Posters

B1.00001: Multimedia Modern Physics for High School Teachers

Kelly Cramer

Many of the research programs at the frontiers of physics are undergirded by basic ideas that are familiar from classical physics: forces, conservation of mass and energy, etc. Using these ideas as a springboard and developing the ideas of modern physics such as quantum mechanics, general relativity, and nuclear interactions, Physics for the 21st Century will take learners to the next level. The course opens the doors to an exciting world of ideas, to help bridge the gap between what is being taught in high school and college and what drives physics researchers and theoreticians. The course is designed by Harvard Professor of Astronomy and Physics, Christopher Stubbs, with units developed by a distinguished group of physicists from Harvard and other top universities and research centers. The course is divided into 11 units, grouped into three broad areas: the universe at its smallest (sub-atomic particle physics), the universe at an everyday scale (atomic and molecular physics), and the universe at its grandest (cosmology). [Preview Abstract]

B1.00002: Novel Liquid Crystal Nanocomposities with High Optical Birefringence

Robert Walton , Ethan Palazzo , Karen Vardanyan

Holographically formed Polymer Dispersed Liquid Crystals (H-PDLC) have broad applications in video displays, switchable focus lenses, electro-optic filters, etc. The proper electro-optical performance of these devices requires Liquid Crystal materials with high diffraction efficiency; i.e. with high optical/dielectric anisotropy, low threshold voltage, and fast switching. One can achieve increase of dielectric anisotropy by using chemical synthesis or mixing LC materials. However, in the most cases, this causes increase in the threshold voltage and switching times. Therefore obtaining materials with high dielectric anisotropy and keeping threshold voltage and switching times low is a challenging task. We achieved promising results by making binary mixtures of certain type polar nematic LC with gold nanoparticles. We could increase the dielectric anisotropy, i.e. birefringence, of the materials by almost 100{\%}, while keeping the threshold voltage and switching times low. We propose that this is the result of cluster formation in the mixtures where presence of nanoparticles disrupts anti-parallel packaging of polar LC molecules in dimmers leaving more parallel LC molecules. This increases the order parameter of LC accordingly increasing dielectric anisotropy. Note that SEM images and microphotographs of the samples confirm our proposition. [Preview Abstract]

B1.00003: The photoacoustic effect and sonoluminescence generated by laser initiated exothermic chemical reactions in carbon suspensions

Han Jung Park , Gerald J. Diebold

We report generation of the photoacoustic effect through chemical reaction of particulate carbon in chemically reactive solutions. Experiments are carried out using the 10ns output of a Q-switched Nd:YAG laser to heat carbon nanoparticles, initiating chemical reaction which results in sound production. The amplitude of the photoacoustic signal from a carbon suspension in H$_{2}$O$_{2}$- H$_{2}$O mixtures is shown to increase dramatically as the percentage of H$_{2}$O$_{2}$ in solution increases. We report the power dependence of the amplitude of the photoacoustic effect, the production of continuum visible radiation, and the products of the reactions. We also report on laser induced chemical generation of sonoluminescence in aqueous carbon suspensions. Following irradiation and chemical reaction, highly compressed gas bubbles are formed. The expansion of the gas bubble past its equilibrium diameter results in oscillation of the bubble diameter. Tens of \textit{$\mu $}s after the initial formation of the bubble, sonoluminescence is found to take place on collapse of the bubble. we show that laser initiated exothermic chemical reactions of particulate carbon in oxidizing solutions results in the production of an enhanced sonoluminescence relative to that found for the endothermic reactions of particulate carbon suspended in water. [Preview Abstract]

B1.00004: Photoacoustic effect in a periodically modulated structure

Binbin Wu , Gerald Diebold

We discuss the photoacoustic effect in one-dimensional phononic structures with sinusoidal modulation of its acoustic properties. The periodic structure is considered to have a modulation in its density or compressibility of the form $1-2\gamma \cos (\frac{2\pi x}{a})$, where γ is the modulation factor and a is the periodic length of the phononic structures. The properties of the photoacoustic waves are determined by an inhomogeneous Mathieu equation. We give several different methods including Green's function solutions, series expansions, and variation of

parameters solutions for determining closed from solutions to the inhomogeneous Mathieu equation to obtain the properties of the photoacoustic effect. [Preview Abstract]

B1.00005: Replica exchange Monte Carlo simulations of derivatized fullerenes on Au(111)

Howard Mayne , Greg Bubnis

Self-assembling surface architectures incorporating derivatized C60 fullerenes have been studied extensively. However, predicting and designing molecular scale patterns remains challenging. By using hydrogen bonding forces as the dominant intermolecular interaction, many small organic molecules can self-assemble into predictable, robust structures. With this in mind, we study pattern formation of a family of C60 fullerenes with carboxylic acid-bearing substituents on the Au(111) surface. Molecules containing two and three fullerene moieties are also considered. Our ``coarse-grained'' modeling approach preserves the dominant physical interactions between molecules and uses rigid constraints to reduce computational expense. With this, we carry out temperature replica exchange Metropolis Monte Carlo simulations of 25 to 50 molecules and obtain a thorough sampling of the configuration space. Averages of the energy and structural order parameters are used to measure patterning and phase changes over a range of temperatures. We also explore how patterning is influenced by varying parameters such as surface corrugation and both intermolecular and molecule-surface interaction energies. [Preview Abstract]

B1.00006: A Model Study of Adlayer Pattern Formation on Square and Hexagonal Substrates

Howard Mayne , Gennadiy Berezutskiy , Greg Bubnis , Lucas Lawrence-Hurt

In recent years there has been considerable interest in the ``bottom-up'' approach to nanotechnology. In particular, the self assembly of patterned templates on solid surfaces from solution or gas phase has been vigorously explored. We present here a model study to investigate pattern formation of a monolayer of linear molecules whose centers are fixed on a square (100) and hexagonal (111) substrates. The molecules interact through a realistic tip-to-tip interatomic potential energy function, whose parameters can be systematically varied. Simulations were carried out to identify the thermodynamically most stable adlayer geometry, as well as the kinetically-controlled geometry obtained via annealing. In general, we found that short-range attraction favors interactions between nearest-neighbor tips, resulting in ``short stripes''. Long-range attraction leads to ``long stripe'' geometries, where each tip interacts equally with two nearest neighbors. Intermediate-range attraction leads to a variety of structures, including several ``herringbone'' patterns, which depend sensitively on the interplay of attractive and repulsive forces. More detailed results will be presented, together with a discussion of candidate systems for further study. [Preview Abstract]

B1.00007: Studies of Insulating Superconductors

S.M. Hollen , James Joy , Maura Lynch , H.Q. Nguyen , M.D. Stewart, Jr. , J. Shainline , Aijun Yin , J.M. Xu , J.M. Valles, Jr.

We present data that shows evidence of superconductivity in a peculiar place: an electrical insulator. By evaporating Sb and then Bi onto a patterned substrate at 8K, we create amorphous 2D films with regular, nanometer-sized holes. A phase transition occurs with added Bi: the thinnest films insulate and the thickest superconduct. Surprisingly, the insulating films appear to contain the fundamental constituents of a superconductor: Cooper pairs of electrons. Their very high resistance oscillates in magnetic field with a period expected for charge 2e carriers. We present evidence that nanometer-sized undulations in film thickness localize the Cooper pairs to islands to prevent long range phase coherence from developing. In future experiments we will attempt to control the Cooper pair localization using tailored film thickness variations on rippled substrates and by using novel nanopatterning techniques on our existing holey substrates. [Preview Abstract]

B1.00008: Studying of the neutron scattering on solitons in low dimensional systems

Irina Bariakhtar , Victor Bariakhtar

The cross section of the scattering of polarized neutrons by solitons in low dimensional systems is calculated. The authors consider solitons corresponding to the formation of a kink in a system of adatoms on the surface of a substrate, or a crowdion in a chain of atoms in crystals described by the sine-Gordon equation, and also solitons in a bound electron-phonon quasi-one-dimensional molecular chain. It is shown that study of the~polarized neutrons~provides for the possibility to gather information on the static and dynamic properties of the solitons. Studying of the neutron scattering allows for experimental reconstruction of the magnetic momentum distribution in solitons. [Preview Abstract]

B1.00009: Energy of membrane-associated folding of pHLIP peptide could be used for selective delivery of molecules across membrane of cancer cells and targeting tumors in vivo

Alexander Karabadzhak , Dhammika Weerakkody , Mak Thakur , Michael Anderson , Dayanjali Wijesinghe , Lan Yao , Jennifer Daniels , Sida Zheng , Oleg Andreev , Yana Reshetnyak

We study spontaneous insertion and folding across a lipid bilayer of moderately polar membrane

peptide pHLIP - pH Low Insertion Peptide. pHLIP has three major states: soluble in water, bound to the surface and inserted across the bilayer as an alpha-helix. We employ variety of biophysical techniques to reveal steady-state and kinetics thermodynamic parameters for transitions between states. Membrane-associate folding is accompanied with the release of energy, which could be used to translocate cell-impermeable cargo molecules across membrane only at slightly acidic environment, which is a characteristic for various pathological states. We show that pHLIP peptide can translocate cell-impermeable cargo molecules through the membrane in cytoplasm in a pH-dependent manner. Among translocated molecules are fluorescent dyes, toxins and gene regulation agents. In vivo fluorescence imaging was used to demonstrate ability of pHLIP to target acidic tumors with high accuracy. [Preview Abstract]

B1.00010: Fluorescence anisotropy imaging of quantum dots and biological molecules

Anthony Bucci , Yao Lan , Yana Reshetnyak , Oleg Andreev

We constructed an optical system and developed the software to create and analyze the fluorescence anisotropy images of a variety of objects including single molecules, quantum dots, proteins, nucleic acids and cells. The system includes an inverted microscope, three calcite prisms (CPs) inserted in the excitation and emission optical paths, and CCD camera. The system allows to record dynamic changes in fluorescence anisotropy images with a millisecond resolution. The interactive program in MatLab has been developed to construct and analyze the fluorescence anisotropy images. Using this technique we analyzed fluorescent properties of thousands of single QDs attached to a glass surface or to actin filaments (QD-nanowires). Despite the ``blinking effect'' the anisotropy of fluorescence of single QD remains stable and depends mostly on the 3-dimensional orientation of the QD. The fluorescence anisotropy images of QD-actin nanowires demonstrate the variation of anisotropy along and across filaments. The same system was used to study actin filament dynamics in live cells expressing actin fused with green fluorescence protein (GFP). [Preview Abstract]

B1.00011: The Nanofluidic Field-Effect in Electrically Actuated Nanopores

Zhijun Jiang , Derek Stein

There exists a fluidic version of the electrostatic field-effect, by which the transport of ions, fluids, and charged objects in solution can be controlled in nanoscale channels. Here we present a theory of such ``electrofluidic'' gating, the fabrication of electrically articulated nanopore devices that can exploit it, and experiments that illustrate its potential. Our model accounts for surface chemistry, which plays a central role in real devices. Our fabrication methods, which are based on high-resolution milling techniques, can articulate nanopores with either a single annular gate electrode or two transverse CNT nanoelectrodes. Conductance gating experiments show a strong dependence on pH and ionic strength that is well described by our electrofluidic gating model. We seek to apply electrostatic control over the translocation of DNA through a gated nanopore, and thereby mimic the single-molecule regulatory capabilities of biological nanopores. [Preview Abstract]

B1.00012: The Statistics of DNA Capture by Solid-State Nanopore

Mirna Mihovilovic , Nick Hagerty , Derek Stein

We have investigated the statistics of DNA threading through solid-state nanopores that are approximately 10 nm in diameter. Intense electric fields are generated in the vicinity of the pore when a voltage is applied across it in ionic solution. The electric forces experienced by a negatively charged DNA molecule are sufficient to pull it through in a folded, ``hairpin'' configuration. The ionic current blockade signal that results offers information about where along the 16.5 micrometer-long DNA molecule the fold was induced. We have analyzed the results of translocation experiments to build a probability distribution for the DNA capture location. We propose a simple polymer scaling theory to explain the results. Our model is based on the equilibrium distribution of polymer conformations in solution, and it predicts the observed bias for capturing molecules near the ends. [Preview Abstract]

B1.00013: Kramers' Problem: Investigating Reaction Rate Theory Using DNA in Nanofluidic Devices

Elijah Shelton , Jackson Del-Bonis O'Donnell , Derek Stein

Kramers' kinetics is the standard theoretical framework for understanding the rates of thermally activated processes. Despite its long history and established place in fields such as chemistry, the theory's prediction of viscosity-dependent rates has been left largely unexplored. We have studied the transport of a biological polymer (Lambda DNA) across a nanofluidic device with a linear array of nanopits, which present a series of free-energy barriers analogous to those that govern chemical reaction rates. By demonstrating the important role of viscosity in this model system, we call attention to viscosity's role in other thermally activated processes. [Preview Abstract]

B1.00014: Slip-Enhanced Electrokinetic Energy Harvesting

Shu Wang , Stephen Albright , Jonathan Beller , Yongqiang Ren , Derek Stein

We experimentally investigate how hydrodynamic slip, the movement of fluid along a solid surface,

affects the efficiency of a proposed electrokinetic energy conversion strategy. Mechanical work is transformed into electrical energy when a pressure-driven fluid flow drives an electrical streaming current, whose origin is the transport of counterions near the charged walls of a channel. We are studying streaming currents for different salt concentrations and surface treatments. To promote slip, the silica nanochannel surface is coated with a self-assembled monolayer of the hydrophobic molecule OTS. We wish to test the theoretical prediction that hydrodynamic slip should dramatically increase streaming currents, and thereby enhance the efficiency of electrokinetic energy conversion. In the future, bundled slip-enhanced nanochannels could be used to harvest power from situations where mechanical work is currently dissipated as heat, such as in the shocks of cars. [Preview Abstract]

B1.00015: The Statistics of DNA Confined in a Charged Fluidic Nanoslit

Yongqiang Ren , Derek Stein

Advances in nanofabrication and single-molecule fluorescence microscopy have enabled detailed studies of the configuration ``states'' of highly confined DNA polymers. In nanoslits of decreasing height, h, we observed an abrupt transition in the behavior of the coil size from an h-dependent, ``de Gennes'' regime, to an h-independent, ``Odijk'' regime. The cross-over occurred at increasing h with decreasing ionic strength. In the Odijk regime, DNA conformations are well described by a 2-D self-avoiding walk model, and correlations in the excluded volume interactions between the segments play an important role. In the de Gennes regime, we probed the electrostatic interactions between the negatively charged DNA molecules and the negatively charged nanoslit walls. From the scaling of the coil size with h, we inferred electrostatic depletion regions that reduced the effective h. The depletion regions significantly exceeded the Debye length, on which a non-trivial dependence was observed. Our investigations reveal a rich state diagram for nanoconfined DNA, and suggest the possibility of controlling single DNA molecules using purely electrostatic forces. [Preview Abstract]

B1.00016: Role of Point-defects in Indium Oxide

Kalum Palandage , Gayanath Fernando

We assessed the effects of point defects including transition metal doping in indium oxide using Density Functional Theory based methods. Interstitial positions, oxygen vacancies and transition metal doping were central to the study. Our interest was to investigate the changes in conductivity, transparency and magnetism with the introduction of these point defects. The self-consistent band structure of the transparent oxide In$_{2}$O$_{3}$ (in the Ia3 structure) has been calculated with oxygen vacancies, oxygen and indium interstitial atoms and several transition metal dopants. We found that an oxygen vacancy alone does not act as a strong native donor but when combined with interstitial indium and (substitutional) transition metal doping, to form shallow donor levels close to the conduction band. Spin polarized calculations show measurable magnetism in some of the transition metal doped systems while the dielectric function calculations indicated whether such systems remain transparent. [Preview Abstract]

B1.00017: Comparison of high resolution density and optical records for the WAIS Divide ice core

Daniel Breton , Gordon Hamilton , Karl Kreutz

Visual inspection and density profiling of firn (multi-year snow) and ice cores is a standard method of understanding and objectively characterizing polar glacier structure. Recent technological developments have transformed these measurements from low-resolution manual measurements to high-resolution automated scans of ice core sections. Here we compare data from two such systems: the Maine Automated Density Gauge Experiment (MADGE), an automated gamma-ray density gauge for firn and ice cores, and the National Ice Core Laboratory Optical Imaging System (NOIS), an automated high resolution line scan camera. Comparison between the MADGE and NOIS data on the West Antarctic Ice Sheet (WAIS) Divide deep core reveals a transition in firn structure with depth: anti-correlation between firn density and image brightness in shallow ($<$ 20m) sections and strong correlation deeper ($>$ 50m) in the core. We use Monte Carlo modeling of photon scattering and absorption in firn and ice of various bulk densities in an attempt to understand this transition and its impact on the paleoclimate record captured within the ice core. [Preview Abstract]

B1.00018: E= (f.d) + G

Peter Schick

Gravity holds, or attracts, things down. When one works with gravity, work and gravity create energy. [Preview Abstract]

B1.00019: Single Molecule Travel in a Nanotube

Richard Kriske

When single molecules, atoms or elementary particles such as electrons travel through a nanotube they should travel in the center of the tube, unless there is an obstruction. The symmetry of the tube seems to indicate that the path of least resistance is in the center of the tube. The size of the tube needs to be considered for each type of molecule or particle. What are the general characteristics of this travel and can there be a general mathematical model for different types of tubes? [Preview Abstract]

B1.00020: Generation of directed neutrino beams through electron capture β-decay and recoil force measurement using atomic force microscopy

Christina DeAngelis , Lorcan M. Folan , Vladimir I. Tsifrinovich

Neutrino beam generation and detection methods are important for the understanding of weak interactions and possible future applications in communication systems. In this work we suggest a beam generation method which exploits Gamow Teller transitions in electron capture β-decay with a decrease of the nuclear spin by one unit. In the simplest case, nuclei are assumed to be totally spin polarized by a magnetic field along the z-axis. To conserve the z-component of angular momentum, the spins of the remaining electron shell and neutrino must compensate for the decrease of the nuclear spin, and because of the negative helicity, all neutrinos must be emitted in the same direction along the z axis. In the general case of partial polarization, the occupation probabilities for each value of the z-component of the nuclear spin are calculated and the branching fractions for each value are determined. The neutrino excess in one direction is computed. Calculations are done for samples of ^{57}Co and ^{119}Sb. We show that atomic force microscopy is a possible method for measuring the recoil force on the sample. The AFM cantilever tip can be replaced with a radioactive sample, and acceptable sample masses are shown to be comparable with typical tip masses. [Preview Abstract]

B1.00021: Must rely on the transfer of energy carriers

Han Yongquan

Must rely on the transfer of energy carriers that can transfer to a medium or carrier, must be one. Electromagnetic wave propagation is dependent on the carrier (due to the density law of gravity as I discovered, is to attract two electrons), the carrier is a high-speed movement and mutual Raozhuan e-pair is the carrier of electromagnetic waves, electromagnetic waves are the underlying causes of wave-particle duality between the two electronic speed Raozhuan elastic ``energy ring,'' ``energy ring'' also for the overall results of the campaign. May be inferred that the entire universe, not be able to share through e-space than the smaller of the electromagnetic wave, electromagnetic particle as a flexible ring, both through the holes, but also to cross the barrier, and does not change itself. Light, the universe may not be the fastest messengers, will not produce the magnetic field around the cathode-ray, magnetic monopole would not be found. Only two basic nature of gravity unit that is positive, negative electron. I am a teacher working in Chawu Railway Middle School, Huairou District, Beijing, China (Postcode: 101402). [Preview Abstract]

B1.00022: Education at Brown U. {\&} the Theory of Elementary Waves (TEW)

Jeffrey Boyd

Two alumni of Brown's Applied Math Dept propose a new idea that is at odds with Wave Particle Duality (WPD). The Theory of Element Waves (TEW) pictures particles and waves traveling in the opposite directions. What is the evidence? How did education at Brown five decades ago prepare them to formulate new ideas? There are 5 experiments in which TEW and WPD predict different outcomes. Two of these have been conducted and favor TEW over WPD. The other 3 are proposed. The first experiment involves a neutron interferometer.(1) When bismuth is added inside the NI to slow down one of two waves, abolishing all interference inside the NI, that interference can be restored by inserting an analyzer crystal downstream from the NI. According to WPD, neutrons {\&} waves go from the reactor to the detectors; so it makes no sense that a crystal inserted downstream could restore interference upstream. TEW says the waves go in the opposite direction: so the results make sense. We also propose a double slit experiment, in which TEW and QM predict different outcomes. Our education prepared us for a lifetime of learning. 1. Kaiser, H., R. Clothier, S. A. Werner, et.al, ``Coherence and spectral filtering in neutron interferometry,'' \textit{Physical Review A}, 45, {\#}1 (Jan 1, 1992): 31-42. [Preview Abstract]

B1.00023: Does the Innsbruck experiment prove nonlocality?

Lewis Little

It is demonstrated that the proposed Theory of Elementary Waves\footnote{Lewis E. Little, \textit{The Theory of Elementary Waves}, New Classics Library, Gainesville, GA, 2009.} offers an explanation of the\ famous ``Innsbruck Experiment''\footnote{Gregor Weihs, Thomas Jennewein, et. al., ``Violation of Bell's Inequality under Strict Einstein Locality Conditions,'' Phys. Rev. Lett. \textbf{81}, 5039 (1998).} that is strictly local, thus providing an exception to the frequently drawn conclusion that the experiment definitively proves the existence of nonlocality/entanglement. Arriving at a definite conclusion will require further experimentation. [Preview Abstract]

B1.00024: Quaternion Quantum Mechanics Demystified

Douglas Sweetser

Quaternion quantum field theory is introduced. The goal is for every equation that plays a role in quantum field theory gets rewritten using real-valued quaternions. Like the correspondence principle before it, the method is simple and systematic: keep 4-vectors together, drop factors of i, keep the constants, but make the expression dimensionless if possible. The differences between

classical, relativistic and quantum mechanics equations are based on their constants and form. There should be enough time to derive the Schrodinger and Klein-Gordon equations. More current information is available at http://visualphysics.org/preprints. [Preview Abstract]

B1.00025: Is Every State an Eigenstate?

Martin Wilner

For any given superposition of eigenstates of an observable A, is there always an observable B of which the given superposition is an eigenstate? For the two-state and three-state systems the answer is yes. We develop two methods for constructing the matrix representation of B. One works directly from the eigenvalue condition, but solves first for the matrix and then for its eigenvalues. The other uses on the diagonal matrix representing A the inverse of the unitary transformation which diagonalizes a matrix. For the two-level system we obtain two commuting matrices with different eigenvalue spectra. For the three-level system the inverse unitary transform yields a continuous infinity of non-commuting matrices, all with the same eigenvalue spectrum, whereas the other method yields a matrix which is none of these: it does not commute with any of them, and its eigenvalue spectrum is different from theirs. [Preview Abstract]

B1.00026: Plasma redshift shows that there is no anomalous acceleration of Pioneer 10 and 11

Ari Brynjolfsson

In the evaluation of the Pioneer experiments, it has been incorrectly surmised that photon frequency is constant as the photons move from the Earth to the Pioneers 10 and 11. Plasma redshift cosmology shows, however, that photons change their frequency as they penetrate hot coronal, interplanetary plasma. Usually, this hot sparse plasma causes plasma redshift of optical photons. However, when the plasma is relatively cold and the wavelength long (such as in the case of the 13 cm wavelength of the signal photons to the Pioneers) the photons will show a small blue shift; confer the last column in Table 1 in reference: arxiv:astro-ph/0401420, which for $a > 3.633$ shows negative redshifts; that is, blue shifts. These plasma blue shifts of the signal photons during their travel from the Earth towards and away from the Pioneers have been misinterpreted as being caused by the Doppler shifts interaction of the photons with the Pioneers. These false Doppler blue shifts have then been interpreted as an additional movement in the Pioneers 10 and 11 towards the Sun. Elimination of these false Doppler shifts eliminates the false anomalous accelerations. [Preview Abstract]

B1.00027: Discovery of the Grand Unified Theory

Radkakrishnan Nair

I have discovered the grand Unified Theory based on 5 concepts: (1) geocentric universe, (2) four states of matter in three dimentional space, (3) space-time exponentiation, (4) the Big Bang Theory in a new perspective and (5) non-duality of matter and energy. [Preview Abstract]

B1.00028: Are QM's ``Beliefs" Improperly Formulated? Hermann Grid's Dark Diagonals Say Where!

Roger David McLeod , David Matthew McLeod

Vision detects electric field amplitude information as spatial Fourier transforms, SFTs, of object space. Optics states: at focal, not image, surfaces, for Hermann, and pincushion, grids. Von B\'{e}k\'{e}sy's skin pressure experiments prove brain circuitry interprets focal diffraction patterns as inverse SFTs. This, enhanced by Schr\"{o}dinger's electron assertions, knocks out QM's ``beliefs". Our electron's string model, based on a neutrino in chiral embrace with a parallel, magnetically repellant, antineutrino, transversely aligned in continuous pairings along each wave-string's closure. This generalized, in Recife, to the three-ring, up quark, down quark, up quark of our Dumbo Proton, underpass-overpass string. Cut by an antineutrino scissor, and merged with our compressed, neutrino-cut electron, a Mickey Neutron with over- or underpass pairs only, is unstable and of 4/3 \textbf{e} string units length. Dumbo Proton is 5/3 \textbf{e} units; this modeling has a Trinitarian electron, charge -1/3 \textbf{e}, during each phase, standing wave up, SWU, traveling wave, TW, and SWD. Camcorders capture this electron at gigapower \textbf{n} values. [Preview Abstract]

B1.00029: Camcorders Detect Energetic Nuclei, Mistaken as UFOs; they Are McLeods' Hyper-energetic ``Strings"

Roger David McLeod , Christopher J. DeCola

McLeods' stringy, Trinitarian Dumbo Proton and Mickey Neutron ear-notch assemble as nuclei for deuterium, tritium, helium three to eight, lithium, and higher, with surprising details evident from traditional cultures' ancient, pictographic records. Alphas particularly are recorded, according to Indians' ideograms. Pictographic data matches our ladder-like early models for certain nuclei, and our procedures show how these become bent and more compact. French-Russian-Japanese experimental collisions of ``our" He eight against Dumbo Proton show just how that Dumbo Proton captures neutrons, becoming H seven. Peruvian Nazcans, like Mayans or ancient Egyptians, record ``stick-figure equivalents" of Orion, also described by psychiatrist Arthur Guirdham, RDM, DMM, Kokopelli, or Pele, out of direct visual experience. Optics gives clues about realities beyond

interpreted belief systems. Maine's Matagamon, California's Mantega, Guatemala's Motagua, Chile's Atacama, Peru's Mollendo, Alaska's Chuginadak {\&} Attu, and Brazil's Tocantins identify well-traveled ``applied physicist-medicine men'' or priests. [Preview Abstract]

B1.00030: Traditionalists ``Optically Won'' Environmental Information Is at Lima, Cusco, and Nazca, Peru; and Miami FL

Silvia Flavia Ribeiro , Roger David McLeod

Camcorders directly catch visual, environmental phenomena from subtle electromagnetic signals that extend across the Americas. Electromagnetic and string-like models of nuclei, particularly alpha particles, lithium, and others, are visually detectable optical phenomena that are and were observed in the Americas and India. RDM at Maine's Mt. Pamola detects details implied when elderly women sweep narrow, ray-like traces leading toward, or away from, the cathedral-capped former Inca `palace' at Cusco, Peru. All similar lines at Nazca, as in the USA, are most clearly detected during nighttime, dusk, or overcast conditions. Direct observation indicates purposeful design that subsequent settlers recycle, as at Machu Picchu, Peru, Rumford, and Rangeley, Maine, and Lowell, MA. Ecclesiastical titles or place names, Mollocket or Pejepscot of ME, Machu, Tallan, Huallac, of Peru, survive and linguistically define a ``science.'' Significant survival information: hurricane or tornado trajectories, volcanic activity, earthquake prediction, are sometimes predictable in advance, as by RDM in 1998. This always is mediated by some electromagnetic interaction, often optical. [Preview Abstract]

B1.00031: On the Classical Derivation of the Numerical Values of Fundamental Quantum Constants

Ferenc Bozso

It is shown that Planck's constant may be interpreted as four-space invariant, and it is presented that causal classical derivation of Planck's radiation law is feasible and plausible. Furthermore, it is shown that the numerical value of h can be calculated from classical physical quantities, specifically, from the speed of light and the wavelength of unit-energy photon. Such interpretation of Planck's constant leads directly to classical derivation and interpretation of the quantum Hall impedance, the magnetic flux quantum, and the fine structure constant, and permits the calculations of the numerical values of these fundamental quantum constants from classical physical quantities, i.e. from the electron charge, the speed of light and the wavelength of unit-energy photon. [Preview Abstract]

B1.00032: The use of Nanotubes as reaction vessels or facilitators

Richard Kriske

There is some reason to believe, due to symmetry, that certain sizes and compositions of Nanotubes would allow the flow of particles, atoms and molecules near the centers of the tube. The flow may be controled with potentials, mass flows, or perhaps electron flows on the surface of the tubes. This could be exploited or perhaps exist naturally in Bacteria or between Cells or within Cells as reaction chambers, filters or perhaps force generating and conveying devices. The nanotubes, in the proper sizes could be seen as a simple machine for the Quantum Mechanical side of Physics in larger sizes as Classical machines and in intermediate sizes as Chemical Reaction Vessels. Controlling the flow of materials in the nanotube can be explored by varying parameters of size and materials. [Preview Abstract]

B1.00033: Is There Iso-PT Symmetric Potential in Nature?

Vic Christianto , Florentin Smarandache

In recent years there are new interests on special symmetry in physical systems, called PT-symmetry with various ramifications. Along with the isodual symmetry popularized by RM Santilli, these ideas form one of cornerstone in hadron physics. In the present article, we argue that it is plausible to generalize both ideas to become iso-PT symmetry which indicate there should be new potential obeying this symmetry. We also discuss some possible interpretation of the imaginary solution of the solution of biquaternionic KGE (BQKGE); which indicate the plausible existence of the propose iso-PT symmetry. Further observation is of course recommended in order to refute or verify this proposition. [Preview Abstract]

B1.00034: Water Based Biological and Photochemical Batteries

Jian Zhang

The designs of prototype batteries are described based on some biological Fenton reactions and the photo-excitation of singlet oxygen and ferrous complexes. The biological batteries consist of hydrogen peroxide in the cathode, and some cold medicines complexed with ferrous gluconate in the anode. Sodium chloride is used as the electrolyte and the anode material is suspended in an aqueous paste of wax, cellulose, stearate, and polyethylene glycol, etc. The batteries generate a voltage of up to 0.4 V and a current of about 0.05 mA in a thin electric wire. The photochemical batteries consist of water or aqueous paste of ferrous gluconate in the anode that is irradiated by sun light, and the cathode is submersed in un-irradiated water or solutions of the cold medicines. These batteries generate a voltage of up to 0.3 V and a current of about 0.02 mA in a thin electric wire. The voltage can be increased by connecting the batteries in sequence and the current can be increased by connecting them in parallel. The advantages of these batteries are that the building

materials are nontoxic and have ample supply in the nature. In addition, the electrolyte paste used in the batteries may be acting like a semiconductor. [Preview Abstract]

B1.00035: Excited Atom in a Light Resonant Cavit

Jeffrey Boyd

The amount of time an excited atom in a light resonant cavity takes to return to its ground state depends on the size of the cavity. If the light wave that would be emitted by the atom, fits as a standing wave in the cavity, the atom will fall back to its ground state and emit a photon hundreds of times more rapidly. If the wave is longer or shorter than the width of the cavity, the atom remains excited twenty times longer than if it were in no cavity at all. What is the relationship between 3 variables: amount of time the atom remains excited, the length of the wave, and the width of the cavity. To account for these data, the wave needs to be real and exist prior to the atom returning to a ground state and emitting a photon. The wave cannot be a wave packet that is the wave-particle equivalent of the photon, because then the atom would have no way of ``knowing'' in advance whether the cavity had a width compatible with the energy level of the photon. The evidence is that this wave is both real and pre-existing. This is consistent with the Theory of Elementary Waves (TEW) and not consistent with Quantum Mechanics (QM). [Preview Abstract]

B1.00036: Classical Derivation of Planck's Radiation Law and Planck's Constant

Ferenc Bozso

Causal classical derivation of Planck's black-body radiation law is presented. A novel physical meaning of Planck's constant as Lorentz-invariant product of the energy and space-time interval of photons is introduced. It is shown that h can be derived, and its numerical value can be calculated from classical physical quantities, furthermore that the physical meaning and the numerical value of the fundamental quantum constants; quantum Hall impedance, magnetic flux quantum, and the fine structure constant can be derived and calculated from classical physical quantities. [Preview Abstract]

B1.00037: Numerical Solution of Schrodinger Equation with PT-Symmetric Periodic Potential, and its Gamow Integral

Vic Christianto , Florentin Smarandache

In a number of preceding papers we introduced a new PT-symmetric periodic potential, derived from biquaternion radial Klein-Gordon equation. In the present paper we will review our preceding result, and continue with numerical solution of Gamow integral for that periodic potential. And then we also compare with other periodic potentials which are already known, such as Posch-Teller or Rosen-Morse potential. We also discuss a number of recent development in the context of condensed matter nuclear science, in particular those experiments which are carried out by Prof. A. Takahashi and his team from Kobe University. There is hint to describe his team's experiment as `mesofusion' (or mesoscopic fusion). We then analyze possibility to enhance the performance of Takahashi's mesofusion experiment under external pulse field. Further experiments are of course recommended in order to verify or refute the propositions outlined herein. [Preview Abstract]

B1.00038: Comments on Quantum Smarandache Paradoxes

O. Bhuiyan

This paper comments on the following five classes of quantum smarandache paradoxes: 1) Sorites Paradox: Our visible world is composed of a totality of invisible particles. 2) Uncertainty Paradox: Large matter, which is under the ``determinist principle,'' is formed by a totality of elementary particles, which are under Heisenberg's ``indeterminacy principle.'' 3) Unstable Paradox: Stable matter is formed by unstable elementary particles (elementary particles decay when free). 4) Short Time Living Paradox: Long time living matter is formed by very short time living elementary particles. [Preview Abstract]

B1.00039: The integration of optical tweezers and nanopores for DNA-protein interaction studies

Xu Liu , Derek Stein

Nanopore technology offers an electronic means of studying the structure of single linear polymers, such as DNA molecules, during their voltage-driven translocation. We seek to study the genetic information along DNA by coating molecules with sequence-sensitive protein, which should also increase conductance blockade signals at the targeted sequences. Our nanopore studies will be facilitated by optical tweezers, which can arrest individual DNA molecules tethered to a trapped bead, detect the positions of protein binding sites with nanometer precision, and measure their binding forces with piconewton sensitivity. Finally, a fluorescence microscopy imaging system will enable the simultaneous study of DNA conformations and dynamics. This poster will describe the development of the experimental apparatus. [Preview Abstract