Argonne NATIONAL LABORATORY

News

WED AUGUST 15 2007 VOLUME 60, NO. 16

Nano-boric acid makes motor oil more slippery

JARED SAGOFF

ONE key to saving the environment, improving our economy and reducing our dependence on foreign oil might just be sitting in your medicine cabinet.

Argonne scientists have begun to combine tiny particles of boric acid — known primarily as a mild antiseptic and eye cleanser — with traditional motor oils in order to improve their lubricity and by doing so increase energy efficiency.

Senior Scientist Ali Erdemir (ES) has spent nearly 20 years investigating the lubricating properties of boric acid. In 1991, he received an *R&D 100* award — widely considered the "Oscar of technology" — for showing that microscopic particles of boric acid could dramatically reduce friction between automobile engine parts. Metals covered with a boric acid film exhibited coefficients of friction lower than that of Teflon, making Erdemir's films the slickest solids in existence at that time.

"Ali was looking at large, micron-sized particles," said George Fenske, who works alongside Erdemir at Argonne. "He was just sprinkling boric acid onto surfaces."

But driven by a conviction that he could fashion boric acid into an even better lubricant, Erdemir continued to chase the ultimate frontier: a frictionless material. Seeing the potential of nanotechnology, Erdemir went smaller — 10 times smaller — and was astonished by the behavior of much thinner boric acid films. "If you can produce or manufacture boric acid at the nanoscale, its properties become even more fantastic," he said.

Reducing the size of the particles to as tiny as 50 nanometers in diameter — less than one-thousandth the width of a human hair — solved a number of old problems and opened up many new possibilities.

In previous tests, his team had combined the larger boric acid particles with pure poly-alpha-olefin, the principal ingredient in many synthetic motor oils. Although these larger particles dramatically improved the lubricity of the pure oil, within a few weeks gravity started to separate the mixture. By using smaller particles, Erdemir created a stable suspension of boric acid in the motor oil.

In laboratory tests, these new boric acid suspensions have reduced by as much as two-thirds the energy lost through friction as heat. The implications for fuel economy are not hard to imagine, Erdemir said. "You're easily talking about a four or five percent reduction in fuel consumption," he said. "In a given day, we consume so many millions of barrels of oil, and if you can reduce that number by even one percent, that will have a huge economic impact."

Argonne researcher Ali Erdemir performs a friction test on a metal disc coated with a solution of motor oil with nano-boric acid particles. *Photo by George Joch.*

Argonne is currently in talks with materials and lubricant manufacturers to bring boric acid technology to the market, Erdemir said. Although these new additives need to pass a battery of environmental and safety tests, they will probably be available within two years.

In his first experiments with boric acid, Erdemir demonstrated that the compound not only proved an effective lubricant but was also every industrial technologist's dream: It came from naturally abundant minerals, was cheap to manufacture and posed no health hazards or environmental threats.

Boric acid owes its friction-reducing properties to its unique natural structure. The compound consists of a stack of crystallized layers in which the atoms tightly adhere to each other. However, these layers stack themselves relatively far apart, so the intermolecular bonds — called van der Waals forces — are comparatively weak. When stressed, the compound's layers smear and slide over one another easily, like a strewn deck of playing cards. The strong bonding within each layer prevents direct contact between sliding parts, which lowers friction and minimizes wear.

Until recently, most of Erdemir's work in boric acid lubrication had been restricted to motor oils, principally because of the relative bulk of the larger particles. The move to the nanoscale, however, has opened up other possible uses of the chemical. Through a simple chemical reaction, nano-boric acid can be transformed into a liquid relative of boric acid that has shown potential to increase fuel lubricity.

(See "Acid" on page 2)

New, more powerful engines might arise from nonproliferation program

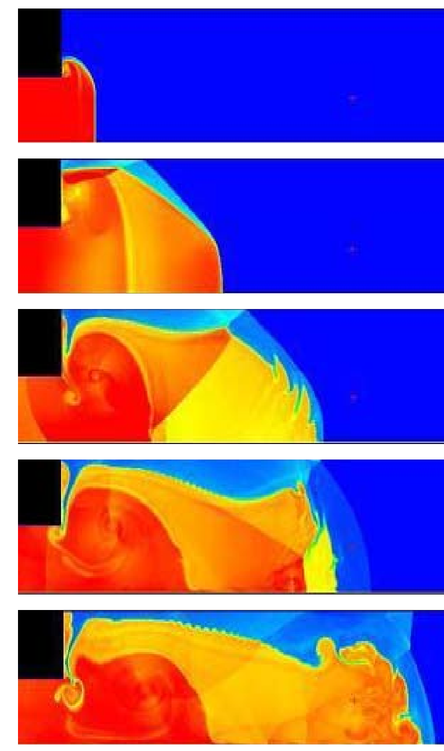
JARED SAGOFF

ARGONNE scientists have teamed up with Russian scientists and General Electric researchers to develop an effective model of pulse detonation engines as part of a program run by the U.S. Department of Energy's National Nuclear Security Administration (NNSA) that aims to prevent nuclear proliferation.

The program, called Global Initiatives for Proliferation Prevention (GIPP), partnered Argonne's Nuclear Engineering division with General Electric and Kinetic Technologies, a Russian technology firm that spun off from the Kurchatov Institute, a former Soviet weapons research laboratory, said project leader Adrian Tentner (NE).

"This multi-year research and development effort will help to develop a new generation of energy-efficient heat engines and has the added benefit of providing former Russian nuclear weapons scientists with sustainable, commercial work," said William Tobey, NNSA's top nonproliferation official.

(See "Engines" on page 2)



This image is taken from a computer visualization of a detonation wave spreading through a fuel chamber. Redder colors represent higher temperatures.

BBC VISITS ARGONNE

Mike Kaminski (CMT) demonstrates Supergel, which could be used to clean surfaces contaminated by a "dirty bomb," for a BBC film crew. BBC correspondent Frank Gardner visited Argonne to learn how to mitigate the damage of a "dirty bomb" for a news segment. A dirty bomb refers to a radiological dispersal device that combines radioactive material with conventional explosives. Argonne's "Supergel" system safely captures and disposes of radioactive elements in porous structures, such as buildings and monuments, using a spray-on, super-absorbent gel and engineered nanoparticles. *Photo by George Joch.*

Engines

(Continued from page 1)

Scientists believe that pulse detonation engines represent the next generation of aircraft engines, as they hold promise for achieving supersonic flight with greater fuel economy and lower emissions than conventional jet engines. Diesel engines might also soon incorporate pulse detonation technology, according to Tentner.

As the technical coordinator, Tentner helped to define common objectives for both GE and Kinetic. "My role was to steer the project and work with both teams to achieve the project goals," Tentner said. "I had to find out how the GE pulse detonation R&D effort can benefit from the talent and expertise of the Russian scientists, while at the same time helping the Russians develop software and expertise that will allow them to compete after the termination of the project."

Tentner, along with his colleagues at GE and Kinetic, determined three principal goals for the project. First, the researchers developed the Integrated Detonation Assessment (IDeA) software system to store physical and chemical data needed for the modeling of pulse detonation engines.

Second, because of the chemical complexity of the aviation fuel that proposed detonation engines would use, the scientists used a multi-step analysis approach to develop a set of about a dozen separate chemical reactions that, when taken together, would closely reproduce the behavior of the actual fuel. "You essentially start with thousands of reactions," Tentner said. "You cannot hope to model them in a realistic engine simulation, even on the biggest computers that are available. A reduced chemical model that still captures the behavior of the actual fuel is essential for computational fluid dynamics simulations of actual pulse detonation engines."

Lastly, after ascertaining the proper chemical mechanism, Tentner and his collaborators used the reaction data and a computational fluid dynamics model to simulate the fuel flow, ignition and detonation formation in the engine.

Detonation engines differ from conventional combustion engines — also known as deflagration engines — in the way that they propagate the ignition of fuel through the reaction chamber. In a conventional combustion engine combustion takes place at subsonic speeds and is sustained by the thermal conductivity of the material in the chamber as thermal diffusion takes place along the flame front.

In a detonation engine, however, a shock wave from the primary ignition rushes through an air-fuel mixture, raising the pressure to near 100 times the atmospheric pressure at the wave front. This creates a temperature spike, which ignites the material farther downstream. "What happens in a normal engine is a relatively slow type of combustion," said Tentner.

Because the fuel takes much longer to combust using deflagration rather than detonation, conventional engines waste much more fuel than would pulse detonation engines. In a deflagration jet engine, the combustion pushes a large amount of fuel out of the rear of the engine before it has a chance to burn. Even while it is still inside the engine, the fuel-air mixture's volume is continually changing, which prevents it from being burned efficiently. In contrast, the pulse detonation engines burn all of the fuel at a constant volume while it is still inside the engine. "Each cycle is very short, and using many small detonations will burn fuel much more efficiently," said Tentner.

As a result of these improvements, theoretical predictions of pulse detonation engines estimate their efficiency at nearly 50 percent, which would well outperform the 30 percent efficiency of conventional jet engines. ■

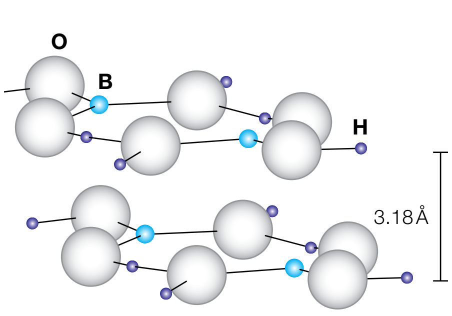
Acid

(Continued from page 1)

Using this liquid analog of solid boric acid as a fuel additive on a large scale could greatly benefit the environment, both because it would help increase fuel efficiency and because it would replace existing fuel lubricants that are potentially harmful to the environment, Erdemir said. By themselves, most fuels — especially diesels — contain some sulfur and other special chemical additives to boost lubricity. When burned, however, some of these additives along with sulfur might cause harmful emissions and acid rain. However, the lack of a suitable alternative complicates efforts to cut sulfur content.

The substitution of liquid boric acid for sulfur-containing additives preserves the health of the car as well as that of the environment. Sulfur exhaust gradually coats the surface of a car's catalytic converter, the device that helps to reduce the toxicity of a car's emissions. Eventually, the converter becomes so choked with sulfur that it is no longer able to process any more exhaust.

Even though he has just begun to unleash the potential of boric acid, Erdemir believes that nanoscale synthetic compounds might prove to be even more effective lubricants. "The next step is to use the basic knowledge that we have gained out of this particular compound to come up with more exotic compounds that will work even better," he said. ■



This diagram illustrates the crystalline structure of boric acid. Boron atoms are shown as blue spheres, oxygen grey, and hydrogen purple. Molecular forces that bind the layers in the lattice enable them to slide over one another with very low friction.

Argonne Combined Appeal thanks contributors for success

Renee Carder, deputy to the laboratory director, speaks at a reception honoring 2007 Argonne Combined Appeal (ACA) division coordinators, Steering Committee members, and others who held key roles in making the campaign a success.

A Guest House reception last month honored 2007 Argonne Combined Appeal (ACA) division coordinators, Steering Committee members, and others who held key roles in making the campaign a success.

ACA Co-Chair Sheila Trznadel distributed certificates to people whose efforts covered a range of activities from designing and printing materials to supporting the electronic pledge form. ACA Co-Chair Joe Kilar expressed appreciation to division level coordinators who served as the primary, personal contacts for contributors.

The campaign raised more than $372,000 for participating agencies. All money contributed goes directly to the agencies contributors select.

"The funds are used to help people in need in our local community," Kilar said, "and provide hope and assistance when they most need it." ■

MORE NEWS AND LATE-BREAKING UPDATES:
INSIDE ARGONNE
www.inside.anl.gov

Transparency spans into X-ray domain

JENNIFER DEANGELIS

Researchers have recently taken electromagnetically induced transparency (EIT) into another realm. A group led by Robin Santra, assistant physicist in Argonne's Chemistry Division, theoretically studied the way laser fields affect X-ray absorption. Their studies concluded that EIT exists in the X-ray domain. This discovery might help expand uses of X-ray technology in several different scientific disciplines.

EIT, a process that enables control over absorption and dispersion of a gaseous medium, has already been known to exist in the optical domain, or visible light. It involves one laser field interacting with the atoms coupling two quantum levels to allow a gas to become transparent at a specific wavelength determined by a third quantum level. Researchers have previously used EIT in the visible domain to slow down the speed of light to that of a bicycle.

But whereas visible light interacts with outer electron shells, X-rays interact only with the inner-most shells, causing a different sort of effect on the atom with regard to EIT. When an X-ray comes into contact with an atom, the inner-most electron is transferred to a higher-lying, "excited" quantum state, and then the atom decays in a femtosecond, or one millionth of a nanosecond. The excited electron must now be "laser-dressed" within this minuscule timeframe, which means a strong laser field must be applied to alter the electronic structure of the absorbing material before the atom collapses. Therefore, in order for EIT to remain possible in the X-ray domain, the dressing laser must be much more intense than usual for EIT.

Santra's team theorized that EIT was still possible, in spite of the strong distortion an atom might experience in such an intense laser field. After testing their theory through various computer calculations, they were able to describe X-ray absorption in strong laser fields and verify EIT's existence in the X-ray domain. Their work is published in the June 22 issue of the *Physical Review Letters*.

This research can be applied to shape X-ray pulses arbitrarily on a femtosecond timescale. According to Santra, the theory also suggests a method for producing short X-ray pulses using existing laser technology. Short X-ray pulses are useful for future pump-probe experiments, which will allow movies of molecular motion on ultra-fast timescales.

Collaborators on this research include Robin Santra, Christian Buth and Linda Young of Argonne. Young and the Atomic Physics group are planning an experimental investigation of EIT at the Advanced Light Source at Lawrence Berkeley National Laboratory.

This research was funded by the U.S. Department of Energy's Office of Basic Energy Sciences. ■

IN MEMORIAM – JULY 2007

QUINVILLE ALLEN, a retired stock handler with 35 years of service in ASD, died June 26. His three daughters survive him.

PAUL E. HESS, a retired scientific associate with 33 years of service in the former ER division, died July 13. His four children survive him.

RETIREES – JULY 2007

CATHERINE FOSTER (CPA) retired June 29 with 16 years of service.

MARY L. KMAK (OTT) retired July 16 with 12 years of service.

MICHAEL MUSCIA (AES) retired July 6 with 16 years of service.

DAVID R. PEPALIS (EQO) retired July 12 with 30 years of service.

THOMAS W. SECOR (FMS-US) retired June 29 with 40 years of service.

Argonne
NATIONAL LABORATORY

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Submit classified ads online at *www.anl.gov/Media_Center/Argonne_News/Classified_Ads* ■ Deadline for all materials is 5 p.m. Friday. ■ Argonne National Laboratory is managed by UChicago Argonne, LLC for the U.S. Department of Energy.

SERVICE AWARDS FOR SEPTEMBER 2007

45 YEARS
Richard S. Konecny (HEP)

40 YEARS
Frank Y. Fradin (MSD), Richard J. Kmiec (CIS), Willis D. Ray (NOD)

35 YEARS
Catherine E. Eyberger (AES), Jeffrey Rest (NE)

30 YEARS
Virginia G. Brown (FMS), Richard L. Coulter (EVS), Ralph R. Fabian (DIS), Patrick L. Garner (NE), Gail W. Pieper (MCS)

25 YEARS
John P. Greene (PHY), William S. Vinikour (EVS)

20 YEARS
John H. Christiansen (DIS), Stephen E. Dorris (ES), Richard C. Eagan (DIS), Deana L. Kinzler (XSD), Louis E. Martino (EVS), Jordi Roglans-Ribas (NE), Carol L. Rosignolo (EVS), Kathy L. Simunich (DIS)

15 YEARS
Michael Arellano (FMS), Nicholas DiMonte (AES), James Golema (FMS), Donald E. Preuss (NOD), Mary Straka (TSD), Keith Trychta (BIO)

10 YEARS
Margaret M. Collins (HR), Boris N. Deriy (ASD), Jacqueline A. Johnson (NE), James A. Vie (EQO)

5 YEARS
Peter H. Beckman (MCS), Susan M. Coghlan (LCF), Jeanne M. Elkins (EQO), Brian E. Finley (CIS), Sven Leyffer (MCS), Benjamin D. Lyall (CIS), Patricia A. Pedergnana (AES), Casandra Pedrak (ES), Robert B. Ross (MCS), Wen Zhang (BIO), Min Zhou (BIO)

NEED A RIDE TO THE UNIVERSITY OF CHICAGO? A FREE SHUTTLE BUS MAKES ROUND TRIPS EVERY WORK DAY. FOR MORE INFO, SEE **www.anl.gov/Visiting/shuttle.html**

CHORAL GROUP PLANS SEPTEMBER 13 CONCERT

The Argonne Choral Group will hold its fall concert on Thursday Sept. 13, at 6:30 pm in the Bldg 362 Auditorium. The theme of the concert is Americana and a variety of music will be performed including such pieces as "Shenandoah" and the Eagles' "Seven Bridges Road." A $5 donation at the door is requested.

The club is now planning year-round performances and is always looking for more singers of any and all talent levels. Rehearsals are held Mondays and Thursdays from 11:45 a.m. to 12:30 p.m. in the Building 362 Auditorium. For more information, contact Pat Garner (NE) at *plgarner@anl.gov* or Katie Weber (U of C) at *kpweber@uchicago.edu*.

GUEST HOUSE PLANS SHRIMP BOIL

All-you-can-eat peel-and-eat shrimp will be featured at the Argonne Guest House on Thursdays. The menu will include a salad bar.

JAZZ CLUB PLANS SMOOTH JAZZ CONCERT

The Argonne Jazz Club will hold a smooth jazz concert Thursday, Aug. 16, from 5:30 – 6:30 p.m. in the Building 402 Auditorium.

A $5 donation is requested; proceeds will be donated to the Alzheimer's Association. Tickets will be available at the door at 4:30 p.m.

There will be a raffle after the concert.

BARBECUE WEDNESDAYS BEGIN AT GUEST HOUSE

Every Wednesday through October, the Argonne Guest House restaurant will feature a barbecue menu at both lunch and dinner.

At lunch there will be a soup and salad bar, and entrees will include barbecue ribs, chicken and fish with a cedar-planked fish of the day. There will also be lunch specials.

At dinner there will be a soup and salad bar, and entrees will include barbecue ribs, chicken, fish and steaks, as well as specials of the day.

Lunch hours at the Guest House are 11 a.m. – 1:30 p.m. Monday through Friday, and dinner hours are 5 – 9 p.m. Monday through Friday.

MUSIC CLUB TO HOST OPEN-MIC NIGHT AUG. 16

The Argonne Music Club will host an open-mic night Thursday, Aug. 16, at 617 Lower Level. All are welcome to perform, listen or dance.

Open mics give musicians and vocalists of all genres and skill levels — from novices to virtuosos — a way to perform in a low-pressure, informal setting. Participants don't need to be in a band; there are many opportunities to jam with other musicians and vocalists.

Performances at previous open-mic nights included classical guitar, country, blues, jazz and classic rock. Doors open at 4:30 p.m.; beverages and snacks will be available for purchase. Music will start at 5:30 p.m.

The Argonne Music Club brings together the site's music enthusiasts and musicians to share their interests and hold informal jam sessions and concerts. For more information see the club's Web site. *www.argonneclub.anl.gov/music*

TSD SUPPLYING TONER AND SUPPLIES FOR NEW CANON COPIERS

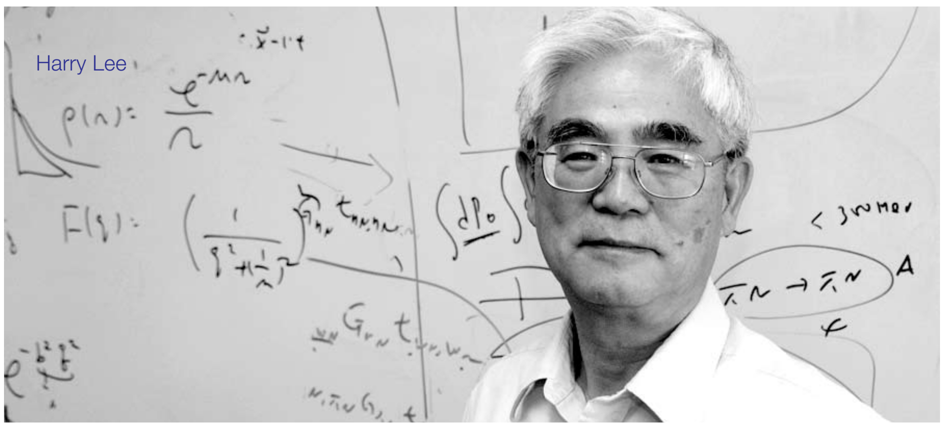
To order toner, staples and waste toner bottles for the new Canon copiers, complete Canon Copier Supply Order Form, form TSD-35, and fax it to ext. 2-4727 or e-mail a scan of the completed form to Gary Weidner (*gweidner@anl.gov*) of the Technical Services Division (TSD).

TSD will put the supplies on the T-run the next business day at no cost. Supplies for the Canon copiers are to be obtained only through TSD.

Employees should be aware that "toner scams" are common. Canon Business Solutions, Argonne's copier vendor, will never call, fax or e-mail asking if employees need toner or requesting the serial number of a copier.

Those who still have toner from old copiers can send it to Gary Weidner (TSD) Building 222, on the T-run. Contact Mary Jo Thompson (TSD) at ext. 2-3740 or *mthompson@anl.gov* for more information about the Canon copiers.

Nuclear physicists reach for the stars


Harry Lee

KANDICE CARTER,
Thomas Jefferson National Accelerator Facility

WITH the help of Harry Lee, joint Jefferson Lab and Argonne senior scientist, Jefferson Lab's Excited Baryon Analysis Center (EBAC) is helping nuclear physicists make the stuff of stars out of ordinary matter. Probing the properties of this "stuff" could provide key insights into the evolution of real stars in the early universe.

"This research can change our understanding of the evolution of stars," said Lee, who leads the EBAC. "So the research we're doing here has consequences, not only in nuclear physics, but also in astrophysics and other fields."

Established in January of 2006, EBAC resides within Jefferson Laboratory's Theory Center. Its mission is to provide theoretical support to worldwide experiments probing the structure of excited baryons. Baryons, such as protons and neutrons, are the building blocks of ordinary matter. However, the baryons inside stars are thought to be more than just protons and neutrons.

"In a star, the density and temperature could be very, very high, so the matter there has not only the regular protons and neutrons, but also their excited states, what we call the N-star (N*) states," Lee explained. To really understand our universe, he said, it's important to understand all the forms matter can take. "It's not enough to understand the protons and neutrons. You need to understand these excited states, too."

Mark Paris, a postdoctoral scientist and the first full-time EBAC researcher, likens the normal and excited states of a baryon to a vibrating telephone cord. "If you've ever been talking on the phone and you look at the cord, you notice that it moves up and down slowly and evenly. Let's say the swaying cord is a regular baryon. Now if you twang the cord, giving it more energy, you can get more wiggles or ripples in it, and that's like an excited baryon," he said.

To find out how the properties of excited baryons differ from their regular counterparts, scientists at Jefferson Lab and elsewhere are using accelerators to produce these particles. For instance, the N* program in Jefferson Lab's Hall B aims to make excited baryons that have never before been seen.

"In a typical experiment," Paris said, "you have a photon or an electron coming in and hitting your target, such as a proton. The proton gets excited."

In the case of Jefferson Lab's Continuous Electron Beam Accelerator Facility (CBAF), the incoming electron "twangs" the proton, giving it extra energy. Extra energy transforms the proton into an excited baryon. This excited baryon doesn't last very long, falling apart nearly instantly. The bits the particle split into are recorded by sensitive detectors. The data collected can reveal how an excited baryon most likely will fall apart.

One goal of EBAC is to further develop and apply theories to existing data. These theories might help scientists squeeze more information about the properties of the excited baryon from the data, which would allow experimentalists to get more information out of their data and to design better experiments from that information.

These new theories might serve as tools for eventually tackling one of the most difficult problems in nuclear physics. Physicists are working to link the description of matter's building blocks, gleaned from experiments, to the most fundamental theory yet for describing how these building blocks make up matter: quantum chromodynamics (QCD).

"So we want to understand not only how the excited states are made," Lee said, "but also how QCD works to form these baryons." If that can be established, the potential benefit is enormous. "Suddenly you understand how the matter in stars is made of baryons, and this is one of the crucial keys to understanding how stars evolve."

"There are so many things that we do not understand about the structure of baryons," said Jefferson Lab's Chief Scientist, Anthony Thomas. "States that we expect have not been seen yet, while still others are in the wrong place. Through EBAC, we have the opportunity to make a truly comprehensive analysis of the world's data, including the beautiful new results from JLab. This promises new insights into how QCD works."'

EBAC is the first of the Department of Energy Topical Theory Centers, an initiative put forth in the 2002 Nuclear Science Advisory Committee Long-Range Plan. In addition to the six principal members of EBAC, two new Jefferson Lab-based members will come on board in the fall: Hiroyuki Kamano (Osaka University) and Kazuo Tsushima (University of Salamanca).

Principal EBAC Researchers are Bruno Julia-Diaz (University of Barcelona), T.-S. Harry Lee (Jefferson Lab and Argonne), Akihiko Matsuyama (Shizuoka University), Mark Paris (Jefferson Lab), Toru Sato (Osaka University) and Alexander Sibirtsev (Jefferson Lab, University of Bonn and FZ Juelich). ■

NOMINATIONS SOUGHT FOR MILLENNIUM PRIZE

The Millennium Prize Foundation, an independent fund based in Finland , is soliciting nominations for the 2008 Millennium Technology Prize.

The Millennium Technology Prize is given every two years to a revolutionary invention that "promotes quality of life, contributes to the realization of humane values and encourages sustainable development." Inaugurated in 2004, the Millennium Prize has had two recipients: Tim Berners-Lee, inventor of the World Wide Web, and Shuji Nakamura, inventor of the white-light-emitting diode.

The winner of the Millennium Prize receives 1,000,000 euros ($1.3 million), which makes it the world's largest technology award. Nominations for the award must be received by the Millennium Prize Foundation by Oct. 1.

Nominations should be sent to Cindy Wilkinson (C&PA), Building 201, Room 258.

APPLICATIONS SOUGHT FOR DIRECTOR'S POSTDOCTORAL FELLOWSHIPS

Director's postdoctoral fellowships do not incur any cost to Argonne divisions.

All candidates are required to submit the following application package:

- A nomination memo (2 pages or fewer) from Argonne sponsor (with copy to division director)
- Research proposal (2 pages or fewer)
- Three letters of recommendation from other than Argonne staff
- CV
- List of publications, abstracts and significant presentations
- Undergraduate and graduate school transcripts

The application deadline is Sept. 4. The required documents must be submitted online at *www.dep.anl.gov*.

Questions and comments should be directed to Giselle Sandi, postdoctoral programs coordinator, at *gsandi@anl.gov* or ext. 2-1903.

TOASTMASTERS

Learn to conquer your fears and have fun at the same time. The next meeting of the Argonne Toastmasters will be Wednesday, Aug. 24, from noon-1 p.m. in Building 201, Conference room 190. Visitors are welcome.

ARGONNE CLUB HOSTS 'ARGONNE DAYS' AT SIX FLAGS GREAT AMERICA

Tickets are now available for "Argonne National Laboratory Days" at Six Flags Great America and Hurricane Harbor, Aug.17, 18, 19 and 25.

Tickets are $27 per person (a $27.99 savings) and are valid for one day only. Ages 3 and under are free. Parking is $15 per vehicle.

Tickets can be purchased Aug. 6-24 in the Argonne Credit Union during regular business hours, from Argonne Club president Todd Hayden at ext. 2-6143 or *argonneclub@anl.gov*.

ARGONNE RUNNING CLUB HOSTS MONTHLY FUN RUN & WALK

The run will begin Wednesday, Aug. 15th, at noon at the Waterfall Glen Lemont Road Trailhead, located at the intersection of Lemont Road and 101st Street, one mile south of Westgate Road. All employees and guests are welcome to attend. There will be refreshments and a raffle at the finish. For more information contact Ken Belcher at ext. 2-7515, Ron Kmak at ext. 2-4645 or visit the Web site at *http://www.argonneclub.anl.gov/ARC/default.htm*.

Running Club members are eligible to enter the drawing for a Dick Pond's gift certificate to be awarded at a later date.

BOWLING LEAGUE SEEKS PLAYERS FOR 2007-08 SEASON

The Argonne Mixed Bowling League is organizing for the 2007-08 season and is looking for bowlers – no experience necessary. The league competes Wednesdays at 6:30 p.m. at the Strike 'n' Spare in Lockport from September to April. For more information, please contact Carol Johnson at *sassycat84@comcast.net* or 815-838-7701.

PART OF BUILDING 360 PARKING LOT TO CLOSE FOR HYDROGEN STATION

The north end of the Building 360 parking lot will be closed to through traffic and parking until Monday, Sept. 24 due to the set-up and use of a temporary hydrogen refueling station. Half of the Building 362 lot will also be closed for a two-week period over that time frame for repaving.

The refueling station will be used as a hub for several BMW Hydrogen 7 vehicles that will be used for demonstrations at Argonne and the Chicago area. Only authorized personnel will be allowed to access the north end of the Building 360 lot.

Alternate parking can be found in the parking lot directly next to Building 360 or the open areas of the Building 362 lot.

For more information, contact Bryan Wozny (ES) at ext. 2-7659.

POSTDOCTORAL OFFICE SEEKING UPDATES FOR ALUMNI WEB PAGE

The Postdoctoral Office is creating an Argonne Postdoctoral Alumni Web page as part of the mentoring program. If you held a postdoctoral appointment at Argonne and wish to participate in this important project, please send the following information to Giselle Sandi at *gsandi@Argonne.gov*:

Name, current photo, past Argonne affiliation, current affiliation and new contact information, a research highlight at Argonne and a short paragraph summarizing your new endeavors. Examples are online at *www.dep.argonne.gov/postdocs/alumni*.

CIS CLASSES

"Introduction to Word 2003" (CIS122)
This course will provide the student with the basic concepts required to produce business documents. You will create, edit, and enhance standard business documents. Learn how to create, edit, format, layout, print documents complete with tables and graphics.

Prerequisite: proficient in a Windows environment.
Dates: Thursday, Sept. 6, 8:30 a.m. – 4:30 p.m.
Location: Building 201, Room 167
Class size: Limited to 8
Instructor: DDF Computer Training
Cost: $240

"Introduction to Excel 2003" (CIS125)
In this course you will learn to create and edit basic Excel worksheets and workbooks. Student will also learn to perform calculations, modify and format a worksheet and develop a workbook.

Prerequisite: an understanding of Windows.
Dates: Friday, Sept. 7, 8:30 a.m. – 4:30 p.m.
Location: Building 201, Room 167
Class size: limited to 8
Instructor: DDF Computer Training
Cost: $240

"Introduction to Access 2003" (CIS128)
This course is for the individual whose job responsibilities include working with tables to create and maintain records, locate records, and produce reports based on the information in the database. It also provides the fundamental knowledge and techniques needed to advance to more technical Access responsibilities, such as creating and maintaining new databases and using programming techniques.

Prerequisite: an understanding of Windows.
Dates: Monday, Sept. 10, 8:30 a.m. – 4:30 p.m.
Location: Building 201, Room 167
Class size: limited to 8
Instructor: DDF Computer Training
Cost: $240

"Introduction to PowerPoint 2003" (CIS131) — This course introduces the skills necessary to develop presentations, create, enhance, print presentation slides, format text slides, add tables to a presentation, chart data, modify objects and add images to a presentation.

Prerequisite: an understanding of Windows.
Dates: Tuesday, Sept. 11, 8:30 a.m. – 4:30 p.m.; Thursday, Nov. 15, 8:30 - 4:30
Location: Building 201, Room 167
Class size: limited to 8
Instructor: DDF Computer Training
Cost: $240.00

RETIREMENT VENDORS ON SITE

Retirement vendors will have representatives on site to meet individually with employees to answer questions about the retirement plan or retirement plan assets. To schedule an appointment with these representatives call the number listed.

Appointments last a half hour.

Vendor / Days / For appointments:
FIDELITY / Thursday, Sept.13 & 27 / (800) 642-7131
TIAA-CREF / Wednesday, Sept. 5, Thursday, Sept. 6, Friday, Sept. 7 / (800) 842-2005 or *www.tiaa-cref.org/moc*
PRUDENTIAL / Wednesday, Sept. 5, and Wednesday, Sept. 19 / Cheryl (mornings only) (630) 285-8876

Classified Ads

MISCELLANEOUS

FURNITURE — Carved wood sofa, love seat, chair, matching dining table, 6 matching chairs, excellent condition, you haul. $300 o.b.o all. Sam Ambegaoker, (630) 960-5731.

MISCELLANEOUS — Technic stereo components, tuner ST-K50, amplifier SU-691, 130 watts per channel, graphic equalizer SH-8017, remote, perfect condition. $100. Whirlpool dishwasher, quiet wash plus model, good condition, soft touch controls, pot scrubber, delayed start, black. $200. John Kasprowicz, (630) 697-6722.

PRAIRIE DIRT — As much as you want. $5. Jill Jonkouski, (773) 586-1664.

MISCELLANEOUS — Tapestry couch, loveseat, autumn colors/floral. $150. Kitchen table, wood, 4 chairs, oval, 1 leaf. $100. Book coffee table. $25. Karen Kerwin, (630) 739-4283.

PUPPIES — Boxer, 6 weeks old. Lori Moore, (708) 747-7561.

MISCELLANEOUS — Garage natural gas heaters, Reznor V3 series, fan-type unit, 50,000 BTU. $800. Glowarm vent free small heater, 14,000 BTU. $150 o.b.o. Jan Buckley, (630) 605-2627.

DIGITAL CAMERA — Nikon D2HS, 3 batteries, charger, rubber eye cup, manuals, Mac 3-year warranty, excellent condition. $1,700. Wes Agresta, (815) 254-5120.

TRAVEL TRAILER — 1998 Vacationaire, 34', electric, battery or propane, queen size bedroom, 2 closets ,full size bath, tub and shower, queen size pull-out couch, LR, kitchen, new water heater, central A/C, heat, call for more details. $12,000 o.b.o. Cheri Jo Giacomi, (815) 260-2437.

MISCELLANEOUS — various furniture, Daewoo TV, DVD player. Binod Raj Giri, (630) 271-9473.

BIKE — Schwinn 10-speed road bike, red, good riding condition. $75. Vannakambadi Ganesh, (540) 353-2718.

GOLD DIAMOND EARRINGS — 18K princess cut, 0.85 CT, G color grade, excellent cut grade, SI(2) clarity, have diamond certificate for insurance purposes. Originally $2,100, asking $1,000 o.b.o. Lisa Peters, (630) 721-8136.

MISCELLANEOUS — Kitchen table, 4 wooden chairs. $50. Coffee, end tables, 4 total. $50. Colleen Tobolic, (815) 254-2079.

REFRIGERATOR — Works, needs to be cleaned, you haul. $75. Suzanne Miller, (630) 810-9369.

DORM REFRIGERATORS — 3.3 cu. ft. $45. 1.5 cu. ft. $20. Jim Feigl, (815) 838-2422.

TRUCK CAP — fiberglass, red, fits 1999 and newer Ford F150 8'. $300 o.b.o. Michael Grimes, (708) 824-9364.

AUTOMOBILES

1996 NISSAN — Sentra, 139K miles, new starter/exhaust system/right front axle, good condition. $2,200. John Kennedy, (630) 852-4415.

1994 DODGE — 10 passenger van, 63K original miles, must see and drive. $2,850. Tracey Stancik, (815) 588-1972.

2001 HONDA — Accord VP, auto, green, 2.3L, 79K miles, excellent condition, garage kept, new tires / brakes. $7,800 o.b.o. Dana Capatina, (847) 970-8664.

2000 ISUZU — Rodeo LS, white, 4WD, 100.3K miles, runs great. $5,600. Roslyn Kiwior, (708) 843-1210.

1994 FORD — Tempo, 122K miles, runs well, good condition. $400. Robert Van Lonkhuyzen, (708) 361-0148.

HOUSING

CONDO/SALE — Tinley Park, 2 bedroom, 2 bath, garage and parking spot, appliances, cathedral ceiling, $500 referral bonus. $163, 500. Jim Podraza, (708) 212-5250.

HOUSE/SALE — Woodridge, 4 bedroom, 3 bath, LR, DR, FR, 2 car garage, appliances, call for additional information. Cliff Pitts, (708) 430-9104.

ROOM/RENT — Furnished, room in 4 bedroom house, cable TV/internet/all utilities/all access, available mid August. $500. Eric Lindert, (815) 886-4504.

HOUSE/SALE — Bolingbrook, 3 bedroom, 2.5 bath, new floor/carpet/paint, fenced yard. $259,900. Gregor von Laszewski, (630) 618-6225.

WANTED

FIELD STONE — Various colors and sizes, will haul. Jerry Rice, (815) 254-0713.

LAWNMOWER — Push mower, good condition. Beth Cerny, (773) 318-0208.

PHYSICS INSTRUCTOR — Part-time, teach introductory physics courses at North Central College, *http://noctrl.edu/x31964.xml*. David Horner, (630) 7171-5544.

LOST AND FOUND

FOUND — At Argonne picnic: Nokia T-Mobile phone, leopard print coin purse with McDonald card. Peggy Stepuszek, 2-3247.