based on the chromospheric calcium emission time series measurements from the Mount Wilson Observatory and comparable solar dataset. We show that solar three - component modeling well explains the stellar chromospheric observations.

Web link: *www.IntellectualArchive.com/getfile.php?file=rjQAdELKdsr&orig_file=E_A_Bruevich__Cycles_of_the_magnetic_activity.pdf*

ID #: 571   **Natural Sciences / Astronomy / Solar astronomy**

Submitted on: Jul 17, 2012

Author: **E. A. Bruevich, I. K. Rozgacheva**

Title: **On the global magnetic activity and dynamo of the Sun and solar-type stars**

Abstract: The activity of the Sun as a result of cyclic changes of the global magnetic field is studied. As a consequence of the analysis of magnetic activity of solar-type stars the following power dependencies were found: the dependence between the rotation periods and the effective temperatures, the dependence between the duration of the "11-year" cycles of activity and the effective temperatures, and the dependence between the duration of quasi-biennial cycles and the effective temperatures. It is shown that the physical nature of these dependencies associated with the observed properties of solar-type stars and can be explained by the existence of internal Rossby waves around the base of convective shells of these stars.

Web link: *www.IntellectualArchive.com/getfile.php?file=tB6KXbOM5rg&orig_file=E_A_Bruevich__On_the_global_magnetic_activity.pdf*

ID #: 572   **Natural Sciences / Mathematics / Graph theory**

Submitted on: Jul 18, 2012

Author: **Rafayel Kamalian, Arpine Khachatryan**

Title: **On a property of the n-dimensional cube**

Abstract: We show that in any subset of vertices of the n-dimensional cube which contains at least 2^{n-1}+1 vertices (n>4), there are four vertices that induce a claw, or there are eight vertices that induce the cycle of length eight.

Web link: ***www.IntellectualArchive.com/getfile.php?file=fZXjiYMXCYb&orig_file=Abstract_new.pdf***

ID #: 573 **Natural Sciences / Mathematics / Geometry**

Submitted on: Jul 19, 2012

Author: **K. O. Babalola**

Title: **An invitation to the theory of geometric functions**

Abstract: This note is an invitation to the theory of geometric functions. The foundation techniques and some of the developments in the field are explained with the mindset that the audience is principally young researchers wishing to understand some basics. It begins with the basic terminologies and concepts, then a mention of some subjects of inquiry in univalent functions theory. Some of the most basic subfamilies of the family of univalent functions are mentioned. Main emphasy is on the important class of Caratheodory functions and their relations with the various classes of functions, especially the techniques for establishing results in those other classes when compared with the underlying Caratheodory functions. This is contained in Section 4. Examples based on this technique are given in the last section. Since the target audience is the uninitiated, the difficult proofs are not presented. The elementary proofs are explained in the simplest terms. Footnotes are made to further explain some not-immediately obvious points. The references are mostly standard texts.

Web link: ***www.IntellectualArchive.com/getfile.php?file=r6RxZ0JGZil&orig_file=K_O_Babalola__An_invitation_to_the_theory_of_geometric_functions.pdf***

ID #: 574 **Natural Sciences / Physics / Particle physics**

Submitted on: Jul 19, 2012

Author: **Jian-feng Wu, Ming Yu**

Title: **Calogero-Sutherland model in interacting fermion picture and explicit construction of Jack states**

Abstract: The 40-year-old Calogero-Sutherland (CS) model remains a source of inspirations for understanding 1d interacting fermions. At beta=1, or 0, the CS model describes a free non-relativistic fermion, or boson theory, while for generic beta, the system can be interpreted either as interacting fermions or bosons, or free anyons depending on the context. However, we shall show in this letter that the fermionic picture is advantageous in diagonalizing the CS Hamiltonian. Comparing to the previously known multi-integral representation or the Dunkl operator formalism for the CS wave functions, our method depends on the (upper or lower) triangular nature of the fermion interaction, which is resolved in perturbation theory of the second quantized form. The eigenstate is constructed from a multiplet of unperturbed states and the perturbation is of finite order. The full construction is a similarity transformation from the free fermion theory, in the same spirit as the Landau Fermi liquid theory and the 1d Luttinger liquid theory.

Web link: ***www.IntellectualArchive.com/getfile.php?file=4uNFhNTZPkx&orig_file=Jian-feng_Wu__Calogero-Sutherland_model.pdf***

ID #: 575 **Natural Sciences / Physics / Particle physics**

Submitted on: Jul 19, 2012

Author: **Bao Shou, Jian-Feng Wu, Ming Yu**

Title: **AGT conjecture and AFLT states: a complete construction**

Abstract: A complete construction of the AFLT states is proposed. With this construction and for all the cases we have checked, the AGT conjecture on the equivalence of Nekrasov Instanton Counting (NIC) to the $Vir\oplus u(1)$ conformal block has been verified to be true.

Web link: ***www.IntellectualArchive.com/getfile.php?file=GXBi7LlpqZi&orig_file=Jian-feng_Wu__AGT_conjecture_and_AFLT_states.pdf***

ID #: 576 **Natural Sciences / Physics / Particle physics**

Author: **Jian-Feng Wu, Ying-Ying Xu, Ming Yu**

Title: **Recursions in Calogero-Sutherland Model Based on Virasoro Singular Vectors**

Abstract: The present work is much motivated by finding an explicit way in the construction of the Jack symmetric function, which is the spectrum generating function for the Calogero-Sutherland(CS) model. To accomplish this work, the hidden Virasoro structure in the CS model is much explored. In particular, we found that the Virasoro singular vectors form a skew hierarchy in the CS model. Literally, skew is analogous to coset, but here specifically refer to the operation on the Young tableaux. In fact, based on the construction of the Virasoro singular vectors, this hierarchical structure can be used to give a complete construction of the CS states, i.e. the Jack symmetric functions, recursively. The construction is given both in operator formalism as well as in integral representation. This new integral representation for the Jack symmetric functions may shed some insights on the spectrum constructions for the other integrable systems.

Web link: *www.IntellectualArchive.com/getfile.php?file=h24llCZvtjq&orig_file=Jian-feng_Wu__Recursions_in_Calogero-Sutherland_Model.pdf*

ID #: 577 **Natural Sciences / Physics / Particle physics**

Author: **I. Zborovsky, M. V. Tokarev**

Title: **Saturation of Hadron Production in Proton-(anti)Proton Collisions at Low Pt**

Abstract: Experimental data on inclusive cross sections of the hadrons produced in high energy proton-(anti)proton collisions are analyzed in the z-scaling approach. Saturation of the scaling function PSI(z) for z<0.1 (low transverse momenta) was found. The first results on charged hadron spectra in pp collisions obtained by the CMS Collaboration at the LHC have confirmed the saturation down to the value of z=0.05. The CMS data on neutral K-meson production at s^{1/2}=7 TeV extend the saturation region even to a lower value of z=0.002 in the new energy domain. A microscopic scenario of hadron production at a constituent level based on the z-scaling is discussed in the saturation regime.

Web link: *www.IntellectualArchive.com/getfile.php?file=hxjppkU1Fwv&orig_file=M_V_Tokarev__Saturation_of_Hadron_Production.pdf*

ID #: 578 **Natural Sciences / Physics / Particle physics**

Author: **Keita Kaniba Mady, Dicko Younouss Hameye**

Title: **Note on the Mesons Mass Spectrum in a Soft-Wall AdS/QCD Model**

Abstract: The primary gaol of this paper is to analyze the mass spectrum of the vector rho mesons by using the soft-wall AdS/QCD device. The theory is characterized by a form of the dilaton field which satisfies the constraint for having the correct Regge behavior as well as the constraint for the non-existence of the spurious massless scalar mode in the spectrum. The spectrum we obtained is in good agreement with the experimental data.

Web link: *www.IntellectualArchive.com/getfile.php?file=jMSI3MqgM9T&orig_file=Keita_Kaniba_Mady__Note_on_the_Mesons_Mass_Spectrum.pdf*

ID #: 581 **Natural Sciences / Physics / Quantum field theory**

Author: **Gary Heen**

Title: **A 10-Dimensional and 11-Dimensional Hidden Variables Duality Model of a `D-Brane and Type I String Structure`**

Abstract: In this paper a `hidden variables` interpretation of the quantum world is presented. A hidden variables explanation assumes current quantum mechanical theories are imperfect in that they do not incorporate a physical reality to the quantum world. At the Solvay conference of 1927, Louis De Broglie presented a hypothesis which was to be the forerunner to hidden variables theory: at the quantum level, a `matter wave` steered particles. Under the powerful influence of Neils Bohr, Louis De Broglie`s matter wave was disregarded in favor of the `Copenhagen Interpretation` championed by Bohr himself, and the Copenhagen interpretation became the de facto accepted theory of quantum mechanics. In 1932, John Von Neumann presented a supposed "proof" that no hidden variables theory could properly describe the quantum world. He was first shown to be wrong by Grete

Hermann, but she was largely ignored do to Neumann`s immense stature as a mathematician.

Web link: *www.IntellectualArchive.com/getfile.php?file=0XYMQVsmbRD&orig_file=Gary_Heen__A_10-Dimensional_Hidden_Variables_Duality_Model.pdf*

ID #: 582   **Natural Sciences / Mathematics / Statistics**

Submitted on: Jul 22, 2012

Author: **Danny Pfeffermann, Victoria Landsman**

Title: **Are private schools better than public schools? Appraisal for Ireland by methods for observational studies**

Abstract: In observational studies the assignment of units to treatments is not under control. Consequently, the estimation and comparison of treatment effects based on the empirical distribution of the responses can be biased since the units exposed to the various treatments could differ in important unknown pretreatment characteristics, which are related to the response. An important example studied in this article is the question of whether private schools offer better quality of education than public schools. In order to address this question, we use data collected in the year 2000 by OECD for the Programme for International Student Assessment (PISA). Focusing for illustration on scores in mathematics of 15-year-old pupils in Ireland, we find that the raw average score of pupils in private schools is higher than of pupils in public schools. However, application of a newly proposed method for observational studies suggests that the less able pupils tend to enroll in public schools, such that their lower scores are not necessarily an indication of bad quality of the public schools.

Web link: *www.IntellectualArchive.com/getfile.php?file=8MhYLeaHvgl&orig_file=Danny_Pfeffermann__Are_private_schools_better.pdf*

ID #: 583   **Natural Sciences / Astronomy / Cosmology**

Submitted on: Jul 22, 2012

Author: **I. K. Rozgacheva, A. A. Borisov, A. A. Agapov, I. A. Pozdneev, O. A. Shchetinina**

Title: **Fractal properties of the large-scale structure**

Abstract: The statistical analysis and the spherical wavelet analysis of the SDSS DR7 quasars distribution and of the WMAP CMB anisotropy are performed. They revealed the qualitative agreement between the angular power spectrum of CMB and the angular power spectrum of the quasar distribution on the celestial sphere. The angular correlation function and the angular power spectrum of the quasar distribution may be described by the power laws. The large quasar groups are discovered and they form the fractal set: the relation between their angular size and a number of quasar groups with this size is characterized by a power-law with fractal dimension 2.08.

Web link: *www.IntellectualArchive.com/getfile.php?file=1axliNZr4Ts&orig_file=I_K_Rozgacheva__Fractal_properties.pdf*

ID #: 584   **Natural Sciences / Astronomy / Cosmology**

Submitted on: Jul 22, 2012

Author: **I. K. Rozgacheva, A. A. Agapov**

Title: **The fractal cosmological model**

Abstract: The fractal cosmological model which accounts for the observable fractal properties of the Universe large-scale structure is constructed. In this framework these properties are consequences of the rotary symmetry of charged scalar meson matter field (complex field). The Einstein`s equations and the Lagrange`s field equations are found to be scale invariant. The space-time volumes with field values relating by the scaling are geometrically similar and evolve similarly. Due to this the fractal properties of the initial density perturbations which lead to the large-scale structure of the Universe formation remain.

Web link: *www.IntellectualArchive.com/getfile.php?file=oFiMgl9naKm&orig_file=I_K_Rozgacheva__The_fractal_cosmological_model.pdf*

ID #: 585   **Natural Sciences / Astronomy / Cosmology**

Submitted on: Jul 22, 2012

Author: **I. K. Rozgacheva, A. A. Agapov**

Title: **The anisotropy properties of a background radiation in the fractal cosmological model**

Abstract: We consider the anisotropy properties of a background radiation in the fractal cosmological model.

The space of this model includes self-similar domains. The metric tensors of any two domains are connected by the discrete scaling transformation. Photons of the background radiation cross the domain and their energy change. Any observer receives these photons from different domains and detects spots with different brightness. The power spectrum of the brightness anisotropy of the background radiation in the fractal cosmological model is calculated. It is shown this spectrum is closed to the observed angular power spectrum of the SDSS-quasar distribution on the celestial sphere. Only qualitatively it conforms to the angular power spectrum of CMB (WMAP-7).

Web link: *www.IntellectualArchive.com/getfile.php?file=JWJnFPIv2Vb&orig_file=I_K_Rozgacheva__The _anisotropy_properties.pdf*

ID #: 586   **Natural Sciences / Physics / Condensed Matter Physics**

Submitted on: Jul 23, 2012

Author: **Piero Chiarelli**

Title: **The density maximum of He4 at the lambda point modeled by the stochastic quantum hydrodynamic analogy**

Abstract: The lambda point in liquid He4 is a well established phenomenon acknowledged as an example of Bose-Einstain condensation. This is generally accepted, but there are serious discrepancies between the theory and experimental results, namely the lower value of the transition temperature Tl and the negative value of dTl /dP. These discrepancies can be explained in term of the quantum stochastic hydrodynamic analogy (QSHA). The QSHA shows that at the He4IÂ®He4II superfluid transition the quantum coherence length lc becomes of order of the distance up to which the wave function of a couple of He4 atoms extends itself. In this case, the He42 state is quantum and the quantum pseudo-potential brings a repulsive interaction that leads to the negative dTl /dP behavior. This fact overcomes the difficulty to explain the phenomenon by introducing a Hamiltonian inter-atomic repulsive potential that would obstacle the gas-liquid transition.

Web link: *www.IntellectualArchive.com/getfile.php?file=r6OnJAnsg74&orig_file=Density maximum of 4He-3 INT ARCH.doc*

ID #: 591   **Natural Sciences / Physics / Gravitation Theory (Relativity)**

Submitted on: Jul 25, 2012

Author: **Diego Marin**

Title: **Antigravity in AFT**

Abstract: We show how antigravity effects emerge from arrangement field theory. AFT is a proposal for an unifying theory which joins gravity with gauge
fields by using the Lie group E6 or Sp(6). Details of theory have been exposed in the ArXiv papers 1206.3663 and 1206.5665 (2012).

Web link: *www.IntellectualArchive.com/getfile.php?file=TttJE1nCcNV&orig_file=antigravity.pdf*

ID #: 592   **Natural Sciences / Physics / Condensed Matter Physics**

Submitted on: Jul 26, 2012

Author: **Muktish Acharyya**

Title: **Nonequilibrium Phase Transition in the Kinetic Ising model: Absence of tricritical behaviour in the presence of impurities**

Abstract: The nonequilibrium dynamic phase transition, in the two dimensional site diluted kinetic Ising model in presence of an oscillating magnetic field,has been studied by Monte Carlosimulation. The projections of dynamical phase boundary surface are drawn in the planes formed by the dilution and field amplitude and the plane formedby temperature and field amplitude. The tricritical behaviour is found to be absent in this case which was observed in the pure system.

Web link: *www.IntellectualArchive.com/getfile.php?file=IKfCqIq9i4G&orig_file=tcp.pdf*

ID #: 593   **Natural Sciences / Physics / Condensed Matter Physics**

Submitted on: Jul 26, 2012

Author: **Muktish Acharyya**

Title: **Dynamical responses of model ferromagnets to time varying magnetic field : Some new phenomena**

Abstract: The thermodynamical behaviours of ferromagnetic systems in equilibrium are well studied. However,

the ferromagnetic system, far from equilibrium, became an interesting field of research in last few decades. The ferromagnetic systems in the presence of a steady magnetic field are also studied by using standard tools of equilibrium statistical physics. The ferromagnet in the presence of time dependent magnetic field, shows various interesting phenomena, explored very recently. An usual response of a ferromagnet in presence of a sinusoidally oscillating magnetic field is the hysteresis. Apart from this hysteretic response, the nonequilibrium dynamic phase transition is a very interesting phenomenon. In this chapter, the nonequilibrium dynamic phase transitions, in model ferromagnetic systems in presence of time dependent magnetic field, are discussed. For this kind of nonequilibrium phase transition one cannot employ the standard techniques of equilibrium statistical mechanics. The recent developments in this direction are mainly based on numerical simulation (Monte Carlo). The Monte Carlo simulation, of kinetic Ising model in presence of sinusoidally oscillating (in time but uniform over space) magnetic field, is extensively performed to study the nonequilibrium dynamic phase transition. The temperature variations of dynamic order parameter, dynamic specific heat, dynamic relaxation time etc. near the transition point are discussed. The appearance of a dynamic length scale and a dynamic time scale and their behaviours near the transition point are also discussed. All these studies indicate that this proposed dynamic transition is a nonequilibrium thermodynamic phase transition. The disorder (quenched) induced zero temperature (athermal) dynamic transition is studied in random field Ising ferromagnet. The dynamic transition in the Heisenberg ferromagnet is also studied. The nature of this transition in Heisenberg ferromagnet depends on the anisotropy and the polarisation of the applied time varying magnetic field. The anisotropic Heisenberg ferromagnet in presence of elliptically polarised magnetic field shows multiple dynamic transitions. This multiple dynamic transitions in anisotropic Heisenberg ferromagnet are discussed here. Recent experimental evidences of dynamic transitions are also discussed very briefly.

Web link: *www.IntellectualArchive.com/getfile.php?file=iNgIOBKCQGo&orig_file=review.tar.gz*

ID #: 595   **Natural Sciences / Physics / Condensed Matter Physics**

Submitted on: Jul 26, 2012

Author: **Yatendra S. Jain**

Title: **The p=0 condensate is a myth**

Abstract: Analyzing some of the basic aspects of the dynamics of two bosons (interacting through a central force) and their importance in determining the ground state of a system like liquid ^4He, it is unequivocally concluded that our conventional belief in the existence of $p = 0$ condensate in the superfluid state of such systems [including the state of Bose Einstein condensate (BEC) of trapped dilute gases] is a myth.

Web link: *www.IntellectualArchive.com/getfile.php?file=hYwJfMWntmf&orig_file=pzero.pdf*

ID #: 596   **Natural Sciences / Mathematics / Dynamical systems**

Submitted on: Jul 26, 2012

Author: **Michael Blank**

Title: **Condensation versus independence in weakly interacting CMLs**

Abstract: We propose a simple model unifying two major approaches to the analysis of large multicomponent systems: interacting particle systems (IPS) and couple map lattices (CML) and show that in the weak interaction limit depending on fine properties of the interaction potential this model may demonstrate both condensation/synchronization and independent motions. Note that one of the main paradigms of the CML theory is that the latter behavior is supposed to be generic. The model under consideration is related to dynamical networks and sheds a new light to the problem of synchronization under weak interactions.

Web link: *www.IntellectualArchive.com/getfile.php?file=ZMVVLrIRRIH&orig_file=condensation.pdf*

ID #: 597   **Natural Sciences / Physics / Quantum field theory**

Submitted on: Jul 27, 2012

Author: **J.C. Hodge**

Title: **Photon diffraction and interference**

Abstract: Some observations of light are inconsistent with a wave-like model. Other observations of light are inconsistent with a traditional particle-like model. A single model of light has remained a mystery. Newton`s speculations, Democritus`s speculations, the Bohm interpretation of quantum mechanics,

and the fractal philosophy are combined. The resulting model of photon structure and dynamics is tested by toy computer experiments. The simulations include photons from a distance, in Young`s experiment, and from a laser. The patterns on the screens show diffraction patterns fit by the Fresnel equation. The model is consistent with the Afshar experiment.

Web link: *www.IntellectualArchive.com/getfile.php?file=26xKOQsxskm&orig_file=J_C_Hodge__Photon_ diffraction_and_interference.pdf*

ID #: 598   **Natural Sciences / Astronomy / General physics**

Submitted on: Jul 28, 2012

Author: **Massimo Materassi and Emanuele Tassi**

Title: **Algebrizing friction: a brief look at the Metriplectic Formalism**

Abstract: The formulation of Action Principles in Physics, and the introduction of the Hamiltonian framework, reduced dynamics to bracket algebrae of observables. Such a framework has great potentialities, to understand the role of symmetries, or to give rise to the quantization rule of modern microscopic Physics. Conservative systems are easily algebrized via the Hamiltonian dynamics: a conserved observable H generates the variation of any quantity f via the Poisson bracket {f,H}. Recently, dissipative dynamical systems have been algebrized in the scheme presented here, referred to as metriplectic framework: the dynamics of an isolated system with dissipation is regarded as the sum of a Hamiltonian component, generated by H via a Poisson bracket algebra; plus dissipation terms, produced by a certain quantity S via a new symmetric bracket. This S is in involution with any other observable and is interpreted as the entropy of those degrees of freedom statistically encoded in friction. In the present paper, the metriplectic framework is shown for two original "textbook" examples. Then, dissipative Magneto-Hydrodynamics (MHD), a theory of major use in many space physics and nuclear fusion applications, is reformulated in metriplectic terms.

Web link: *www.IntellectualArchive.com/getfile.php?file=p8rHUea92nL&orig_file=Materassi Tassi Chaos 2011.pdf*

ID #: 600   **Natural Sciences / Mathematics / Computation**

Submitted on: Jul 28, 2012

Author: **Jiapu Zhang**

Title: **A Simple But Effective Canonical Dual Theory Unified Algorithm for Global Optimization**

Abstract: Numerical global optimization methods are often very time consuming and could not be applied for high-dimensional nonconvex/nonsmooth optimization problems. Due to the nonconvexity/nonsmoothness, directly solving the primal problems sometimes is very difficult. This paper presents a very simple but very effective canonical duality theory (CDT) unified global optimization algorithm. This algorithm has convergence is proved in this paper. More important, for this CDT-unified algorithm, numerous numerical computational results show that it is very powerful not only for solving low-dimensional but also for solving high-dimensional nonconvex/nonsmooth optimization problems, and the global optimal solutions can be easily and elegantly got with zero dual gap.

Web link: *www.IntellectualArchive.com/getfile.php?file=8beZgWo4vlN&orig_file=A Simple But Effective Canonical Dual Theory Unified Algorithm for Global Optimization.pdf*

ID #: 601   **Natural Sciences / Mathematics / Geometry**

Submitted on: Jul 30, 2012

Author: **Alexander Krasulin**

Title: **Five-Dimensional Tangent Vectors in Space-Time: II. Differential-Geometric Approach**

Abstract: In this part of the series five-dimensional tangent vectors are introduced first as equivalence classes of parametrized curves and then as differential-algebraic operators that act on scalar functions. I then examine their basic algebraic properties and their parallel transport in the particular case where space-time possesses a special local symmetry. After that I give definition to five-dimensional tangent vectors associated with dimensional curve parameters and show that they can be identified with the five-vectors introduced formally in part I. In conclusion I speak about differential forms associated with five-vectors.

Web link: *www.IntellectualArchive.com/getfile.php?file=FljlANJMaVs&orig_file=5D_tangent_vectors_Part_2.pdf*

ID #: 602   **Natural Sciences / Mathematics / Computation**

Submitted on: Jul 30, 2012

Author: **Jiapu Zhang**

Title: **Canonical Duality Theory for Solving Minimization Problem of Rosenbrock Function**

Abstract: This paper presents a canonical duality theory for solving nonconvex minimization problem of Rosenbrock function. Extensive numerical results show that this
benchmark test problem can be solved precisely and efficiently to obtain global optimal solutions.

Web link: *www.IntellectualArchive.com/getfile.php?file=NbjNrgjeSSx&orig_file=Canonical Duality Theory for Solving Minimization Problem of Rosenbrock Function.pdf*

ID #: 603   **Natural Sciences** / **Physics** / **Quantum field theory**

Submitted on: Jul 31, 2012

Author: **A. Garces Doz**

Title: **Supersymmetry, extra dimensions, RG running of the Higgs quartic coupling of MSSM/ NMSSM models and the seven faces of the God particle**

Abstract: In this paper, we focus on the calculation of the supersymmetric term for obtaining the mass of the lightest Higgs boson. Thus will provide the scale of supersymmetry. Similarly, entering the exact angle beta,will allow us to calculate the masses of the remaining four Higgs bosons , mA , mH0 , mH ±, and the stop mass of 422.9 Gev
Was used for this, the well-known model of a one-dimensional string, or a dimensional box. We believe that the results obtained consistent with the observation, carry a string model mathematically satisfactory of a n-dimensional string, well known to all physicists. The main novelty of this model is the introduction of dimensionless ratios between the Planck length and the length n dimensional, as the length of the string. An extension of the Heisenberg principle to extra dimensions, will derive a principle of equivalence between mass, time and space so that it showed that the mass is actually another dimension. This principle of equivalence, so described, anger further and allow the equivalence between spin, probability, fluctuations and dimensions. Successive breaking symmetries-topology geometry involved, appears to be the cause of the distinguishability between spins, number of particles, dimensions, etc.; to the observer to make measurements of observables.

Web link: *www.IntellectualArchive.com/getfile.php?file=VOYldV5HFld&orig_file=supersymmetry_v2.pdf*

End of July 2012 bulletin