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Press Events at the LA March APS Meeting
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AN EMBARGO EXTENDING TO THE TIME OF THE PRESS CONFERENCE APPLIES TO THE FOLLOWING INFORMATION

March 7, 2005-------The following press events will take place at the March Meeting of the American Physical Society (APS) at the Los Angeles Convention Center. The pressroom will be in room 508BC, while all press conferences, and the reception, will be held in room 508A.

Press Conference, Monday, March 21, 10 AM
NEW QUANTUM TOOLS
Michael Barnes of the University of Massachusetts-Amherst (D35.6; mdbarnes@chem.umass.edu) will describe the construction of a pair of "nantennae," small posts just 10 nanometers tall, roughly 100 million times smaller than a car antenna. The two "nantennae" interact with each other much like conventional antennae do - like a transmitter-receiver pair. In addition to providing insights into the behavior of light at small distances, the nantennae could be important for photonic-based quantum-information processing applications. Mal Teich of Boston University (D35.5; teich@bu.edu) will present a new twist in a three-dimensional diagnostic imaging technique known as optical coherence tomography (OCT), widely used in ophthalmology and in creating cross-section images of biological tissue for noninvasive optical biopsy. By replacing the broadband light source used in traditional OCT with pairs of entangled photons, the BU researchers have performed demonstrations of "quantum optical coherence tomography" (QOCT)--imaging the surfaces of fused silica windows while increasing the axial resolution of the resulting images by a factor of five. Jeff Kimble of Caltech (D35.2; hjkimble@its.caltech.edu) will present his group's latest experimental breakthroughs in cavity QED, in which a single atom is trapped in an optical resonator formed by two mirrors separated by 40 microns. Such a setup is a promising building block for quantum computation and communication, as the energy levels of the atom could constitute a useful "quantum bit" and the atom-field interaction can enable quantum logic operations between pairs of atoms or photons. Among Kimble's announcements: the demonstration of what he considers the first "quantum protocol" for cavity QED; and discovery of a "photon blockade" for light traveling through the cavity.

Wine & Cheese Reception, March 21, 5 PM
AIP SCIENCE WRITING AWARD
Each year the AIP gives four science writer awards, one to a journalist, one to a scientist, one to an author of a book for children, and one for broadcast items. This year’s

broadcast award will be presented at this reception to Bill Hammack for "Public Radio Pieces, " aired on WILL-AM Radio (Chicago, Illinois).

Press Conference, Tuesday, March 22, 9:30 AM
MOORE'S LAW FEELS THE HEAT
Has Moore's Law--the doubling of the amount of transistors on a computer chip every 18 months--run against a debilitating obstacle? Computer chips are facing a power crisis--trying to crowd more transistors into traditional chips makes them too hot to work properly. Now, research that physicists started twenty years ago is coming to the rescue. A pioneer in this research, UCLA's Ya-Hong Xie (chair of session J15, yhx@ucla.edu), will describe strained silicon---essentially a stretched-out form of silicon--as a way to make faster, low-power computer chips with conventional technology. Strained Si technology has begun appearing in the product lines of major chip manufacturers such as AMD, Intel, TI and IBM. George Celler, chief scientist at semiconductor manufacturer SOITEC (Paper J15.7, george.celler@soitec.com), will describe silicon-on-insulator (SOI) technology as another solution for making faster chips. The next generation of game machines (Playstation 3 from Sony, and Xbox Next from Microsoft) will use SOI substrates. Ralph Cavin (Paper L5.1, Ralph.Cavin@src.org), vice president of research operations for the Semiconductor Research Corporation, will provide physics-based projections of microprocessor technology as well as potential solutions. For example, he expects that the traditional CMOS (complementary metal oxide semiconductor) technology will reach the limits of physics when the dimensions of transistor gates are only 7 times smaller than they are today.

Press Conference, March 22, 11:30 AM
CIRCADIAN RHYTHMS
Earthquakes, bacteria colonies, heartbeat rhythms, and many other common phenomena share important traits. In particular, in graphs of event sizes for these various systems the curves all fall off as the inverse power of the event size. This power-law behavior is the hallmark of complexity science. Eugene Stanley (paper L6.4, hes@bu.org, 617-353-2617) has been a pioneer in drawing out the statistical significance of complex phenomena. He and two of his Boston University colleagues, Kun Hu (V22.8, khu@buphy.bu.edu) and Plamen Ivanov (M6.4, plamen@erato.bu.edu), will provide fresh results in several complexity research areas: the first evidence for circadian rhythms in a human motor activity (forearm motion); circadian rhythms and cardiac vulnerability; and comparative sleep patterns for mammals.

Press Conference, March 22, 1 PM
FLUIDS AND MICROFLUIDICS
Stephen Quake (Stanford, quake@stanford.edu, paper L37.1) will report on new methods for systematically (combinatorially) crystalizing proteins under many conditions on a microfluidic chip. Paul Kenis (University of Illinois, kenis@uiuc.edu, paper L37.2) will report on the creation of a handy fuel cell power supply that operates with no solid membrane; it uses instead two parallel liquid flows which act as fuel and oxidant. This device is alkaline-compatible making it more amenable to powering laptop computers. Todd Squires (Caltech, tsquires@acm.caltech.edu, chair of session L37) will summarize

a number of other microfluidic results at the meeting. In the realm of macroscopic fluid dynamics, Sidney Nagel (Univ Chicago, srnagel@uchicago.edu, J24.5) will report on surprising new findings about what happens when a liquid drop strikes a solid surface. Anne-Virginie Salsac (UC San Diego, paper A23.4, asalsac@mechanics.ucsd.edu) will present new physics-based insights on the development of an abdominal aortic aneurysm, a usually fatal ballooning of the abdominal portion of the aorta, the largest artery that carries blood from the heart to the rest of the body.

Press Conference, Wednesday, March 23, 9:30 AM
A SMARTER FLU VACCINE
Using sophisticated tools of statistical physics, Michael Deem of Rice University (P23.11, mwdeem@rice.edu) will present a new method of predicting the annual flu vaccine's effectiveness in preventing flu-like illness. The Rice team measures the fraction of amino acids that change in the most highly mutating antibody-triggering region of Influenza A's major protein. Deem believes that this new measure will prove useful in designing the annual flu vaccine and in interpreting vaccine efficacy studies. (Paper P23.11)

Press Conference, Wednesday, March 23, 11:30 AM
HOW TO WIN A NOBEL PRIZE
Albert Einstein's achievements and his methods have been much scrutinized in the World Year of Physics. But how do other mortals arrive at important results? Sometimes by indirection, as Douglas Osheroff (Stanford) will explain. Osheroff (osheroff@stanford.edu), delivering the Year of Physics lecture Tuesday night, won a Nobel Prize for his discovery of helium-3 superfluidity. Nancy Greenspan, author of the new (and first) biography of Max Born ("The End of the Certain World"), will discuss how Born, Niels Bohr, and others (over the objections of Einstein) arrived at the current conceptual interpretation of quantum uncertainty. Ms. Greenspan (substitute speaker on paper N7.2, jacobg@starpower.net) has come into possession of---and will show at the press conference---a home movie recorded in 1927 at the famous Solvay Conference. The short film, never before shown in public, depicts, Einstein, Madame Curie, Born, Bohr, Dirac, Pauli, and other physics luminaries.

Press Conference, Wednesday, March 23, 1 PM
ZEPTOGRAM MASS DETECTION---WEIGHING MOLECULES
Michael Roukes and his Caltech colleagues produce some of the finest nanoscopic electromechanical systems (NEMS) devices in the world. His latest achievement is performing mass measurements with zeptogram (zg) sensitivity, that is, with an uncertainty of only a few times 10^-21 grams. At this level you can start to weigh molecules one at a time. In experiments, the presence of xenon accretions of only about 30 atoms (a weight of about 4 kilodaltons, or the same as for a small protein) have been detected in real time. Minuscule masses are measured through their effect on an oscillating doubly clamped silicon carbide beam, which serves as the frequency-determining element in a tuned circuit. Roukes (roukes@caltech.edu, 626-395-2916) will be joined by his Caltech co-workers, Ya-Tang Yang (paper S44.9) and Xiaoli Feng.