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BULLETIN

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

Toronto
August 2012

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

ID #: 605   **Natural Sciences / Mathematics / Statistics**

Submitted on: Aug 09, 2012

Author: **Roberto Caimmi**

Title: **Bivariate least squares linear regression: towards a unified analytic formalism. II. Extreme structural models**

Abstract: Concerning bivariate least squares linear regression, the classical results obtained for extreme structural models in earlier attempts are reviewed using a new formalism in terms of deviation (matrix) traces which, for homoscedastic data, reduce to usual quantities leaving aside an unessential (but dimensional) multiplicative factor. Within the framework of classical error models, the dependent variable relates to the independent variable according to the usual additive model. The classes of linear models considered are regression lines in the limit of uncorrelated errors in X and in Y. The following models are considered in detail: (Y) errors in X negligible (ideally null) with respect to errors in Y; (X) errors in Y negligible (ideally null) with respect to errors in X; (C) oblique regression; (O) orthogonal regression; (R) reduced major-axis regression; (B) bisector regression. For homoscedastic data, the results are taken from earlier attempts and rewritten using a more compact notation. For heteroscedastic data, the results are inferred from a procedure related to functional models. An example of astronomical application is considered, concerning the dependence of oxygen abundance on iron abundance deduced from five samples related to different stars and/or different methods of oxygen abundance determination. For low-dispersion samples and assigned methods, different regression models yield results which are in agreement within the errors for both heteroscedastic and homoscedastic data, while the contrary holds for large-dispersion samples. In any case, samples related to different methods produce discrepant results, due to the presence of (still undetected) systematic errors, which implies no definitive statement can be made at present. Asymptotic expressions approximate regression line slope and intercept variance estimators, for normal residuals, to a better extent with respect to earlier attempts. Related fractional discrepancies are not exceeding a few percent for low-dispersion data, which grows up to about 10% for large-dispersion data. An extension of the formalism to generic structural models is left to further investigation.

Web link: *www.IntellectualArchive.com/getfile.php?file=Og4kEgNRmpf&orig_file=prova.pdf*

ID #: 606   **Natural Sciences / Physics / Mathematical Physics**

Submitted on: Aug 14, 2012

Author: **Miroslav Pardy**

Title: **Lorentz-Dirac equation in the delta-function pulse**

Abstract: We formulate the Lorentz-Dirac equation in the plane wave and in the Dirac delta-function pulse. The discussion on the relation of the Dirac delta-function to the ultrashort laser pulse is involved.

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

ID #: 607   **Natural Sciences / Physics / General Physics**

Submitted on: Aug 15, 2012

Author: **Florentin Smarandache, V. Christianto**

Title: **Neutrosophic Logic, Wave Mechanics, and Other Stories**

Abstract: This work consists of selected collection of our published papers in Progress in Physics. The general topics are mathematics, set theory, general physics, astrophysics, quantum mechanics.

Web link: *www.IntellectualArchive.com/getfile.php?file=Mu0BU1IqlHw&orig_file=0904.0005v1wavemechanics.pdf*

ID #: 608   **Natural Sciences / Astronomy / Astrophysics**

Submitted on: Aug 15, 2012

Author: **Florentin Smarandache, V. Christianto**

Title: **Quantization in Astrophysics, Brownian Motion, and Supersymmetry**

Abstract: The present book discusses, among other things, various quantization phenomena found in Astrophysics and some related issues including Brownian Motion. With recent discoveries of exoplanets in our galaxy and beyond, this Astrophysics quantization issue has attracted numerous discussions in the past few years. Most chapters in this book come from published papers in various peer-reviewed journals, and they cover different methods to describe quantization, including Weyl geometry, Supersymmetry, generalized Schrödinger, and Cartan torsion method. In some chapters Navier-Stokes equations are also discussed, because it is likely that this theory will remain relevant in Astrophysics and Cosmology While much of the arguments presented in this book are theoretical, nonetheless we recommend further observation in order to verify or refute the propositions described herein. It is of our hope that this volume could open a new chapter in our knowledge on the formation and structure of Astrophysical systems. The present book is also intended for young physicist and math fellows who perhaps will find the arguments described here are at least worth pondering.

Web link: *www.IntellectualArchive.com/getfile.php?file=LYSUJFeZgJk&orig_file=1003.0025v1quantizati oninastrophysics.pdf*

ID #: 611   **Natural Sciences / Mathematics / Topology**

Submitted on: Aug 15, 2012

Author: **Alexander A. Ermolitski**

Title: **Three-dimensional compact manifolds and the Poincare conjecture**

Abstract: Abstract: The aim of the work is to prove the following main theorem.
Theorem. Let M3 be a three-dimensional, connected, simple connected, compact, closed, smooth manifold and S3 be the three-dimensional sphere. Then the manifolds M3 and S3 are diffeomorphic.

Web link: *www.IntellectualArchive.com/getfile.php?file=wMdhtiJxh11&orig_file=P.C._2_copy.pdf*

ID #: 612   **Natural Sciences / Mathematics / Calculus / Analysis**

Submitted on: Aug 18, 2012

Author: **Ivan D. Remizov, Alexei V. Savvateev**

Title: **D(Maximum)=P(Argmaximum)**

Abstract: In this note, we propose a formula for the subdifferential of the maximum functional $m(f) = \max_K f$ on the space of real-valued continuous functions f defined on an arbitrary metric compact K. We show that, given f, the subdifferential of m(f) always coincides with the set of all probability measures on the arg-maximum (the set of all points in K at which f reaches the maximal value). In fact, this relation lies in the core of several important identities in microeconomics, such as Roy`s identity, Sheppard`s lemma, as well as duality theory in production and linear programming.

Web link: *www.IntellectualArchive.com/getfile.php?file=mL4KH8J5esG&orig_file=Ivan_Remizov__D_Ma ximum_P_Argmaximum.pdf*

ID #: 613   **Natural Sciences / Mathematics / Number theory**

Submitted on: Aug 18, 2012

Author: **Ofer Gabber, Adrian Vasiu**

Title: **Dimensions of group schemes of automorphisms of truncated Barsotti-Tate groups**

Abstract: Let D be a p-divisible group over an algebraically closed field k of characteristic p>0. Let n_D be the smallest non-negative integer such that D is determined by $D[p^{n_D}]$ within the class of p-divisible groups over k of the same codimension c and dimension d as D. We study n_D, lifts of $D[p^m]$ to truncated Barsotti--Tate groups of level m+1 over k, and the numbers $\gamma_D(i):=\dim(\pmb{Aut}(D[p^i]))$. We show that $n_D\le cd$, $(\gamma_D(i+1)-\gamma_D(i))_{i\in\Bbb N}$ is a decreasing sequence in $\Bbb N$, for $cd>0$ we have $\gamma_D(1)<\gamma_D(2)<...<\gamma_D(n_D)$, and for $m\in\{1,...,n_D-1\}$ there exists an infinite set of truncated Barsotti--Tate groups of level m+1 which are pairwise non-isomorphic and

lift D[p^m]. Different generalizations to p-divisible groups with a smooth integral group scheme in the crystalline context are also proved.

ID #: 614   **Natural Sciences / Mathematics / Geometry**

Submitted on: Aug 18, 2012

Author: **Adrian Mitrea**

Title: **On the Area of Pedal and Antipedal Triangles**

Abstract: We give a new proof of the formula expressing the area of the triangle whose vertices are the projects of an arbitrary point in the plane onto the sides of a given triangle, in terms of the geometry of the the given triangle and the location of the projection point. Other related geometrical constructions and formulas are also presented.

ID #: 615   **Natural Sciences / Mathematics / Geometry**

Submitted on: Aug 18, 2012

Author: **Adrian Mitrea**

Title: **The Six-Point Circle Theorem**

Abstract: Given ΔABC and angles $\alpha,\beta,\gamma\in(0,\pi)$ with $\alpha+\beta+\gamma=\pi$, we study the properties of the triangle DEF which satisfies: (i) $D\in BC$, $E\in AC$, $F\in AB$, (ii) $\aangle D=\alpha$, $\aangle E=\beta$, $\aangle F=\gamma$, (iii) ΔDEF has the minimal area in the class of triangles satisfying (i) and (ii). In particular, we show that minimizer ΔDEF, exists, is unique and is a pedal triangle, corresponding to a certain pedal point P. Permuting the roles played by the angles α,β,γ in (ii), yields a total of six such area-minimizing triangles, which are pedal relative to six pedal points, say, $P_1,....,P_6$. The main result of the paper is the fact that there exists a circle which contains all six points.

ID #: 616   **Natural Sciences / Physics / Biophysics**

Submitted on: Aug 18, 2012

Author: **Patrick Krauss, Claus Metzner, Janina Lange, Nadine Lang, Ben Fabry**

Title: **Reconstructing fiber networks from confocal image stacks**

Abstract: We present a numerically efficient method to reconstruct a disordered network of thin biopolymers, such as collagen gels, from three-dimensional (3D) image stacks recorded with a confocal microscope. Our method is based on a template matching algorithm that simultaneously performs a binarization and skeletonization of the network. The size and intensity pattern of the template is automatically adapted to the input data so that the method is scale invariant and generic. Furthermore, the template matching threshold is iteratively optimized to ensure that the final skeletonized network obeys a universal property of voxelized random line networks, namely, solid-phase voxels have most likely three solid-phase neighbors in a 3x3 neighborhood. This optimization criterion makes our method free of user-defined parameters and the output exceptionally robust against imaging noise.

ID #: 617   **Natural Sciences / Physics / Biophysics**

Submitted on: Aug 18, 2012

Author: **John S. Schreck, Jian-Min Yuan**

Title: **A Statistical Mechanical Approach to Protein Aggregation**

Abstract: We develop a theory of aggregation using statistical mechanical methods. An example of a complicated aggregation system with several levels of structures is peptide/protein self-assembly. The problem of protein aggregation is important for the understanding and treatment of neurodegenerative diseases and also for the development of bio-macromolecules as new materials.

We write the effective Hamiltonian in terms of interaction energies between protein monomers, protein and solvent, as well as between protein filaments. The grand partition function can be expressed in terms of a Zimm-Bragg-like transfer matrix, which is calculated exactly and all thermodynamic properties can be obtained. We start with two-state and three-state descriptions of protein monomers using Potts models that can be generalized to include q-states, for which the exactly solvable feature of the model remains.

Web link: *www.IntellectualArchive.com/getfile.php?file=bwh5XCcrdoR&orig_file=Jian-Min_Yuan__A_Statistical_Mechanical_Approach.pdf*

ID #: 618 **Natural Sciences / Mathematics / Statistics**

Submitted on: Aug 18, 2012

Author: **Arijit Das, Anthony Quinn**

Title: **A Variational Bayes Approach to Decoding in a Phase-Uncertain Digital Receiver**

Abstract: This paper presents a Bayesian approach to symbol and phase inference in a phase-unsynchronized digital receiver. It primarily extends [Quinn 2011] to the multi-symbol case, using the variational Bayes (VB) approximation to deal with the combinatorial complexity of the phase inference in this case. The work provides a fully Bayesian extension of the EM-based framework underlying current turbo-synchronization methods, since it induces a von Mises prior on the time-invariant phase parmeter. As a result, we achieve tractable iterative algorithms with improved robustness in low SNR regimes, compared to the current EM-based approaches. As a corollary to our analysis we also discover the importance of prior regularization in elegantly tackling the significant problem of phase ambiguity.

Web link: *www.IntellectualArchive.com/getfile.php?file=bV6QFvbi2KU&orig_file=Arijit_Das__A_Variational_Bayes_Approach_to_Decoding.pdf*

ID #: 619 **Natural Sciences / Computer Sciences / Mathematical logic**

Submitted on: Aug 18, 2012

Author: **Apostolos Syropoulos, Valeria de Paiva**

Title: **Fuzzy Topological Systems**

Abstract: Dialectica categories are a very versatile categorical model of linear logic. These have been used to model many seemingly different things (e.g., Petri nets and Lambek`s calculus). In this note, we expand our previous work on fuzzy petri nets to deal with fuzzy topological systems. One basic idea is to use as the dualizing object in the Dialectica categories construction, the unit real interval [0,1], which has all the properties of a {\em lineale}. The second basic idea is to generalize Vickers`s notion of a topological system.

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

ID #: 620 **Natural Sciences / Physics / Biophysics**

Submitted on: Aug 19, 2012

Author: **Claus Metzner**

Title: **1D analysis of 2D isotropic random walks**

Abstract: Many stochastic systems in physics and biology are investigated by recording the two-dimensional (2D) positions of a moving test particle in regular time intervals. The resulting sample trajectories are then used to induce the properties of the underlying stochastic process. Often, it can be assumed {\em a priori} that the underlying discrete-time random walk model is independent from absolute position (homogeneity), direction (isotropy) and time (stationarity). In this article we first review some common statistical methods for analyzing 2D trajectories, based on quantities with built-in rotational invariance. We then discuss an alternative approach in which the two-dimensional trajectories are reduced to one dimension by projection onto an arbitrary axis and rotational averaging. Each step of the resulting 1D trajectory is further factorized into sign and magnitude.

Web link: *www.IntellectualArchive.com/getfile.php?file=gdhX2WtHl8h&orig_file=Claus_Metzner__1D_analysis_of_2D_isotropic_random_walks.pdf*

ID #: 621 **Natural Sciences / Physics / Biophysics**

Submitted on: Aug 19, 2012

Author: **Claus Metzner**

Title: **Scaling properties of correlated random walks**

Abstract: Many stochastic time series can be modelled by discrete random walks in which a step of random sign but constant length δx is performed after each time interval δt. In correlated discrete time random walks (CDTRWs), the probability q for two successive steps having the same sign is unequal 1/2. The resulting probability distribution $P(\Delta x,\Delta t)$ that a displacement Δx is observed after a lagtime Δt is known analytically for arbitrary persistence parameters q. In this short note we show how a CDTRW with parameters $[\delta t, \delta x, q]$ can be mapped onto another CDTRW with rescaled parameters $[\delta t/s, \delta x\cdot g(q,s), q^{\prime}(q,s)]$, for arbitrary scaling parameters s, so that both walks have the same displacement distributions $P(\Delta x,\Delta t)$ on long time scales. The nonlinear scaling functions $g(q,s)$ and $q^{\prime}(q,s)$ and derived explicitely.

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

ID #: 622 **Natural Sciences / Physics / Biophysics**

Submitted on: Aug 19, 2012

Author: **Claus Metzner, Patrick Krauss, Ben Fabry**

Title: **Poresizes in random line networks**

Abstract: Many natural fibrous networks with fiber diameters much smaller than the average poresize can be described as three-dimensional (3D) random line networks. We consider here a `Mikado` model for such systems, consisting of straight line segments of equal length, distributed homogeneously and isotropically in space. First, we derive analytically the probability density distribution $p(r_{no})$ for the `nearest obstacle distance` r_{no} between a randomly chosen test point within the network pores and its closest neighboring point on a line segment. Second, we show that in the limit where the line segments are much longer than the typical pore size, $p(r_{no})$ becomes a Rayleigh distribution. The single parameter σ of this Rayleigh distribution represents the most probable nearest obstacle distance and can be expressed in terms of the total line length per unit volume.

Web link: *www.IntellectualArchive.com/getfile.php?file=5k1mVU8WJ9N&orig_file=Claus_Metzner__Poresizes_in_random_line_networks.pdf*

ID #: 623 **Natural Sciences / Physics / General Physics**

Submitted on: Aug 20, 2012

Author: **Shubham Chakraborty, Shuborno Chakroborty**

Title: **Ohm`s law: Fundamental mistakes made by authors and teachers**

Abstract: Ohm`s law has been stated and re-stated by many a physicist and physics teachers in a variety of ways, the most usual being either of the following. ...keeping
all physical conditions constant the current owing through a conductor is directly proportional to the potential diff erence applied across its end OR ....
keeping all physical conditions constant potential difference across the conductor is directly proportional to the current owing through it.
In this paper I will show that both are equivalent but require diff erent ways to experiment with and understand.

Web link: *www.IntellectualArchive.com/getfile.php?file=KOl2v5kksOf&orig_file=ohmslaw.pdf*

ID #: 624 **Natural Sciences / Computer Sciences / Analysis of algorithms**

Submitted on: Aug 20, 2012

Author: **C. M. Li, F. Manya, J. Planes**

Title: **New Inference Rules for Max-SAT**

Abstract: Exact Max-SAT solvers, compared with SAT solvers, apply little inference at each node of the proof tree. Commonly used SAT inference rules like unit propagation produce a simplified formula that preserves satisfiability but, unfortunately, solving the Max-SAT problem for the simplified formula is not equivalent to solving it for the original formula. In this paper, we define a number of original inference rules that, besides being applied efficiently, transform Max-SAT instances into equivalent Max-SAT instances which are easier to solve. The soundness of the rules, that can be seen as

refinements of unit resolution adapted to Max-SAT, are proved in a novel and simple way via an integer programming transformation. With the aim of finding out how powerful the inference rules are in practice, we have developed a new Max-SAT solver, called MaxSatz, which incorporates those rules, and performed an experimental investigation.

Web link: *www.IntellectualArchive.com/getfile.php?file=holfKeSNFNq&orig_file=C_M_Li__New_Inference_Rules_for_Max-SAT.pdf*

ID #: 625   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 20, 2012

Author: **Amit K. Mishra, Chris Baker**

Title: **A cognitive diversity framework for radar target classification**

Abstract: Classification of targets by radar has proved to be notoriously difficult with the best systems still yet to attain sufficiently high levels of performance and reliability. In the current contribution we explore a new design of radar based target recognition, where angular diversity is used in a cognitive manner to attain better performance. Performance is bench- marked against conventional classification schemes. The proposed scheme can easily be extended to cognitive target recognition based on multiple diversity strategies.

Web link: *www.IntellectualArchive.com/getfile.php?file=onlJ31VQuVK&orig_file=Amit_Mishra__A_cognitive_diversity_framework.pdf*

ID #: 626   **Natural Sciences** / **Physics** / **Condensed Matter Physics**

Submitted on: Aug 20, 2012

Author: **Dorota Lipowska, Adam Lipowski**

Title: **Naming Game on Adaptive Weighted Networks**

Abstract: We examine a naming game on an adaptive weighted network. A weight of connection for a given pair of agents depends on their communication success rate and determines the probability with which the agents communicate. In some cases, depending on the parameters of the model, the preference toward successfully communicating agents is basically negligible and the model behaves similarly to the naming game on a complete graph. In particular, it quickly reaches a single-language state, albeit some details of the dynamics are different from the complete-graph version. In some other cases, the preference toward successfully communicating agents becomes much more relevant and the model gets trapped in a multi-language regime. In this case gradual coarsening and extinction of languages lead to the emergence of a dominant language, albeit with some other languages still being present. A comparison of distribution of languages in our model and in the human population is discussed.

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

ID #: 627   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 20, 2012

Author: **I. Muslea, S. Minton, C. A. Knoblock**

Title: **Active Learning with Multiple Views**

Abstract: Active learners alleviate the burden of labeling large amounts of data by detecting and asking the user to label only the most informative examples in the domain. We focus here on active learning for multi-view domains, in which there are several disjoint subsets of features (views), each of which is sufficient to learn the target concept. In this paper we make several contributions. First, we introduce Co-Testing, which is the first approach to multi-view active learning. Second, we extend the multi-view learning framework by also exploiting weak views, which are adequate only for learning a concept that is more general/specific than the target concept. Finally, we empirically show that Co-Testing outperforms existing active learners on a variety of real world domains such as wrapper induction, Web page classification, advertisement removal, and discourse tree parsing. *** Journal reference: "Journal of Artificial Intelligence Research 27 (2006) 257-287" ***

Web link: *www.IntellectualArchive.com/getfile.php?file=ULHeLqD4GmR&orig_file=C_A_Knoblock__Active_Learning_with_Multiple_Views.pdf*

ID #: 629   **Natural Sciences** / **Other** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Alexander Egoyan**

Title: **A POSSIBLE SOLUTION TO THE HARD PROBLEM OF CONSCIOUSNESS USING MULTIDIMENSIONAL APPROACH**

Abstract: In this work a new solution to the hard problem of consciousness using multidimensional approach [1-3] is proposed. It is shown that our perceptions may be interpreted as elastic oscillations of a two dimensional membrane with closed topology embedded in our brains. According to the model our universe is also a three dimensional elastic membrane embedded into the higher dimensional space-time. The model allows us to create a unified world picture where physical and perceptual aspects of the reality are complementary. We can observe our 2d self-membranes through our perceptions, which are encoded in elastic oscillations of the elastic membrane. According to the theory, elastic membranes occupy energetically favorable positions around microtubules involved into Orch OR. Elastic membranes responsible for qualia interact with our brains and provide them with information about the character of incoming stimuli (pleasant or unpleasant), they squeeze to preserve quantum coherent states producing pleasant perceptions and stretch to avoid unpleasant ones.

Web link: *www.IntellectualArchive.com/getfile.php?file=nevCWcLkqsY&orig_file=A POSSIBLE SOLUTION TO THE HARD PROBLEM OF CONSCIOUSNESS.doc*

ID #: 630   **Natural Sciences / Other / Trans-Disciplinarian**

Submitted on: Aug 22, 2012

Author: **Alexander Egoyan**

Title: **A POSSIBLE SOLUTION TO THE HARD PROBLEM OF CONSCIOUSNESS USING MULTIDIMENSIONAL APPROACH**

Abstract: In this work a new solution to the hard problem of consciousness using multidimensional approach [1-3] is proposed. It is shown that our perceptions may be interpreted as elastic oscillations of a two dimensional membrane with closed topology embedded in our brains. According to the model our universe is also a three dimensional elastic membrane embedded into the higher dimensional space-time. The model allows us to create a unified world picture where physical and perceptual aspects of the reality are complementary. We can observe our 2d self-membranes through our perceptions, which are encoded in elastic oscillations of the elastic membrane. According to the theory, elastic membranes occupy energetically favorable positions around microtubules involved into Orch OR. Elastic membranes responsible for qualia interact with our brains and provide them with information about the character of incoming stimuli (pleasant or unpleasant), they squeeze to preserve quantum coherent states producing pleasant perceptions and stretch to avoid unpleasant ones.

Web link: *www.IntellectualArchive.com/getfile.php?file=uDdxxPw2mF2&orig_file=A POSSIBLE SOLUTION TO THE HARD PROBLEM OF CONSCIOUSNESS.pdf*

ID #: 631   **Natural Sciences / Physics / Condensed Matter Physics**

Submitted on: Aug 22, 2012

Author: **David Holec, Martin Friák, Antonín Dlouhý, Jörg Neugebauer**

Title: **Ab initio study of pressure stabilised NiTi allotropes: pressure-induced transformations and hysteresis loops**

Abstract: Changes in stoichiometric NiTi allotropes induced by hydrostatic pressure have been studied employing density functional theory. By modelling the pressure-induced transitions in a way that imitates quasi-static pressure changes, we show that the experimentally observed B19` phase is (in its bulk form) unstable with respect to another monoclinic phase, B19". The lower symmetry of the B19" phase leads to unique atomic trajectories of Ti and Ni atoms (that do not share a single crystallographic plane) during the pressure-induced phase transition. This uniqueness of atomic trajectories is considered a necessary condition for the shape memory ability. The forward and reverse pressure-induced transition B19`$\leftrightarrow$B19" exhibits a hysteresis that is shown to originate from hitherto unexpected complexity of the Born-Oppenheimer energy surface.

Web link: *www.IntellectualArchive.com/getfile.php?file=INJpR6jrHKr&orig_file=David_Holec__Ab_initio _study_of_pressure.pdf*

ID #: 632   **Natural Sciences / Astronomy / Astrophysics**

Submitted on: Aug 22, 2012

Author: **A. Sezer, F. Gök, M. Hudaverdi, E.N. Ercan**

Title: **Suzaku observation of Galactic supernova remnant CTB 37A (G348.5+0.1)**

Abstract: We present here the results of the observation of CTB 37A obtained with the X-ray Imaging Spectrometer onboard the {\it Suzaku} satellite. The X-ray spectrum of CTB 37A is well fitted by two components, a single-temperature ionization equilibrium component (VMEKAL) with solar abundances, an electron temperature of $kT_{\rm e}\sim0.6$ keV, absorbing column density of $N_{\rm H}\sim3\times10^{22}$ ${\rm cm^{-2}}$ and a power-law component with photon index of Γ ~ 1.6. The X-ray spectrum of CTB 37A is characterized by clearly detected K-shell emission lines of Mg, Si, S, and Ar. The plasma with solar abundances supports the idea that the X-ray emission originates from the shocked interstellar material. The ambient gas density, and age of the remnant are estimated to be $\sim1f^{-1/2}$$${\rm cm^{-3}}$ and $\sim3\times10^{4}f^{1/2}$ yr, respectively. The center-filling X-ray emission surrounded by a shell-like radio structure and other X-ray properties indicate that this remnant would be a new member of mixed-morphology supernova remnant class.

Web link: *www.IntellectualArchive.com/getfile.php?file=jS2ci0VSrja&orig_file=E_N_Ercan__Suzaku_observation_of_Galactic_supernova.pdf*

ID #: 633 **Natural Sciences** / **Physics** / **Condensed Matter Physics**

Submitted on: Aug 22, 2012

Author: **G.J. Ackland, K. D`Mellow, S.L. Daraszewicz, D.J. Hepburn, M. Uhrin, K. Stratford**

Title: **The MOLDY short-range molecular dynamics package**

Abstract: We describe a parallelised version of the MOLDY molecular dynamics program. This Fortran code is aimed at systems which may be described by short-range potentials and specifically those which may be addressed with the embedded atom method. This includes a wide range of transition metals and alloys. MOLDY provides a range of options in terms of the molecular dynamics ensemble used and the boundary conditions which may be applied. A number of standard potentials are provided, and the modular structure of the code allows new potentials to be added easily. The code is parallelised using OpenMP and can therefore be run on shared memory systems, including modern multicore processors. Particular attention is paid to the updates required in the main force loop, where synchronisation is often required in OpenMP implementations of molecular dynamics. We examine the performance of the parallel code in detail and give some examples of applications to realistic problems, including the dynamic compression of copper and carbon migration in an iron-carbon alloy.

Web link: *www.IntellectualArchive.com/getfile.php?file=USjLNqgPLeP&orig_file=G_J_Ackland__The_MOLDY_short-range_molecular.pdf*

ID #: 634 **Natural Sciences** / **Astronomy** / **Astrophysics**

Submitted on: Aug 22, 2012

Author: **A. L. Tadross**

Title: **A catalog of 120 NGC open star clusters**

Abstract: A sample of 145 JHK--2MASS observations of NGC open star clusters is studied, of which 132 have never been studied before. Twelve are classified as non-open clusters and 13 are re-estimated self-consistently, after applying the same methods in order to compare and calibrate our reduction procedures. The fundamental and structural parameters of the 120 new open clusters studied here are derived using color-magnitude diagrams of JHK Near-IR photometry with the fitting of solar metallicity isochrones. We provide here, for the first time, a catalog of the main parameters for these 120 open clusters, namely, diameter, distance, reddening and age.

Web link: *www.IntellectualArchive.com/getfile.php?file=mamCglNUVXJ&orig_file=A_L_Tadross__A_catalog_of_120_NGC_open_star_clusters.pdf*

ID #: 636 **Natural Sciences** / **Physics** / **Particle physics**

Submitted on: Aug 22, 2012

Author: **Dmitry V. Zhuridov**

Title: **Freed Leptogenesis**

Abstract: Economical extensions of the Standard Model (SM), in which the famous Davidson-Ibarra bound on the CP asymmetry relevant for leptogenesis may be significantly relaxed by the loop effects, comparing to predictions of the SM extended only by right-handed neutrinos with hierarchical masses, are discussed. This leads to decreasing of the lower bound on the heavy neutrino masses

and increasing of the upper bound on the light neutrino masses. In addition, the considered theory may help to solve the dark matter problem.

Web link: *Journal reference: Mod.Phys.Lett. A26 (2011) 2983-2996; DOI: 10.1142/S0217732311037340; Cite as: arXiv:1107.1087 [hep-ph]*

ID #: 638   **Natural Sciences** / **Physics** / **General Physics**

Submitted on: Aug 22, 2012

Author: **Huimin Zheng, HaiXing Hu, Nan Wu, Fangmin Song**

Title: **On Measurement and Computation**

Abstract: Inspired by the work of Feynman, Deutsch, We formally propose the theory of physical computability and accordingly, the physical complexity theory. To achieve this, a framework that can evaluate almost all forms of computation using various physical mechanisms is discussed. Here, we focus on using it to review the theory of Quantum Computation. As a preliminary study on more general problems, some examples of other physical mechanism are also given in this paper.

Web link: *www.IntellectualArchive.com/getfile.php?file=15nsG6K6Xvn&orig_file=Zheng__On_Measurement_and_Computation.pdf*

ID #: 639   **Natural Sciences** / **Physics** / **General Physics**

Submitted on: Aug 22, 2012

Author: **Haihong Li, Hongyan Cheng, Qionglin Dai, Ping Ju, Mei Zhang, Junzhong Yang**

Title: **Effects of dimers on cooperation in the spatial prisoner`s dilemma game**

Abstract: We investigate the evolutionary prisoner`s dilemma game in structured populations by introducing dimers, which are defined as that two players in each dimer always hold a same strategy. We find that influences of dimers on cooperation depend on the type of dimers and the population structure. For those dimers in which players interact with each other, the cooperation level increases with the number of dimers though the cooperation improvement level depends on the type of network structures. On the other hand, the dimers, in which there are not mutual interactions, will not do any good to the cooperation level in a single community, but interestingly, will improve the cooperation level in a population with two communities. We explore the relationship between dimers and self-interactions and find that the effects of dimers are similar to that of self-interactions.

Web link: *www.IntellectualArchive.com/getfile.php?file=h2bJuM6i05M&orig_file=Haihong_Li__Effects_of_dimers.pdf*

ID #: 640   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Chunyan Wang, Bernardo A. Huberman**

Title: **How Random are Online Social Interactions?**

Abstract: The massive amounts of data that social media generates has facilitated the study of online human behavior on a scale unimaginable a few years ago. At the same time, the much discussed apparent randomness with which people interact online makes it appear as if these studies cannot reveal predictive social behaviors that could be used for developing better platforms and services. We use two large social databases to measure the mutual information entropy that both individual and group actions generate as they evolve over time. We show that user`s interaction sequences have strong deterministic components, in contrast with existing assumptions and models. In addition, we show that individual interactions are more predictable when users act on their own rather than when attending group activities.

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

ID #: 641   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Christina Aperjis, Bernardo A. Huberman**

Title: **A Market for Unbiased Private Data: Paying Individuals According to their Privacy Attitudes**

Abstract: Since there is, in principle, no reason why third parties should not pay individuals for the use of their data, we introduce a realistic market that would allow these payments to be made while taking into account the privacy attitude of the participants. And since it is usually important to use unbiased

samples to obtain credible statistical results, we examine the properties that such a market should have and suggest a mechanism that compensates those individuals that participate according to their risk attitudes. Equally important, we show that this mechanism also benefits buyers, as they pay less for the data than they would if they compensated all individuals with the same maximum fee that the most concerned ones expect.

Web link: *www.IntellectualArchive.com/getfile.php?file=YNAVFfUa1cM&orig_file=Bernardo_Huberman_ _A_Market_for_Unbiased_Private_Data.pdf*

ID #: 642   **Natural Sciences / Computer Sciences / Cognitive science**

Submitted on: Aug 22, 2012

Author: **Chunyan Wang, Mao Ye, Bernardo A. Huberman**

Title: **From User Comments to On-line Conversations**

Abstract: We present an analysis of user conversations in on-line social media and their evolution over time. We propose a dynamic model that accurately predicts the growth dynamics and structural properties of conversation threads. The model successfully reconciles the differing observations that have been reported in existing studies. By separating artificial factors from user behaviors, we show that there are actually underlying rules in common for on-line conversations in different social media websites. Results of our model are supported by empirical measurements throughout a number of different social media websites.

Web link: *www.IntellectualArchive.com/getfile.php?file=hOuEK7MjN2j&orig_file=Bernardo_Huberman__ From_User_Comments_to_On-line_Conversations.pdf*

ID #: 643   **Natural Sciences / Computer Sciences / Cognitive science**

Submitted on: Aug 22, 2012

Author: **Roja Bandari, Sitaram Asur, Bernardo A. Huberman**

Title: **The Pulse of News in Social Media: Forecasting Popularity**

Abstract: News articles are extremely time sensitive by nature. There is also intense competition among news items to propagate as widely as possible. Hence, the task of predicting the popularity of news items on the social web is both interesting and challenging. Prior research has dealt with predicting eventual online popularity based on early popularity. It is most desirable, however, to predict the popularity of items prior to their release, fostering the possibility of appropriate decision making to modify an article and the manner of its publication. In this paper, we construct a multi-dimensional feature space derived from properties of an article and evaluate the efficacy of these features to serve as predictors of online popularity. We examine both regression and classification algorithms and demonstrate that despite randomness in human behavior, it is possible to predict ranges of popularity on twitter with an overall 84% accuracy. Our study also serves to illustrate the differences between traditionally prominent sources and those immensely popular on the social web.

Web link: *www.IntellectualArchive.com/getfile.php?file=Pr8KE37wqkg&orig_file=Bernardo_Huberman__ The_Pulse_of_News_in_Social_Media.pdf*

ID #: 644   **Natural Sciences / Computer Sciences / Cognitive science**

Submitted on: Aug 22, 2012

Author: **Louis Yu, Sitaram Asur, Bernardo A. Huberman**

Title: **Artificial Inflation: The True Story of Trends in Sina Weibo**

Abstract: There has been a tremendous rise in the growth of online social networks all over the world in recent years. This has facilitated users to generate a large amount of real-time content at an incessant rate, all competing with each other to attract enough attention and become trends. While Western online social networks such as Twitter have been well studied, characteristics of the popular Chinese microblogging network Sina Weibo have not been. In this paper, we analyze in detail the temporal aspect of trends and trend-setters in Sina Weibo, constrasting it with earlier observations on Twitter. First, we look at the formation, persistence and decay of trends and examine the key topics that trend in Sina Weibo. One of our key findings is that retweets are much more common in Sina Weibo and contribute a lot to creating trends. When we look closer, we observe that a large percentage of trends in Sina Weibo are due to the continuous retweets of a small amount of fraudulent accounts.

Web link: *www.IntellectualArchive.com/getfile.php?file=Ba6U3vSJuCp&orig_file=Bernardo_Huberman_ _Artificial_Inflation.pdf*

ID #: 645   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Zeinab Abbassi, Christina Aperjis, Bernardo A. Huberman**

Title: **Swayed by Friends or by the Crowd?**

Abstract: We have conducted three empirical studies of the effects of friend recommendations and general ratings on how online users make choices. These two components of social influence were investigated through user studies on Mechanical Turk. We find that for a user deciding between two choices an additional rating star has a much larger effect than an additional friend`s recommendation on the probability of selecting an item. Equally important, negative opinions from friends are more influential than positive opinions, and people exhibit more random behavior in their choices when the decision involves less cost and risk. Our results can be generalized across different demographics, implying that individuals trade off recommendations from friends and ratings in a similar fashion.

Web link: *www.IntellectualArchive.com/getfile.php?file=xl2Q4l2ZPW2&orig_file=Bernardo_Huberman__ Swayed_by_Friends_or_by_the_Crowd.pdf*

ID #: 646   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Chunyan Wang, Bernardo A. Huberman**

Title: **Long Trend Dynamics in Social Media**

Abstract: A main characteristic of social media is that its diverse content, copiously generated by both standard outlets and general users, constantly competes for the scarce attention of large audiences. Out of this flood of information some topics manage to get enough attention to become the most popular ones and thus to be prominently displayed as trends. Equally important, some of these trends persist long enough so as to shape part of the social agenda. How this happens is the focus of this paper. By introducing a stochastic dynamical model that takes into account the user`s repeated involvement with given topics, we can predict the distribution of trend durations as well as the thresholds in popularity that lead to their emergence within social media. Detailed measurements of datasets from Twitter confirm the validity of the model and its predictions.

Web link: *www.IntellectualArchive.com/getfile.php?file=jQW8ibliQhd&orig_file=Bernardo_Huberman__L ong_Trend_Dynamics_in_Social_Media.pdf*

ID #: 647   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Haiyi Zhu, Bernardo A. Huberman, Yarun Luon**

Title: **To Switch or Not To Switch: Understanding Social Influence in Recommender Systems**

Abstract: We designed and ran an experiment to test how often people`s choices are reversed by others` recommendations when facing different levels of confirmation and conformity pressures. In our experiment participants were first asked to provide their preferences between pairs of items. They were then asked to make second choices about the same pairs with knowledge of others` preferences. Our results show that others people`s opinions significantly sway people`s own choices. The influence is stronger when people are required to make their second decision sometime later (22.4%) than immediately (14.1%). Moreover, people are most likely to reverse their choices when facing a moderate number of opposing opinions. Finally, the time people spend making the first decision significantly predicts whether they will reverse their decisions later on, while demographics such as age and gender do not. These results have implications for consumer behavior research as well as online marketing strategies.

Web link: *www.IntellectualArchive.com/getfile.php?file=4uuxktlfmpJ&orig_file=Bernardo_Huberman__T o_Switch_or_Not_To_Switch.pdf*

ID #: 648   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Mao Ye, Chunyan Wang, Christina Aperjis, Bernardo A. Huberman, Thomas Sandholm**

Title: **Collective Attention and the Dynamics of Group Deals**

Abstract: We present a study of the group purchasing behavior of daily deals in Groupon and LivingSocial and introduce a predictive dynamic model of collective attention for group buying behavior. In our model, the aggregate number of purchases at a given time comprises two types of processes: random

discovery and social propagation. We find that these processes are very clearly separated by an inflection point. Using large data sets from both Groupon and LivingSocial we show how the model is able to predict the success of group deals as a function of time. We find that Groupon deals are easier to predict accurately earlier in the deal lifecycle than LivingSocial deals due to the final number of deal purchases saturating quicker. One possible explanation for this is that the incentive to socially propagate a deal is based on an individual threshold in LivingSocial, whereas in Groupon it is based on a collective threshold, which is reached very early. Furthermore, the personal benefit of propagating a deal is also greater in LivingSocial.

Web link: *www.IntellectualArchive.com/getfile.php?file=KKA8esTZu35&orig_file=Bernardo_Huberman__ Collective_Attention.pdf*

ID #: 649   **Natural Sciences** / Computer Sciences / Cognitive science

Submitted on: Aug 22, 2012

Author: **Louis Yu, Sitaram Asur, Bernardo A. Huberman**

Title: **What Trends in Chinese Social Media**

Abstract: There has been a tremendous rise in the growth of online social networks all over the world in recent times. While some networks like Twitter and Facebook have been well documented, the popular Chinese microblogging social network Sina Weibo has not been studied. In this work, we examine the key topics that trend on Sina Weibo and contrast them with our observations on Twitter. We find that there is a vast difference in the content shared in China, when compared to a global social network such as Twitter. In China, the trends are created almost entirely due to retweets of media content such as jokes, images and videos, whereas on Twitter, the trends tend to have more to do with current global events and news stories.

Web link: *www.IntellectualArchive.com/getfile.php?file=b6PYsUXODE2&orig_file=Bernardo_Huberman_ _What_Trends_in_Chinese_Social_Media.pdf*

ID #: 650   **Natural Sciences** / Computer Sciences / Cognitive science

Submitted on: Aug 22, 2012

Author: **Sitaram Asur, Bernardo A. Huberman, Gabor Szabo, Chunyan Wang**

Title: **Trends in Social Media: Persistence and Decay**

Abstract: Social media generates a prodigious wealth of real-time content at an incessant rate. From all the content that people create and share, only a few topics manage to attract enough attention to rise to the top and become temporal trends which are displayed to users. The question of what factors cause the formation and persistence of trends is an important one that has not been answered yet. In this paper, we conduct an intensive study of trending topics on Twitter and provide a theoretical basis for the formation, persistence and decay of trends. We also demonstrate empirically how factors such as user activity and number of followers do not contribute strongly to trend creation and its propagation. In fact, we find that the resonance of the content with the users of the social network plays a major role in causing trends.

Web link: *www.IntellectualArchive.com/getfile.php?file=70BOgNZORoA&orig_file=Bernardo_Huberman __Trends_in_Social_Media.pdf*

ID #: 651   **Natural Sciences** / Computer Sciences / Cognitive science

Submitted on: Aug 22, 2012

Author: **Christina Aperjis, Bernardo A. Huberman**

Title: **Social Attention and the Provider`s Dilemma**

Abstract: While attracting attention is one of the prime goals of content providers, the conversion of that attention into revenue is by no means obvious. Given that most users expect to consume web content for free, a provider with an established audience faces a dilemma. Since the introduction of advertisements or subscription fees will be construed by users as an inconvenience which may lead them to stop using the site, what should the provider do in order to maximize revenues? We address this question through the lens of adaptation theory, which states that even though a change affects a person`s utility initially, as time goes on people tend to adapt and become less aware of past changes. We establish that if the likelihood of continuing to attend to the provider after an increase in inconvenience is log-concave in the magnitude of the increase, then the provider faces a tradeoff between achieving a higher revenue per user sooner and maximizing the number of users in the long term.

Web link: *www.IntellectualArchive.com/getfile.php?file=tX0YYcLqKP9&orig_file=Bernardo_Huberman__*

Social_Attention.pdf

ID #: 652   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Christina Aperjis, Bernardo A. Huberman, Fang Wu**

Title: **Human Speed-Accuracy Tradeoffs in Search**

Abstract: When foraging for information, users face a tradeoff between the accuracy and value of the acquired information and the time spent collecting it, a problem which also surfaces when seeking answers to a question posed to a large community. We empirically study how people behave when facing these conflicting objectives using data from Yahoo Answers, a community driven question-and-answer site. We first study how users behave when trying to maximize the amount of acquired information while minimizing the waiting time. We find that users are willing to wait longer for an additional answer if they have received a small number of answers. We then assume that users make a sequence of decisions, deciding to wait for an additional answer as long as the quality of the current answer exceeds some threshold. The resulting probability distribution for the number of answers that a question gets is an inverse Gaussian, a fact that is validated by our data.

Web link: *www.IntellectualArchive.com/getfile.php?file=LI0Ickgd6NO&orig_file=Bernardo_Huberman__ Human_Speed-Accuracy.pdf*

ID #: 653   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Daniel M. Romero, Wojciech Galuba, Sitaram Asur, Bernardo A. Huberman**

Title: **Influence and Passivity in Social Media**

Abstract: The ever-increasing amount of information flowing through Social Media forces the members of these networks to compete for attention and influence by relying on other people to spread their message. A large study of information propagation within Twitter reveals that the majority of users act as passive information consumers and do not forward the content to the network. Therefore, in order for individuals to become influential they must not only obtain attention and thus be popular, but also overcome user passivity. We propose an algorithm that determines the influence and passivity of users based on their information forwarding activity. An evaluation performed with a 2.5 million user dataset shows that our influence measure is a good predictor of URL clicks, outperforming several other measures that do not explicitly take user passivity into account. We also explicitly demonstrate that high popularity does not necessarily imply high influence and vice-versa.

Web link: *www.IntellectualArchive.com/getfile.php?file=xjYtla9XKeL&orig_file=Bernardo_Huberman__In fluence_and_Passivity_in_Social_Media.pdf*

ID #: 654   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Sitaram Asur, Bernardo A. Huberman**

Title: **Predicting the Future with Social Media**

Abstract: In recent years, social media has become ubiquitous and important for social networking and content sharing. And yet, the content that is generated from these websites remains largely untapped. In this paper, we demonstrate how social media content can be used to predict real-world outcomes. In particular, we use the chatter from Twitter.com to forecast box-office revenues for movies. We show that a simple model built from the rate at which tweets are created about particular topics can outperform market-based predictors. We further demonstrate how sentiments extracted from Twitter can be further utilized to improve the forecasting power of social media.

Web link: *www.IntellectualArchive.com/getfile.php?file=38SjIWrit20&orig_file=Bernardo_Huberman__Pr edicting_the_Future_with_Social_Media.pdf*

ID #: 655   **Natural Sciences** / **Computer Sciences** / **Cognitive science**

Submitted on: Aug 22, 2012

Author: **Christina Aperjis, Bernardo A. Huberman, Fang Wu**

Title: **Harvesting Collective Intelligence: Temporal Behavior in Yahoo Answers**

Abstract: When harvesting collective intelligence, a user wishes to maximize the accuracy and value of the acquired information without spending too much time collecting it. We empirically study how people

behave when facing these conflicting objectives using data from Yahoo Answers, a community driven question-and-answer site. We take two complementary approaches. We first study how users behave when trying to maximize the amount of the acquired information, while minimizing the waiting time. We identify and quantify how question authors at Yahoo Answers trade off the number of answers they receive and the cost of waiting. We find that users are willing to wait more to obtain an additional answer when they have only received a small number of answers; this implies decreasing marginal returns in the amount of collected information. We also estimate the user`s utility function from the data. Our second approach focuses on how users assess the qualities of the individual answers without explicitly considering the cost of waiting.

Web link: *www.IntellectualArchive.com/getfile.php?file=JthqlXZjpww&orig_file=Bernardo_Huberman__ Harvesting_Collective_Intelligence.pdf*

ID #: 656   **Natural Sciences / Physics / Optics**

Submitted on: Aug 23, 2012

Author: **Marco Leonetti, Cefe Lopez**

Title: **Measurement of transport mean free path of light in thin systems**

Abstract: We extensively investigate in-plane light diffusion in systems with thickness larger than but comparable with the transport mean free path. By exploiting amplified spontaneous emission from dye molecules placed in the same holder of the sample, we obtain a directional probe beam precisely aligned to the sample plane. By comparing spatial intensity distribution of laterally leaking photons with predictions from random walk simulations, we extract accurate values of transport mean free path, opening the way to the investigation of a previously inaccessible kind of samples.

Web link: *www.IntellectualArchive.com/getfile.php?file=pJTOttiUf9C&orig_file=Marco_Leonetti__Measur ement_of_transport.pdf*

ID #: 657   **Natural Sciences / Physics / Quantum field theory**

Submitted on: Aug 23, 2012

Author: **Marco del Rey, Carlos Sabin, Juan Leon**

Title: **Short-time quantum detection: probing quantum fluctuations**

Abstract: In this work we study the information provided by a detector click on the state of an initially excited two level system. By computing the time evolution of the corresponding conditioned probability beyond the rotating wave approximation, as needed for short time analysis, we show that a click in the detector is related with the decay of the source only for long times of interaction. For short times, non-rotating wave approximation effects, like self-excitations of the detector, forbid a na\"{i}ve interpretation of the detector readings. These effects might appear in circuit QED experiments.

Web link: *www.IntellectualArchive.com/getfile.php?file=S4EacXvCJtj&orig_file=Marco_del_Rey__Short-t ime_quantum_detection.pdf*

ID #: 658   **Natural Sciences / Physics / Quantum field theory**

Submitted on: Aug 23, 2012

Author: **Eduardo Martin-Martinez, Miguel Montero, Marco del Rey**

Title: **Wavepacket detection with the Unruh-DeWitt model**

Abstract: In this paper we deal with several issues in the localisation of the Unruh-Dewitt detector model. In its original formulation as a pointlike detector, the Unruh-DeWitt model has been used to study extensively the physics of quantum fields in presence of accelerations or curved backgrounds. Natural extensions of the model have tried to take into account the spatial profile of such detectors but all of them have met a series of problems in their spectral response which render them useless to study some of the most interesting physical scenarios. This paper analyses the spectral response of spatially smeared Unruh-DeWitt detectors, discusses the kind of spatial profiles which are useful for the study of relevant scenarios and study in which cases the Unruh-DeWitt model can be effectively used to describe atoms interacting with the EM field.

Web link: *www.IntellectualArchive.com/getfile.php?file=ZfTcJTfKibo&orig_file=Marco_del_Rey__Wavep acket_detection.pdf*

ID #: 659   **Natural Sciences / Computer Sciences / Mathematical logic**

Submitted on: Aug 23, 2012

Author: **Paraskevas V. Lekeas, Giorgos Stamatopoulos**

Title: **Cooperative oligopoly games: a probabilistic approach**

Abstract: We analyze the core of a cooperative Cournot game. We assume that when contemplating a deviation, the members of a coalition assign positive probability over all possible coalition structures that the non-members can form. We show that when the number of firms in the market is sufficiently large then the core of the underlying cooperative game is non-empty. Moreover, we show that the core of our game is a subset of the \gamma - core.

Web link: *www.IntellectualArchive.com/getfile.php?file=2KtViKIxE1g&orig_file=Paraskevas_Lekeas__Cooperative_oligopoly_games.pdf*

ID #: 660 **Natural Sciences / Computer Sciences / Analysis of algorithms**

Submitted on: Aug 24, 2012

Author: **Sivan Sabato, Naftali Tishby**

Title: **Multi-Instance Learning with Any Hypothesis Class**

Abstract: In the supervised learning setting termed Multiple-Instance Learning (MIL), the examples are bags of instances, and the bag label is a function of the labels of its instances. Typically, this function is the Boolean OR. The learner observes a sample of bags and the bag labels, but not the instance labels that determine the bag labels. The learner is then required to emit a classification rule for bags based on the sample. MIL has numerous applications, and many heuristic algorithms have been used successfully on this problem, each adapted to specific settings or applications. In this work we provide a unified theoretical analysis for MIL, which holds for any underlying hypothesis class, regardless of a specific application or problem domain. We show that the sample complexity of MIL is only poly-logarithmically dependent on the size of the bag, for any underlying hypothesis class. In addition, we introduce a new PAC-learning algorithm for MIL, which uses a regular supervised learning algorithm as an oracle.

Web link: *www.IntellectualArchive.com/getfile.php?file=K4xiQb9LwPj&orig_file=Naftali_Tishby__Multi-Instance_Learning.pdf*

ID #: 661 **Natural Sciences / Computer Sciences / Analysis of algorithms**

Submitted on: Aug 24, 2012

Author: **Yevgeny Seldin, Naftali Tishby**

Title: **PAC-Bayesian Analysis of Co-clustering and Beyond**

Abstract: The analysis of co-clustering is extended to tree-shaped graphical models, which can be used to analyze high dimensional tensors. According to the bounds, the generalization abilities of tree-shaped graphical models depend on a trade-off between their empirical data fit and the mutual information that is propagated up the tree levels. We also formulate weighted graph clustering as a prediction problem: given a subset of edge weights we analyze the ability of graph clustering to predict the remaining edge weights. The analysis of co-clustering easily extends to this problem and suggests that graph clustering should optimize the trade-off between empirical data fit and the mutual information that clusters preserve on graph nodes.

Web link: *www.IntellectualArchive.com/getfile.php?file=dMvFKfdLeQD&orig_file=Naftali_Tishby__PAC-Bayesian_Analysis.pdf*

ID #: 662 **Natural Sciences / Computer Sciences / Analysis of algorithms**

Submitted on: Aug 24, 2012

Author: **Sivan Sabato, Nathan Srebro, Naftali Tishby**

Title: **Reducing Label Complexity by Learning From Bags**

Abstract: We consider a supervised learning set t ing in which the main cost of learning is the number of training labels and one can obtain a single label for a bag of examples, indicating only if a positive example exists in the bag, as in Multi-Instance Learning. We thus propose to create a training sample of bags, and to use the obtained labels to learn to classify individual examples. We provide a theoret ical analysis showing how to select the bag size as a function of the problem parameters, and prove that if the original labels are distributed unevenly, the number of required labels drops considerably when learning from bags. We demonstrate that finding a low-error separating hyperplane from bags is feasible in this setting using a simple iterative procedure similar to latent SVM. Experiments on synthetic and real data sets demonstrate the success of the approach.

Web link: *www.IntellectualArchive.com/getfile.php?file=fIJLIPNRGQn&orig_file=Naftali_Tishby__Reduci*

ng_Label_Complexity.pdf

ID #: 663   **Natural Sciences** / **Computer Sciences** / **Analysis of algorithms**

Submitted on: Aug 24, 2012

Author: **Ron M Hecht, Elad Noor, Naftali Tishby**

Title: **Speaker Recognition by Gaussian Information Bottleneck**

Abstract: This paper explores a novel approach for the extraction of relevant information in speaker recognition tasks. This approach uses a principled information theoretic framework - the Information Bottleneck method (IB). In our application, the method compresses the acoustic data while preserving mostly the relevant information for speaker identification. This paper focuses on a continuous version of the IB method known as the Gaussian Information Bottleneck (GIB). This version assumes that both the source and target variables are high dimensional multivariate Gaussian variables. The GIB was applied in our work to the Super Vector (SV) dimension reduction conundrum. Experiments were conducted on the male part of the NIST SRE 2005 corpora. The GIB representation was compared to other dimension reduction techniques and to a baseline system. In our experiments, the GIB outperformed the baseline system; achieving a 6.1% Equal Error Rate (EER) compared to the 15.1% EER of a baseline system.

Web link: *www.IntellectualArchive.com/getfile.php?file=1ex8AMoUhk4&orig_file=Naftali_Tishby__Speaker_Recognition.pdf*

ID #: 664   **Natural Sciences** / **Computer Sciences** / **Analysis of algorithms**

Submitted on: Aug 24, 2012

Author: **Sivan Sabato, Nathan Srebro, Naftali Tishby**

Title: **Tight Sample Complexity of Large-Margin Learning**

Abstract: We obtain a tight distribution-specific characterization of the sample complexity of large-margin classification with L_2 regularization: We introduce the \gamma-adapted-dimension, which is a simple function of the spectrum of a distribution`s covariance matrix, and show distribution-specific upper and lower bounds on the sample complexity, both governed by the \gamma-adapted-dimension of the source distribution. We conclude that this new quantity tightly characterizes the true sample complexity of large-margin classification. The bounds hold for a rich family of sub-Gaussian distributions.

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

ID #: 666   **Natural Sciences** / **Physics** / **Gravitation Theory (Relativity)**

Submitted on: Aug 25, 2012

Author: **Celia Escamilla-Rivera, Gerardo Garcia-Jimenez, Oscar Loaiza-Brito, Octavio Obregon**

Title: **Closed String Tachyon: Inflation and Cosmological Collapse**

Abstract: By compactifying a critical bosonic string theory on an internal non-flat space with a constant volume, we study the role played by the closed string tachyon in the cosmology of the effective four-dimensional space-time. The effective tachyon potential consists on a negative constant related to the internal curvature space and a polynomial with only quadratic and quartic terms of the tachyon field. Based on it, we present a solution for the tachyon field and the scale factor, which describes an accelerated universe which expands to a maximum value before collapsing. At early times, the closed string tachyon potential behaves as a cosmological constant driving the Universe to an expansion. The value of the cosmological constant is determined by the curvature of the internal space which also fixes the value of the vacuum energy. As time evolves, inflation is present in our models, and it finishes long before the collapsing. At late times, we show that the collapse of the Universe starts as soon as the tachyon field condensates.

Web link: *www.IntellectualArchive.com/getfile.php?file=kMLfZPDit8Y&orig_file=Celia_Escamilla-Rivera__Closed_String_Tachyon.pdf*

ID #: 667   **Natural Sciences** / **Astronomy** / **Solar astronomy**

Submitted on: Aug 25, 2012

Author: **N.I.Kobanov, A.S.Kustov, S.A.Chupin, V.A.Pulyaev**

Title: **Oscillations in the Solar Faculae. III. The Phase Relations between Chromospheric and**

Photospheric LOS Velocities

Abstract: An analysis of line-of-sight velocity oscillation in nine solar faculae was undertaken with the aim of studying of phase relations between chromosphere (He i 10830 A line) and photosphere (Si i 10827 A line) five-minute oscillations. We found that time lag of the chromospheric signal relative to photospheric one varies from -12 to 100 seconds and is about 50 seconds on average. We assume that the small observed lag can have three possible explanations: i) convergence of formation levels of He i 10830 A and Si i 10827 A in faculae; ii) significant increase of five-minute oscillation propagation velocity above faculae; iii) simultaneous presence of standing and travelling waves.

Web link: *www.IntellectualArchive.com/getfile.php?file=b8lguO97Keo&orig_file=N_I_Kobanov__Oscillations_in_the_Solar_Faculae.pdf*

ID #: 668   **Natural Sciences / Physics / Condensed Matter Physics**

Submitted on: Aug 25, 2012

Author: **Nikolay Plakida**

Title: **Spin excitations and mechanisms of superconductivity in cuprates**

Abstract: A microscopic theory of spin excitations in strongly-correlated electronic systems within the t-J model is discussed. An exact representation for the dynamic spin susceptibility is derived. In the normal state, the excitation spectrum reveals a crossover from spin-wave-like excitations at low doping to overdamped paramagnons above the optimal doping. At low temperatures, the resonance mode at the antiferromagnetic wave vector $Q = \pi(1,1)$ emerges which is explained by a strong suppression of the spin excitation damping caused by a spin gap at Q rather than by opening of a superconducting gap. A major role of spin excitations in the d-wave superconducting pairing in cuprates is stressed in discussing mechanisms of high-Tc superconductivity within the Hubbard model in the limit of strong correlations, while electron-phonon interaction and a well-screened weak Coulomb interaction are not essential.

Web link: *www.IntellectualArchive.com/getfile.php?file=pJDOmb6jqKv&orig_file=Nikolay_Plakida__Spin_excitations_and_mechanisms.pdf*

ID #: 669   **Natural Sciences / Astronomy / Cosmology**

Submitted on: Aug 25, 2012

Author: **Xiang Liu, Hua-Gang Song, Jun Liu, Zhen Ding, Nicola Marchili, Thomas P. Krichbaum, Lars Fuhrmann, Anton Zensus, Tao An**

Title: **Radio observations of the first three-month Fermi-AGN at 4.8 GHz**

Abstract: Using the Urumqi 25m radio telescope, sources from the first three-month Fermi-LAT detected AGN catalog with declination >0 were observed in 2009 at 4.8 GHz. The radio flux density appears to correlate with the gamma-ray intensity. Intra-day variability (IDV) observations were performed in March, April and May in 2009 for selected 42 gamma-ray bright blazars, and 60% of them show evident flux variability at 4.8 GHz during the IDV observations, the IDV detection rate is higher than that in previous flat-spectrum AGN samples. The IDV appears more often in the VLBI-core dominant blazars, and the non-IDV blazars show relatively `steeper` spectral indices than the IDV blazars. Pronounced inter-month variability has been found in two BL Lac objects: J0112+2244 and J0238+1636.

Web link: *www.IntellectualArchive.com/getfile.php?file=nRvTK8HQnDQ&orig_file=Xiang_Liu__Radio_observations.pdf*

ID #: 670   **Natural Sciences / Computer Sciences / Analysis of algorithms**

Submitted on: Aug 25, 2012

Author: **Pierre De Loor, Romain Benard, Chevaillier Pierre**

Title: **Real-time retrieval for case-based reasoning in interactive multiagent-based simulations**

Abstract: The aim of this paper is to present the principles and results about case-based reasoning adapted to real- time interactive simulations, more precisely concerning retrieval mechanisms. The article begins by introducing the constraints involved in interactive multiagent-based simulations. The second section pre- sents a framework stemming from case-based reasoning by autonomous agents. Each agent uses a case base of local situations and, from this base, it can choose an action in order to interact with other auton- omous agents or users` avatars. We illustrate this framework with an example dedicated to the study of dynamic situations in football. We then go on to address the difficulties of conducting such simulations in real-time and propose a model for case and for case base. Using generic agents and adequate case base structure associated with a dedicated recall

algorithm, we improve retrieval performance under time pressure compared to classic CBR techniques. We present some results relating to the performance of this solution.

Web link: *www.IntellectualArchive.com/getfile.php?file=VRgEIQROAke&orig_file=Pierre_De_Loor__Real -time_retrieval.pdf*

ID #: 671   **Natural Sciences** / **Astronomy** / **Cosmology**

Submitted on: Aug 26, 2012

Author: **Eric S. Perlman, Y. Jack Ng, David J. E. Floyd, Wayne A. Christiansen**

Title: **Using Observations of Distant Quasars to Constrain Quantum Gravity**

Abstract: When calculating the path taken by photons as they travel from a distant source to Earth, one must use the comoving distance rather than the luminosity distance. This then also becomes the appropriate distance to use when calculating the angular broadening expected in a distant source. The use of the wrong distance measure causes Tamburini et al. to overstate the constraints that can be placed on models of spacetime foam. In addition, we consider the impact of different ways of parametrizing and measuring the effects of spacetime foam. Given the variation of the shape of the point-spread function (PSF) on the chip, as well as observation-specific factors, it is important to select carefully -- and document -- the comparison stars used as well as the methods used to compute the Strehl ratio.

Web link: *www.IntellectualArchive.com/getfile.php?file=9urWvHrBQmZ&orig_file=Eric_Perlman__Using _Observations_of_Distant_Quasars.pdf*

ID #: 672   **Natural Sciences** / **Astronomy** / **Cosmology**

Submitted on: Aug 26, 2012

Author: **Wayne A. Christiansen, David J. E. Floyd, Y. Jack Ng, Eric S. Perlman**

Title: **Limits on Spacetime Foam**

Abstract: Plausibly spacetime is "foamy" on small distance scales, due to quantum fluctuations. We elaborate on the proposal to detect spacetime foam by looking for seeing disks in the images of distant quasars and AGNs. This is a null test in the sense that the continued presence of unresolved "point" sources at the milli-arc second level in samples of distant compact sources puts severe constraints on theories of quantized spacetime foam at the Planckian level. We discuss the geometry of foamy spacetime, and the appropriate distance measure for calculating the expected angular broadening. We then deal with recent data and the constraints they put on spacetime foam models. While time lags from distant pulsed sources such as GRBs have been posited as a possible test of spacetime foam models, we demonstrate that the time-lag effect is rather smaller than has been calculated, due to the equal probability of positive and negative fluctuations in the speed of light inherent in such models.

Web link: *www.IntellectualArchive.com/getfile.php?file=P9xKj6lieuI&orig_file=Eric_Perlman__Limits_on _Spacetime_Foam.pdf*

ID #: 673   **Natural Sciences** / **Physics** / **Condensed Matter Physics**

Submitted on: Aug 26, 2012

Author: **Biao Hu, Gregory T. McCandless, V. O. Garlea, S. Stadler, Yimin Xiong, Julia Y. Chan, E. W. Plummer, R. Jin**

Title: **Evolution of Structural and Physical Properties of Sr3(Ru1-xMnx)2O7 with Mn Concentration**

Abstract: Layered ruthenates are prototype materials with strong structure-property correlations. We report the structural and physical properties of double-layered perovskite $Sr_3(Ru_{1-x}Mn_x)_2O_7$ single crystals with $0<=x<=0.7$. Single crystal x-ray diffraction refinements reveal that Mn doping on the Ru site leads to the shrinkage of unit-cell volume and disappearance of (Ru/Mn)O6 octahedron rotation when $x>0.16$, while the crystal structure remains tetragonal. Correspondingly, the electric and magnetic properties change with x. The electrical resistivity reveals metallic character ($d\rho/dT>0$) at high temperatures but insulating behavior ($d\rho/dT<0$) below a characteristic temperature T_{MIT}. Interestingly, T_{MIT} is different from T_M, at which magnetic susceptibility reaches maximum. T_{MIT} monotonically increases with increasing x while T_M shows non-monotonic dependence with x. The difference between T_{MIT} and T_M ($T_{MIT}>T_M$) becomes larger when $x>0.16$.

Web link: *www.IntellectualArchive.com/getfile.php?file=EKChgnEcEOw&orig_file=R_Jin__Evolution_of_ Structural_and_Physical_Properties.pdf*

ID #: 674   **Natural Sciences / Physics / Optics**

Submitted on: Aug 26, 2012

Author: **Seng Fatt Liew, Jin-Kyu Yang, Heeso Noh, Carl F. Schreck, Eric R. Dufresne, Corey S. O`Hern, Hui Cao**

Title: **Photonic Band Gaps in 3D Network Structures with Short-range Order**

Abstract: We present a systematic study of photonic band gaps (PBGs) in three-dimensional (3D) photonic amorphous structures (PAS) with short-range order. From calculations of the density of optical states (DOS) for PAS with different topologies, we find that tetrahedrally connected dielectric networks produce the largest isotropic PBGs. Local uniformity and tetrahedral order are essential to the formation of PBGs in PAS, in addition to short-range geometric order. This work demonstrates that it is possible to create broad, isotropic PBGs for vector light fields in 3D PAS without long-range order.

Web link: *www.IntellectualArchive.com/getfile.php?file=fdOoJs4gVMN&orig_file=Seng_Fatt_Liew__Photonic_Band_Gaps.pdf*

ID #: 675   **Natural Sciences / Physics / Optics**

Submitted on: Aug 26, 2012

Author: **Oliver Paul, Yaroslav Urzhumov, Christoffer Elsen, David Smith, Marco Rahm**

Title: **Flat-face approximations of invisibility cloaks with planar metamaterial layers**

Abstract: Transformation optics (TO) is a powerful tool for the design of artiffcial materials with unprecedented optical properties. Here, we propose the approximation of TO structures of arbitrary shape by faceting, in which curved surfaces are approximated by at metamaterial layers that can be implemented by standard fabrication and stacking techniques. We illustrate the approximation approach for the specific example of a cylindrical invisibility cloak. First, we introduce a numerical method for the design of cloaks with arbitrary boundary shapes, and apply it to faceted shapes. Subsequently, we reduce the complexity of the metamaterials needed to implement the perfect faceted cloak by introducing several approximations, whose validity is quantified by an investigation of the scattering cross section.

Web link: *www.IntellectualArchive.com/getfile.php?file=c7cnLG6CTM9&orig_file=Oliver_Paul__Flat-face_approximations.pdf*

ID #: 676   **Natural Sciences / Computer Sciences / User interfaces**

Submitted on: Aug 26, 2012

Author: **Seth James Nielson, Caleb E. Spare, Dan S. Wallach**

Title: **Building Better Incentives for Robustness in BitTorrent**

Abstract: BitTorrent is a widely-deployed, peer-to-peer file transfer protocol engineered with a "tit for tat" mechanism that encourages cooperation. Unfortunately, there is little incentive for nodes to altruistically provide service to their peers after they finish downloading a file, and what altruism there is can be exploited by aggressive clients like Bit- Tyrant. This altruism, called seeding, is always beneficial and sometimes essential to BitTorrent`s real-world performance. We propose a new long-term incentives mechanism in BitTorrent to encourage peers to seed and we evaluate its effectiveness via simulation. We show that when nodes running our algorithm reward one another for good behavior in previous swarms, they experience as much as a 50% improvement in download times over unrewarded nodes. Even when aggressive clients, such as BitTyrant, participate in the swarm, our rewarded nodes still outperform them, although by smaller margins.

Web link: *www.IntellectualArchive.com/getfile.php?file=2Pg8pQv7Ogg&orig_file=Seth_James_Nielson__Building_Better_Incentives.pdf*

ID #: 678   **Natural Sciences / Physics / Mathematical Physics**

Submitted on: Aug 27, 2012

Author: **Zhifeng Gao, Yisong Yang**

Title: **Existence of Dyons in Minimally Gauged Skyrme Model via Constrained Minimization**

Abstract: We prove the existence of electrically and magnetically charged particlelike static solutions, known as dyons, in the minimally gauged Skyrme model developed by Brihaye, Hartmann, and Tchrakian. The solutions are spherically symmetric, depend on two continuous parameters, and carry unit monopole and magnetic charges but continuous Skyrme charge and non-quantized electric charge induced from the `t Hooft electromagnetism. The problem amounts to obtaining a finite-energy critical

point of an indefinite action functional, arising from the presence of electricity and the Minkowski spacetime signature. The difficulty with the absence of the Higgs field is overcome by achieving suitable strong convergence and obtaining uniform decay estimates at singular boundary points so that the negative sector of the action functional becomes tractable.

Web link: *www.IntellectualArchive.com/getfile.php?file=Aljn98RTjgj&orig_file=Yisong_Yang__Existence _of_Dyons.pdf*

ID #: 679   **Natural Sciences / Astronomy / Cosmology**

Submitted on: Aug 27, 2012

Author: **Yu.N. Efremov, V.L. Afanasiev, O.V. Egorov**

Title: **Ionized Gas Characteristics in the Cavities of the Gas and Dust Disc of the Spiral Galaxy NGC 6946**

Abstract: The parameters of the ionized gas in NGC 6946 (in the [NII]6548,6583, H-alpha and [SII]6717,6731 lines) are investigated with the SAO RAS BTA telescope along three positions of the long slit of the SCORPIO focal reducer, passing through a number of large and small cavities of the gaseous disc of the galaxy. Most of these cavities correspond exactly to the cavities in warm dust. We found that everywhere in the direction of NGC 6946 the lines of ionized gas are decomposed into two Gaussians, one of which shows almost constant [SII]/H-alpha and [NII]/H-alpha ratios, as well as an almost constant radial velocity within the measurement errors (about -35 - -50 km/s). This component is in fact the foreground radiation from the diffuse ionized gas of our Galaxy; a similar component is also present in the emission of neutral hydrogen. The analysis of the component of ionized gas, occurring in NGC 6946, has revealed that it shows signs of shock excitation in the cavities of the gaseous disc of the galaxy.

Web link: *www.IntellectualArchive.com/getfile.php?file=JZlOWYYMl6H&orig_file=Yu_Efremov__Ionized_ Gas_Characteristics.pdf*

ID #: 680   **Natural Sciences / Astronomy / Solar astronomy**

Submitted on: Aug 27, 2012

Author: **Tomoko Kawate, Ayumi Asai, Kiyoshi Ichimoto**

Title: **Center-to-Limb Variation of Radio Emissions from Thermal-Rich and Thermal-Poor Solar Flares**

Abstract: A statistical analysis of radio flare events was performed by using the event list of Nobeyama Radioheliograph in 1996-2009. We examined center-to-limb variations of 17GHz and 34GHz flux by dividing the flare events into different groups with respect to the `thermal plasma richness` (ratio of the peak flux of soft X-ray to non-thermal radio emissions) and the duration of radio bursts. It is found that peak flux of 17 and 34GHz tend to be higher toward the limb for thermal-rich flares with short durations. We propose that the thermal-rich flares, which are supposed to be associated with an efficient precipitation of high energy particles into the chromosphere, have a pitch angle distribution of non-thermal electrons with a higher population along the flare loop.

Web link: *www.IntellectualArchive.com/getfile.php?file=hIl6EjOOxxB&orig_file=Tomoko_Kawate__Cent er-to-Limb_Variation_of_Radio_Emissions.pdf*

ID #: 681   **Natural Sciences / Mathematics / Algebra**

Submitted on: Aug 27, 2012

Author: **Eli Aljadeff, Alexei Kanel-Belov**

Title: **Representability and Specht problem for G-graded algebras**

Abstract: Let W be an associative PI algebra over a field F of characteristic zero, graded by a finite group G. Let $id_{G}(W)$ denote the T-ideal of G-graded identities of W. We prove: 1. {[G-graded PI equivalence]} There exists a field extension K of F and a finite dimensional $Z/2ZxG$-graded algebra A over K such that $id_{G}(W)=id_{G}(A^{*})$ where A^{*} is the Grassmann envelope of A. 2. {[G-graded Specht problem]} The T-ideal $id_{G}(W)$ is finitely generated as a T-ideal. 3. {[G-graded PI-equivalence for affine algebras]} Let W be a G-graded affine algebra over F. Then there exists a field extension K of F and a finite dimensional algebra A over K such that $id_{G}(W)=id_{G}(A)$.

Web link: *www.IntellectualArchive.com/getfile.php?file=mWKEAgUNJ0n&orig_file=Alexei_Kanel-Belov_ _Representability_and_Specht_problem.pdf*

ID #: 682   **Natural Sciences / Mathematics / Dynamical systems**

Author: **Alexei Kanel-Belov, Ivan Mitrofanov**

Title: **Periodicity of Rauzy scheme and substitutional systems**

Abstract: In the paper the notion of Rauzy scheme is introduced. From Rauzy graph Rauzy Scheme can be obtaining by uniting sequence of vertices of ingoing and outgoing degree 1 by arches. This notion is a tool to describe Rauzy graph behavior. For morphic superword we prove periodicity of Rauzy schemes. This is generalization of fact that quadratic irrationals have periodic chain fractions.

Web link: *www.IntellectualArchive.com/getfile.php?file=9hwkbkVDeiK&orig_file=Alexei_Kanel-Belov__Periodicity_of_Rauzy_scheme.pdf*

ID #: 683 **Natural Sciences / Mathematics / Algebra**

Author: **Eli Aljadeff, Alexei Kanel-Belov**

Title: **Hilbert series of PI relatively free G-graded algebras are rational functions**

Abstract: Let G be a finite group, $(g_{1},...,g_{r})$ an (unordered) r-tuple of $G^{(r)}$ and x_{i,g_i}`s variables that correspond to the $g\_i$`s, i=1,...,r. Let $F<x_{1,g_1},...,x_{r,g_r}>$ be the corresponding free G-graded algebra where F is a field of zero characteristic. Here the degree of a monomial is determined by the product of the indices in G. Let I be a G-graded T-ideal of $F<x_{1,g_1},...,x_{r,g_r}>$ which is PI (e.g. any ideal of identities of a G-graded finite dimensional algebra is of this type). We prove that the Hilbert series of $F<x_{1,g_1},...,x_{r,g_r}>/I$ is a rational function. More generally, we show that the Hilbert series which corresponds to any g-homogeneous component of $F<x_{1,g_1},...,x_{r,g_r}>/I$ is a rational function.

Web link: *www.IntellectualArchive.com/getfile.php?file=XjTIu0ClIMI&orig_file=Alexei_Kanel-Belov__Hilbert_series.pdf*

ID #: 684 **Natural Sciences / Mathematics / Algebra**

Author: **Alexey Kanel-Belov, Sergey Malev, Louis Rowen**

Title: **The images of non-commutative polynomials evaluated on 2x2 matrices**

Abstract: Let p be a multilinear polynomial in several non-commuting variables with coefficients in a quadratically closed field K of any characteristic. It has been conjectured that for any n, the image of p evaluated on the set $M_n(K)$ of n by n matrices is either zero, or the set of scalar matrices, or the set $sl_n(K)$ of matrices of trace 0, or all of $M_n(K)$. We prove the conjecture for $n=2$.

Web link: *www.IntellectualArchive.com/getfile.php?file=TSWsMjX4ENA&orig_file=Alexei_Kanel-Belov__The_images_of_non-commutative_polynomials.pdf*

ID #: 685 **Natural Sciences / Astronomy / Astrophysics**

Author: **Z. Cao, S.Z. Chen**

Title: **TeV gamma-ray survey of the northern sky using the ARGO-YBJ experiment**

Abstract: The ARGO-YBJ experiment is an extensive air shower array with full coverage RPC detectors located at Yangbajing (4300 m asl, Tibet, China). It is operated with high duty cycle (>86%) and a large field of view ($\sim$ 2sr). It continuously monitors the entire overhead sky at γ-ray energies above 0.1 TeV. In the talk, we will present the result of the northern sky survey (between declinations of -10° and 70°) from an analysis of ~4 years of the ARGO-YBJ data (between July 2006 and February 2011). There are four known TeV sources observed with significance greater than 5 S.D.. The significance from Crab Nebula is more than 16 S.D.. 90% confidence level upper limits to the flux from all directions in the sky are also presented, which vary from 0.09 to 0.53 Crab unit for Crab-like point sources.

Web link: *www.IntellectualArchive.com/getfile.php?file=WjLW0wVEM69&orig_file=S_Z_Chen__TeV_gamma-ray_survey.pdf*

ID #: 686 **Natural Sciences / Physics / Particle physics**

Author: R. Smida, H. Bluemer, R. Engel, A. Haungs, T. Huege, K.-H. Kampert, H. Klages, M. Kleifges, O. Kroemer, S. Mathys, J. Rautenberg, M. Riegel, M. Roth, F. Salamida, H. Schieler, J. Stasielak, M. Unger, M. Weber, F. Werner, H. Wilczynski, J. Wochele

Title: First results of the CROME experiment

Abstract: It is expected that a radio signal in the microwave range is produced in the atmosphere due to molecular bremsstrahlung initiated by extensive air showers. The CROME (Cosmic-Ray Observation via Microwave Emission) experiment was built to search for this microwave signal. Radiation from the atmosphere is monitored in the extended C band (3.4--4.2 GHz) in coincidence with showers detected by the KASCADE-Grande experiment. The detector setup consists of several parabolic antennas and fast read-out electronics. The sensitivity of the detector has been measured with different methods. First results after half a year of data taking are presented.

Web link: *www.IntellectualArchive.com/getfile.php?file=fGKHrlu4sh6&orig_file=R_Smida__First_results _of_the_CROME_experiment.pdf*

ID #: 687　　**Natural Sciences** / **Physics** / **Mathematical Physics**

Submitted on: Aug 28, 2012

Author: Amalia Torre

Title: Appell Transformation and Canonical Transforms

Abstract: The interpretation of the optical Appell transformation, as previously elaborated in relation to the free-space paraxial propagation under both a rectangular and a circular cylindrical symmetry, is reviewed. Then, the caloric Appell transformation, well known in the theory of heat equation, is shown to be amenable for a similar interpretation involving the Laplace transform rather than the Fourier transform, when dealing with the 1D heat equation. Accordingly, when considering the radial heat equation, suitably defined Hankel-type transforms come to be involved in the inherent Appell transformation. The analysis is aimed at outlining the link between the Appell transformation and the canonical transforms.

Web link: *www.IntellectualArchive.com/getfile.php?file=o8Jim7big8f&orig_file=Amalia_Torre__Appell_T ransformation.pdf*

ID #: 688　　**Natural Sciences** / **Physics** / **Condensed Matter Physics**

Submitted on: Aug 28, 2012

Author: A. I. Karasevskii, V. V. Lubashenko

Title: Heat release in clusterization of nanoparticles

Abstract: We show that the effect of size dependence of the melting temperature of nanocrystals may be used to govern anomalies of thermodynamic properties of nanocrystals in the premelting range. For example, if temperature of nanocrystals is near the melting point, their mechanical contact should result in a change of the temperature and release of some heat. We discuss fundamental possibility of construction of a "heat pump" to extract thermal energy from a low-temperature medium.

Web link: *www.IntellectualArchive.com/getfile.php?file=culjeek7RKC&orig_file=A_I_Karasevskii__Heat_ release.pdf*

ID #: 689　　**Natural Sciences** / **Physics** / **Quantum field theory**

Submitted on: Aug 28, 2012

Author: Martin Lukac, Marek Perkowski, Michitaka Kameyama

Title: Evolutionary Quantum Logic Synthesis of Boolean Reversible Logic Circuits Embedded in Ternary Quantum Space using Heuristics

Abstract: It has been experimentally proven that realizing universal quantum gates using higher-radices logic is practically and technologically possible. We developed a Parallel Genetic Algorithm that synthesizes Boolean reversible circuits realized with a variety of quantum gates on qudits with various radices. In order to allow synthesizing circuits of medium sizes in the higher radix quantum space we performed the experiments using a GPU accelerated Genetic Algorithm. Using the accelerated GA we compare heuristic improvements to the mutation process based on cost minimization, on the adaptive cost of the primitives and improvements due to Baldwinian vs. Lamarckian GA. We also describe various fitness function formulations that allowed for various realizations of well known universal Boolean reversible or quantum-probabilistic circuits.

Web link: *www.IntellectualArchive.com/getfile.php?file=g5gSdhfZPEH&orig_file=Maarti_Lukac__Evoluti onary_Quantum_Logic_Synthesis.pdf*

ID #: 690   **Natural Sciences / Computer Sciences / Network topology**

Submitted on: Aug 28, 2012

Author: **G.A. Tarnavsky, E.V. Vorozhtsov**

Title: **Computer Simulation Center in Internet**

Abstract: The general description of infrastructure and content of SciShop.ru computer simulation center is given. This resource is a new form of knowledge generation and remote education using modern Cloud Computing technologies.

Web link: *www.IntellectualArchive.com/getfile.php?file=960hijTMtNg&orig_file=E_V_Vorozhtsov__Computer_Simulation_Center_in_Internet.pdf*

ID #: 691   **Natural Sciences / Mathematics / Algebra**

Submitted on: Aug 30, 2012

Author: **Piotr Multarzynski**

Title: **An algebraic analysis framework for quantum calculus**

Abstract: An algebraic analysis framework for quantum calculus is proposed. The quantum derivative operator $D_{\tau ,\sigma}$ is based on two commuting bijections τ and σ defined on an arbitrary set M equipped with a tension structure determined by a single tension function θ, i.e. a 1-dimensional case is analyzed here. The well known cases, i.e. h- and q-calculi together with their symmetric versions, can be obtained owing to special choice of mappings τ and σ.

Web link: *www.IntellectualArchive.com/getfile.php?file=IN4vCNgOJTa&orig_file=Piotr_Multarzynski__An_algebraic_analysis_framework.pdf*

ID #: 692   **Natural Sciences / Physics / Particle physics**

Submitted on: Aug 30, 2012

Author: **Guillaume Decerprit, Denis Allard**

Title: **Constraints on the origin of ultra-high-energy cosmic rays from cosmogenic neutrinos and photons**

Abstract: We study the production of cosmogenic neutrinos and photons during the extragalactic propagation of ultra-high-energy cosmic rays (UHECRs). For a wide range of models in cosmological evolution of source luminosity, composition and maximum energy we calculate the expected flux of cosmogenic secondaries by normalizing our cosmic ray output to experimental spectra and comparing the diffuse flux of GeV-TeV gamma-rays to the experimental one measured by the Fermi satellite. Most of these models yield significant neutrino fluxes for current experiments like IceCube or Pierre Auger. Furthermore, we discuss the possibilities of signing the presence of UHE proton sources either within or outside the cosmic ray horizon using neutrinos or photons observations even if the cosmic ray composition becomes heavier at the highest energies. We discuss the possible constraints that could be brought on the UHECR origin from the different messengers and energy ranges.

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

ID #: 693   **Natural Sciences / Physics / Particle physics**

Submitted on: Aug 30, 2012

Author: **Javier Resta-Lopez, Glenn Christian**

Title: **Pulse-to-pulse Orbit Jitter Propagation in Multi-bunch Operation at the KEK Accelerator Test Facility 2 (ATF2)**

Abstract: Pulse-to-pulse orbit jitter, if not controlled, can drastically degrade the luminosity in future linear colliders. The second goal of the ATF2 project at the KEK accelerator test facility is to stabilise the vertical beam position down to approximately 5% of the nominal rms vertical beam size at the virtual Interaction Point (IP). This will require control of the orbit to better than 1 micrometre at the entrance of the ATF2 final focus system. In this report simulation studies are presented for vertical jitter propagation through the ATF2 extraction line and final focus system, and the jitter is evaluated at the IP. For these studies pulse-to-pulse vertical jitter measurements using three stripline beam position monitors are used as initial inputs. These studies are performed for the case of a bunch-train with three bunches, but could easily be extended for a larger number of bunches. The cases with and without intra-train orbit feedback correction in the extraction line of ATF2 are compared.

ID #: 694   **Philosophy** / **Metaphysics** / **Philosophy of self**

Submitted on: Aug 30, 2012

Author: **J.C. Hodge**

Title: **Survival is the only moral goal of life**

Abstract: What morals are required for survival and life? The principles of science are applied to the nature of society and religion. The measure of moral systems is suggested to be their survival ability. The data are the natural life of animals and plants and the history of human societies. The result is a view of nature and a set of morals that are very different from current thought. We are again facing a crisis. What must we change to survive?

ID #: 695   **Natural Sciences** / **Physics** / **Mathematical Physics**

Submitted on: Aug 30, 2012

Author: **Chang-Shou Lin, Gabriella Tarantello, Yisong Yang**

Title: **Solutions to the Master Equations Governing Fractional Vortices**

Abstract: By means of variational methods, in this paper, we establish sharp existence results for solutions of the master equations governing `fractional multiple vortices.` In the doubly periodic situation, the conditions for existence are both necessary and sufficient and give the upper bounds for the vortex numbers in terms of the size of the periodic cell domain. In the planar situation, there is no restriction on the vortex numbers. In both situations, the solutions are uniquely determined by the prescribed locations and the local winding numbers of the vortices.

ID #: 696   **Natural Sciences** / **Physics** / **Mathematical Physics**

Submitted on: Aug 30, 2012

Author: **Shouxin Chen, Yisong Yang**

Title: **Existence of Multiple Vortices in Supersymmetric Gauge Field Theory**

Abstract: Two sharp existence and uniqueness theorems are presented for solutions of multiple vortices arising in a six-dimensional brane-world supersymmetric gauge field theory under the general gauge symmetry group $G=U(1)\times SU(N)$ and with N Higgs scalar fields in the fundamental representation of G. Specifically, when the space of extra dimension is compact so that vortices are hosted in a 2-torus of volume $|\Om|$, the existence of a unique multiple vortex solution representing $n_1,...,n_N$ respectively prescribed vortices arising in the N species of the Higgs fields is established under the explicitly stated necessary and sufficient condition \[n_i<\frac{g^2v^2}{8\pi N}|\Om|+\frac{1}{N}(1-\frac{1}{N}[\frac{g}{e}]^2)n,\quad i=1,...,N,\] where e and g are the U(1) electromagnetic and SU(N) chromatic coupling constants, v measures the energy scale of broken symmetry, and $n=\sum_{i=1}^N n_i$ is the total vortex number;

ID #: 697   **Natural Sciences** / **Physics** / **Particle physics**

Submitted on: Aug 30, 2012

Author: **Elliott H. Lieb, Yisong Yang**

Title: **Non-Abelian Vortices in Supersymmetric Gauge Field Theory via Direct Methods**

Abstract: Vortices in supersymmetric gauge field theory are important constructs in a basic conceptual phenomenon commonly referred to as the dual Meissner effect which is responsible for color confinement. Based on a direct minimization approach, we present a series of sharp existence and uniqueness theorems for the solutions of some non-Abelian vortex equations governing color-charged multiply distributed flux tubes, which provide an essential mechanism for linear confinement. Over a doubly periodic domain, existence results are obtained under explicitly stated necessary and sufficient conditions that relate the size of the domain, the vortex numbers, and the

underlying physical coupling parameters of the models. Over the full plane, existence results are valid for arbitrary vortex numbers and coupling parameters. In all cases, solutions are unique.

Web link: *www.IntellectualArchive.com/getfile.php?file=NEVjgtEoRgu&orig_file=Yisong_Yang__Non-Ab elian_Vortices.pdf*

ID #: 698   **Natural Sciences / Physics / Gravitation Theory (Relativity)**

Submitted on: Aug 30, 2012

Author: **Joel Spruck, Yisong Yang**

Title: **Charged cosmological dust solutions of the coupled Einstein and Maxwell equations**

Abstract: It is well known through the work of Majumdar, Papapetrou, Hartle, and Hawking that the coupled Einstein and Maxwell equations admit a static multiple blackhole solution representing a balanced equilibrium state of finitely many point charges. This is a result of the exact cancellation of gravitational attraction and electric repulsion under an explicit condition on the mass and charge ratio. The resulting system of particles, known as an extremely charged dust, gives rise to examples of spacetimes with naked singularities. In this paper, we consider the continuous limit of the Majumdar--Papapetrou--Hartle--Hawking solution modeling a space occupied by an extended distribution of extremely charged dust. We show that for a given smooth distribution of matter of finite ADM mass there is a continuous family of smooth solutions realizing asymptotically flat space metrics.

Web link: *www.IntellectualArchive.com/getfile.php?file=jLUujnE7e8P&orig_file=Yisong_Yang__Charged _cosmological_dust_solutions.pdf*

ID #: 699   **Natural Sciences / Physics / Gravitation Theory (Relativity)**

Submitted on: Aug 30, 2012

Author: **Yurii Ignatyev, Alexander Agathonov**

Title: **Exact Solutions of the Self-consistent System of Relativistic Magnetohydrodynamics Equations for an Anisotropic Plasma on the Background of Bondi-Pirani-Robinson`s Metric**

Abstract: Exact solutions of the self-consistent relativistic magnetohydrodynamics equations for an anisotropic magnetized plasma on the background of Bondi-Pirani-Robinson`s vacuum plane gravitational wave (PGW) metric with an arbitrary polarization are obtained, which generalize the results obtained earlier by one of the authors for the transverse polarization of a gravitational wave. Based on the reformulated energobalance equation it is shown that in the linear approximation by gravitational wave amplitude only the transverse polarization of PGW interacts with magnetized plasma.

Web link: *www.IntellectualArchive.com/getfile.php?file=7ZLfvi0uxKM&orig_file=Yurii_Ignatyev__Exact_ Solutions.pdf*

ID #: 700   **Natural Sciences / Computer Sciences / Analysis of algorithms**

Submitted on: Aug 30, 2012

Author: **Roya Golchay, Frederic Le Mouel, Stephane Frenot, Julien Ponge**

Title: **Towards Bridging IoT and Cloud Services: Proposing Smartphones as Mobile and Autonomic Service Gateways**

Abstract: Computing is currently getting at the same time incredibly in the small with sensors/actuators embedded in our every- day objects and also greatly in the large with data and ser- vice clouds accessible anytime, anywhere. This Internet of Things is physically closed to the user but suffers from weak run-time execution environments. Cloud Environments provide powerful data storage and computing power but can not be easily accessed and integrate the final-user context- awareness. We consider smartphones are set to become the universal interface between these two worlds. In this position paper, we propose a middleware approach where smartphones provide service gateways to bridge the gap between IoT services and Cloud services. Since smartphones are mobile gateways, they should be able to (re)configure themself according to their place, things discovered around, and their own resources such battery.

Web link: *www.IntellectualArchive.com/getfile.php?file=xbf2mZafxYe&orig_file=Frederic_Le_Mouel__To wards_Bridging_IoT.pdf*

ID #: 701   **Natural Sciences / Physics / Gravitation Theory (Relativity)**

Submitted on: Aug 30, 2012

Author: **Yu.F.Pirogov, I.Yu.Polev**

Title: **Dark halos built of scalar gravitons: numerical study**

Abstract: In a previous article due to one of the present authors (YFP), an extension to General Relativity, violating general covariance to the residual unimodular one, was proposed. As a manifestation of such a violation, there appears the (massive) scalar graviton in addition to the massless tensor one. The former was proposed as a candidate on the dark matter in the Universe. In a subsequent article, an application of the extension was developed. Particularly, a regular solution to the static spherically symmetric equations in empty space was studied by means of analytical methods. This solution was proposed as a prototype model for the galaxy soft-core dark halos, with the coherent scalar-graviton field as dark matter. The present report is a supplement to the aforementioned article. The statements of the latter are verified and visualized by means of numerical analysis and symbolic calculations. The nice validity of analytical results is found.

Web link: *www.IntellectualArchive.com/getfile.php?file=MC6ADrQUKQM&orig_file=Yu_Pirogov__Dark_halos.pdf*

ID #: 703   **Social Sciences / Economics / Financial**

Submitted on: Aug 31, 2012

Author: **Victor Christianto, Florentin Smarandache**

Title: **Cultural Advantage for Cities an Alternative for Developing Countries**

Abstract: After more than a decade Michael Porter`s book Competitive Advantage of Nations stays ahead of the other books, in particular as alternative framework from the comparative advantage idea inspired by Adam Smith. This small book is merely an alternative proposition, a postscript perhaps, to Porter`s book, with basic idea that one cannot rely merely on industrial processes alone to keep stay ahead of market changes. Hence, for cities in developing countries the municipal shall find out their city`s best resources, and develop their city starting from there, instead of striving blindly in the conventional industrial path.

Web link: *www.IntellectualArchive.com/getfile.php?file=4L8JjDETK1p&orig_file=V_Christianto__cultural_advantage_for_cities.pdf*

ID #: 704   **Social Sciences / Economics / Financial**

Submitted on: Aug 31, 2012

Author: **Fu Yuhua, Florentin Smarandache, Victor Christianto**

Title: **Cultural Advantages in China: Tale of Six Cities**

Abstract: Nowadays, plenty of factories from Europe and other developed countries have been relocated to this country, considering its tremendous economic scale and rapid growth rate during the past three decades. But most of what happens inside the China nowadays is deeply hidden from the outside world ("the foreigners" as China people would call). This fact is partly because most reports on China were written by the so-called fly-high experts who are busy completing their reports despite a busy schedule. Very few books or reports were written by people inside, or at least "foreigners" who spent a few years in China. Therefore in this book, we took a different approach, by inviting local scientists and other writers to describe what happens surround them.

Web link: *www.IntellectualArchive.com/getfile.php?file=Ki0igff6tkS&orig_file=V_Christianto__Cultural_Advantages_in_China.pdf*

ID #: 705   **Natural Sciences / Physics / Astrophysics**

Submitted on: Aug 31, 2012

Author: **Victor Christianto**

Title: **From Fractality of Quantum Mechanics to Bohr-Sommerfeld`s Quantization of Planetary Orbit Distance**

Abstract: In the present paper, we use periodic orbit quantization as suggested by Bohr-Sommerfeld in order to analyze quantization in astrophysical phenomena, i.e. planetary orbit distances. It is known that one can deduce Bohr-Sommerfeld quantization rules from Burger's turbulence, and recently such an approach leads to a subfield in physics known as quantum turbulence. Further recommendation for generalizing Bohr-Sommerfeld quantization rules is also mentioned.

Web link: *www.IntellectualArchive.com/getfile.php?file=rEA0lQOTdl3&orig_file=V_Christianto__From_fractality_of_quantum_mechanics.pdf*

ID #: 706   **Natural Sciences / Physics / Condensed Matter Physics**

Submitted on: Aug 31, 2012

Author: **Florentin Smarandache, Victor Christianto**

Title: **Hadron Models and Related New Energy Issues**

Abstract: The present book covers a wide-range of issues from alternative hadron models to their likely implications in New Energy research, including alternative interpretation of lowenergy reaction (coldfusion) phenomena.

Web link: *www.IntellectualArchive.com/getfile.php?file=nL4HmNp22it&orig_file=V_Christianto__hadron _models.pdf*

ID #: 707 **Natural Sciences / Physics / Quantum field theory**

Submitted on: Aug 31, 2012

Author: **Florentin Smarandache, Victor Christianto**

Title: **Multi-Valued Logic, Neutrosophy, and Schroedinger Equation**

Abstract: This book was intended to discuss some paradoxes in Quantum Mechanics from the viewpoint of Multi-Valued-logic pioneered by Lukasiewicz, and a recent concept Neutrosophic Logic. Essentially, this new concept offers new insights on the idea of `identity`, which too often it has been accepted as given. Neutrosophy itself was developed in attempt to generalize Fuzzy-Logic introduced by L. Zadeh. While some aspects of theoretical foundations of logic are discussed, this book is not intended solely for pure mathematicians, but instead for physicists in the hope that some of ideas presented herein will be found useful. The book is motivated by observation that despite almost eight decades, there is indication that some of those paradoxes known in Quantum Physics are not yet solved. In our knowledge, this is because the solution of those paradoxes requires re-examination of the foundations of logic itself, in particular on the notion of identity and multi-valuedness of entity.

Web link: *www.IntellectualArchive.com/getfile.php?file=hgfQAsH5S6Z&orig_file=V_Christianto__multiva lued_logic.pdf*

ID #: 708 **Natural Sciences / Physics / Astrophysics**

Submitted on: Aug 31, 2012

Author: **Victor Christianto, Florentin Smarandache**

Title: **On Recent Discovery of New Planetoids in the Solar System and Quantization of Celestial System**

Abstract: The present note revised the preceding article discussing new discovery of a new planetoid in the solar system. Some recent discoveries have been included, and its implications in the context of quantization of celestial system are discussed, in particular from the viewpoint of superfluid dynamics. In effect, it seems that there are reasons to argue in favor of gravitation-related phenomena from boson condensation.

Web link: *www.IntellectualArchive.com/getfile.php?file=wnZfM6JRwd5&orig_file=V_Christianto__recent _discovery.pdf*

ID #: 709 **Natural Sciences / Physics / Mathematical Physics**

Submitted on: Aug 31, 2012

Author: **Florentin Smarandache, Victor Christianto, Fu Yuhua, Radi I. Khrapko, J. Hutchison**

Title: **Unfolding the Labyrinth: Open Problems in Physics, Mathematics, Astrophysics, and Other Areas of Science**

Abstract: The reader will find herein a collection of unsolved problems in mathematics and the physical sciences. Theoretical and experimental domains have each been given consideration. The authors have taken a liberal approach in their selection of problems and questions, and have not shied away from what might otherwise be called speculative, in order to enhance the opportunities for scientific discovery. Progress and development in our knowledge of the structure, form and function of the Universe, in the true sense of the word, its beauty and power, and its timeless presence and mystery, before which even the greatest intellect is awed and humbled, can spring forth only from an unshackled mind combined with a willingness to imagine beyond the boundaries imposed by that ossified authority by which science inevitably becomes, as history teaches us, barren and decrepit.

Web link: *www.IntellectualArchive.com/getfile.php?file=P9XPq2JLgZ3&orig_file=V_Christianto__unfoldi ng_labyrinth.pdf*

ID #: 710   **Natural Sciences** / **Physics** / **Mathematical Physics**

Submitted on: Aug 31, 2012

Author: **Leonid I. Manevich, Valeri V. Smirnov**

Title: **Resonant energy exchange in nonlinear oscillatory chains and Limiting Phase Trajectories: from small to large systems**

Abstract: We present an adequate analytical approach to the description of nonlinear vibration with strong energy exchange between weakly coupled oscillators and oscillatory chains. The fundamental notion of the limiting phase trajectory (LPT) corresponding to complete energy exchange is introduced. At first we propose a simple analytical description of vibrations of nonlinear oscillators. We show that two dynamical transitions occur in the system. First of them corresponds to the bifurcation of anti-phase vibrations of oscillators. And the second one is caused by coincidence of LPT with separatrix dividing two stable stationary states and leads to qualitative change in both phase and temporal behavior of the LPT. Next problem under consideration relates to intensive intermodal exchange in the periodic nonlinear systems with finite (n>2) number of degrees of freedom. We consider two limiting cases. If the number of particles is not large enough, the energy exchange between nonlinear normal modes in two-dimensional integral manifolds is considered.

Web link: *www.IntellectualArchive.com/getfile.php?file=W4mgMK9KbfN&orig_file=Leonid_Manevich__Resonant_energy_exchange.pdf*

ID #: 711   **Natural Sciences** / **Physics** / **Geophysics**

Submitted on: Aug 31, 2012

Author: **K. Eftaxias, G. Minadakis, L. Athanasopoulou, M. Kalimeri, S. M. Potirakis, G. Balasis**

Title: **Are Epileptic Seizures Quakes of the Brain? An Approach by Means of Nonextensive Tsallis Statistics**

Abstract: The field of study of complex systems holds that the dynamics of complex systems are founded on universal principles that may used to describe a great variety of scientific and technological approaches of different types of natural, artificial, and social systems. Authors have suggested that earthquake dynamics and neurodynamics can be analyzed within similar mathematical frameworks, a claim further supported by recent evidence. The purpose of this paper is to suggest a shift in emphasis from the large to the small in the search for a dynamical analogy between seizure and earthquake. Our analyses focus on a single epileptic seizure generation and the activation of a single fault (earthquake) and not on the statistics of sequences of different seizures and earthquakes. A central property of the epileptic seizure / earthquake generation is the occurrence of coherent large-scale collective behaviour with very rich structure, resulting from repeated nonlinear interactions among the constituents of the system, respectively firing neurons and opening cracks.

Web link: *www.IntellectualArchive.com/getfile.php?file=bhBCkMMt87h&orig_file=G_Balasis__Are_Epileptic_Seizures.pdf*

ID #: 712   **Natural Sciences** / **Mathematics** / **Calculus** / **Analysis**

Submitted on: Aug 31, 2012

Author: **Dmitry Tyshkevich, Irina Karpenko**

Title: **On the model of a skew-selfadjoint operator with a simple spectrum on a Hilbert quaternion module**

Abstract: In this work we construct the model of a skew-selfadjoint operator with a simple spectrum acting on a Hilbert quaternion bimodule. This result is based on the Spectral Theorem for a skew-selfadjoint operator.

Web link: *www.IntellectualArchive.com/getfile.php?file=NSJfIqiD0SX&orig_file=Dmitry_Tyshkevich__On_the_model.pdf*

ID #: 713   **Natural Sciences** / **Physics** / **Condensed Matter Physics**

Submitted on: Aug 31, 2012

Author: **H. Z. Arham, C. R. Hunt, W. K. Park, J. Gillett, S. D. Das, S. E. Sebastian, Z. J. Xu, J. S. Wen, Z. W. Lin, Q. Li, G. Gu, A. Thaler, S. L. Budko, P. C. Canfield, L. H. Greene**

Title: **Gap-like feature in the normal state of X(Fe1-xCox)2As2, X = Ba; Sr and Fe1+yTe revealed by Point Contact Spectroscopy**

Abstract: Point contact spectroscopy reveals a gap-like feature above the magnetic and structural transition temperatures for underdoped $Ba(Fe_{1-x}Co_x)_2As_2$, $SrFe_2As_2$ and $Fe_{1+y}Te$. The

conductance spectrum starts showing an enhancement at temperatures as high as 177 K for $BaFe_2As_2$ (T_N $\sim$ 132 K) and 250 K for $SrFe_2As_2$ (T_N $\sim$ 192 K). Possible origins for this enhancement are discussed in light of recent experimental claims of nematicity in these materials. We construct a modified phase diagram for Co-doped Ba122 showing a gap-like feature existing above T_N and T_S for the underdoped regime.

Web link: *www.IntellectualArchive.com/getfile.php?file=c4dBDQBx6TM&orig_file=H_Z_Arham__Gap-like_feature.pdf*

ID #: 714   **Natural Sciences / Physics / Condensed Matter Physics**

Submitted on: Aug 31, 2012

Author: **H. Z. Arham, C. R. Hunt, W. K. Park, J. Gillett, S. D. Das, S. E. Sebastian, Z. J. Xu, J. S. Wen, Z. W. Lin, Q. Li, G. Gu, A. Thaler, S. Ran, S. L. Bud`ko, P. C. Canfield, D. Y. Chung, M. G. Kanatzidis, L. H. Greene**

Title: **Detection of Orbital Fluctuations Above the Structural Transition Temperature in the Iron-Pnictides and Chalcogenides**

Abstract: We use point contact spectroscopy to probe $\rm{AEFe_2As_2}$ ($\rm{AE=Ca, Sr, Ba}$) and $\rm{Fe_{1+y}Te}$. For $\rm{AE=Sr, Ba}$ we detect orbital fluctuations above T_S while for AE=Ca these fluctuations start below T_S. Co doping preserves the orbital fluctuations while K doping suppresses it. The fluctuations are only seen at those dopings and temperatures where an in-plane resistive anisotropy is known to exist. We predict an in-plane resistive anisotropy of $\rm{Fe_{1+y}Te}$ above T_S. Our data are examined in light of the recent work by W.-C. Lee and P. Phillips. We also study how joule heating in the PCS junctions impacts the spectra. Spectroscopic information is only obtained from those PCS junctions that are free of heating eff?ects while those PCS junctions that are in the thermal regime display bulk resistivity phenomenon.

Web link: *www.IntellectualArchive.com/getfile.php?file=15eFZNmn4QS&orig_file=H_Z_Arham__Detection_of_Orbital_Fluctuations.pdf*

ID #: 715   **Natural Sciences / Physics / Particle physics**

Submitted on: Aug 31, 2012

Author: **Hisao Nakkagawa, Hiroshi Yokota, Koji Yoshida**

Title: **Vanishing Thermal Mass in the Strongly Coupled QCD/QED medium**

Abstract: In this paper we perform a nonperturbative analysis of a thermal quasifermion in thermal QCD/QED by studying its self-energy function through the Dyson-Schwinger equation with the hard-thermal-loop resummed improved ladder kernel. Our analysis reveals several interesting results, some of which may force us to change the image of the thermal quasifermion: (1) The thermal mass of a quasifermion begins to decrease as the coupling gets stronger and finally disappears in the strong coupling region,(2) the imaginary part of the chiral invariant mass function (i.e., the decay width of the quasifermion) persists to have $O(g^2 T \log (1/g))$ behavior. Present results suggest that in the recently produced strongly coupled quark-gluon-plasma, the thermal mass of a quasifermion should vanish. We also briefly comment on evidence of the existence of a massless, or an ultrasoft mode.

Web link: *www.IntellectualArchive.com/getfile.php?file=NbWMENL5j0c&orig_file=Hiroshi_Yokota__Vanishing_Thermal_Mass.pdf*

End of August 2012 bulletin