

ARGONNE UPDATE

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Planning for biocontainment lab on schedule

The University of Chicago's Regional Biocontainment Laboratory (RBL) at Argonne's Illinois site is on track for ground-breaking in about one year.

The RBL is one of nine laboratories recently funded by the National Institutes of Health (NIH) to support research into infectious diseases. For emergency responders in the area, it will be a safe and secure resource for training and in case disease breaks out.

For researchers from the Great Lakes Regional Center of Excellence for Biodefense and Emerging Infectious Diseases, it will be a primary resource in their collaborative hunt for better ways to detect, treat, and prevent naturally occurring infectious diseases, and especially those that could be spread by terrorists.

They will study only those diseases for which some defenses are already available — classed by NIH as biosafety level 3 organisms. More dangerous organisms, classed as biosafety level 4, can not be present in an RBL.

The University of Chicago, which NIH approved to build and operate the RBL, is the co-leader, with Northwestern University, of the center. Its members include 18 premier medical research organizations in Minnesota, Wisconsin, Michigan, Illinois,



The Regional Biocontainment Laboratory, shown here in an artist's conception, would be built on the Argonne site to stimulate and support scientific discovery and its applications to prevent, moderate and treat infectious disease.

Indiana and Ohio, including the Mayo Clinic, University of Illinois campuses in Chicago and Urbana-Champaign, and Loyola University of Chicago.

Since the lease between the U.S. Department of Energy (DOE) and the University of Chicago was approved in December, 2003, the university has selected Flad & Associates (www.flad.com) and Affiliated Engineers, Inc. (www.aeieng.com), both of Madison, Wisconsin, as the architectural/engineering team for the building. These firms helped prepare the preliminary design the university used in its proposal for the RBL. The university

has also established a multidisciplinary design team that meets regularly to refine the preliminary design, with a steady eye on making it as safe as possible.

In compliance with the National Environmental Policy Act, an assessment of the laboratory's potential environmental impacts has begun. The study will include close attention to questions raised at several meetings with Argonne's neighbors, particularly about property values and possible health risks.

Argonne's Environmental Assessment Division was commissioned to conduct the evaluation.

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Catalyst could help diesels meet NOx deadlines

A new catalyst developed at Argonne could help auto makers meet the U.S. Environmental Protection Agency's deadline to eliminate 95 percent of nitrogen-oxide from diesel engine exhausts by 2007, while saving energy.

The new catalyst is one of a family of related catalysts that also shows promise for reducing NOx emissions from industrial sources, such as coal-fired power plants and furnaces at chemical plants and refineries. Catalysts are materials that enable or speed chemical reactions without being consumed themselves.

Nitrogen oxides — collectively called "NOx" — contribute to smog, acid rain and global climate change.

"For diesel engines, we envision manufacturers placing



ceramic catalytic reactors in the exhaust pipes, where they will convert NOx emissions into nitrogen," said inventor Chris Marshall of Argonne's Chemical Engineering Division. Nitrogen is a harmless gas that makes up more than 80 percent of the

Earth's atmosphere.

The catalyst works at normal exhaust temperatures and is actually more effective with water vapor than without it. With a lean fuel-air mixture, it removes as much as 95 to 100 percent of NOx emissions.

Initial research on the cerium-oxide catalyst was funded by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy. The catalyst was developed for chemical plant emissions under a joint research agreement with BP. Plans call for expanded research aimed at both diesel and natural gas engines and coal-fired power plants.

A patent application has been filed on the new catalyst and it is expected to be available for licensing.

Meet an Argonne scientist

Lemont resident and Argonne scientist Alexei Abrikosov recently shared a



Nobel Prize in physics with two colleagues for theories about how matter can show bizarre behavior at extremely low temperatures.

Abrikosov

The Royal Swedish

Academy of Sciences cited Abrikosov, 75, Anthony J. Leggett, 65, and Vitaly L. Ginzburg, 87, for their work concerning two phenomena called superconductivity and superfluidity.

Abrikosov's research centers on condensed-matter physics (the structure and behavior of solids and liquids), and concentrates on superconductivity, the ability of some materials to carry electrical current without resistance. He was the first to propose the concept of "type-II superconductors" in 1952 and constructed the theory of their magnetic properties, known as the Abrikosov vortex lattice.

Abrikosov had been nominated several times before, but this year the Nobel committee notified him that he was a candidate. "And since this had never happened before, I

See "Abrikosov," page 2

Argonne is operated for the U.S. Department of Energy by the University of Chicago



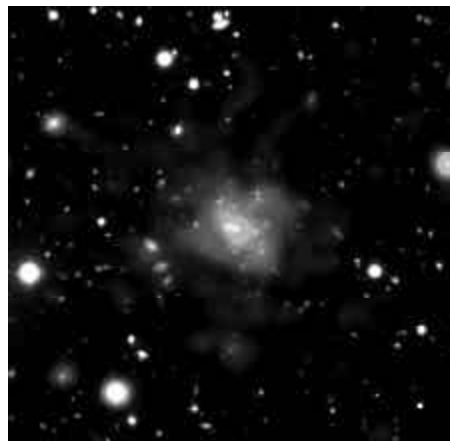
Stardust reveals memories of ancient stars

Argonne researchers have reached for the stars — and seen what's inside.

In collaboration with colleagues at the University of Chicago, Washington University and the Università di Torino in Italy, Argonne scientists examined stardust from a meteorite and found remnants of now-extinct technetium atoms made in stars long ago.

The stardust grains are tiny bits of stars that lived and died before the solar system formed. Each grain is many times smaller than the width of a human hair, and carries a chemical record of nuclear reactions in its parent star.

Famed scientist P.W. Merrill 50 years ago observed the signature of live technetium — an element that has no stable isotopes — in the starlight from certain types of



Argonne scientists examined stardust from a meteorite and found remnants of now-extinct technetium atoms made in stars long ago. *Image by P. Rosati, European Southern Observatory.*

stars, thereby proving the then-controversial theory that stars make atoms via a process called nucleosynthesis. Savina and co-

workers' discovery that their stardust grains once harbored live technetium brings the science of nucleosynthesis full circle.

"Finding traces of technetium decay products in stardust provides a very precise confirmation of the theories of how atoms are made inside stars," said Argonne Scientist Michael Savina. "The fact that we can both predict and measure very tiny effects in the chemistry of these grains gives us a lot of confidence in our models of how stars work."

The work was made possible by a specialized instrument at Argonne called CHARISMA, the only instrument of its type in the world. "CHARISMA is designed to analyze very tiny samples — the kind where you can't afford to waste atoms, because there are so few of them to work with," Savina said.



Abrikosov, left, receives the Nobel Prize in Physics from Sweden's King Carl Gustaf XVI.

Abrikosov

(Continued from page 1) saw this as a good sign," he said. "But I thought my life is good even without [the Nobel Prize]. I have interesting work. I am happy. I love my family."

Superconductivity is the ability of some materials to conduct electricity without resistance when they are chilled to extremely low temperatures. Researchers hope to harness superconductivity for such uses as power lines that can conduct current without loss due to resistance and high-speed trains that float above the tracks.

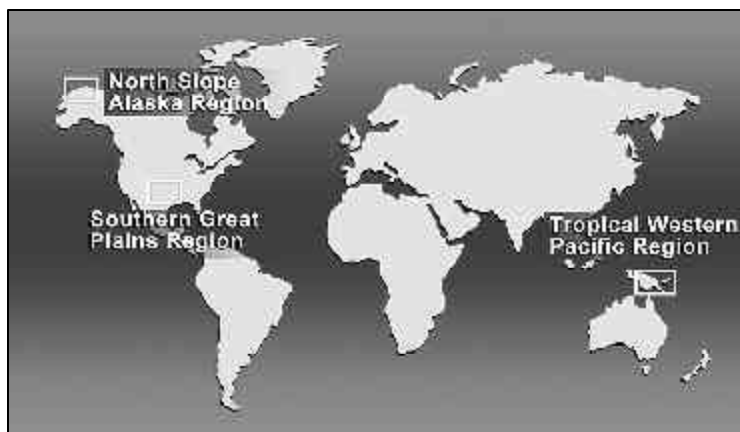
Abrikosov is Argonne Distinguished Scientist at the Condensed Matter Theory Group in Argonne's Materials Science Division. His recent research has focused on the origins of magnetoresistance, a property of some materials that change their resistance to electrical flow under the influence of a magnetic field.

Before joining Argonne in 1991, Abrikosov was director of the Institute for High-Pressure Physics of the Academy of Sciences, Moscow. He was chairman of theoretical physics at the Moscow Institute for Steel and Alloys from 1976-1991, and was head of the condensed matter theory division of Russia's Landau Institute for Theoretical Physics from 1966-1988.

Real-time weather data available worldwide

Thanks to the installation of a satellite-based communications network by Argonne scientists, real time meteorological data from locations around the world are available to researchers quickly — and free — through the Department of Energy's Atmospheric Radiation Measurement (ARM) Program.

The goal of the ARM Program is to provide quality data for the improvement of computer models used for climate forecasting. To accomplish this, data are continuously gathered at six facilities around the world. In July 2003, these sites were collectively designated as a national user facility by the



The Atmospheric Radiation Measurement program gathers climate data from sites around the world. The goal of the ARM Program is to provide quality data for the improvement of computer models used for climate forecasting.

Department of Energy's Office of Biological and Environmental Research.

The ARM Program gathers huge amounts of data at climate research sites in three locales

(See map).

"Until recently, users had no continuous, reliable communications with sites in the Tropical Western Pacific," said Dick Eagan (DIS), who coordinated the communications. Now, raw data from all sites are sent via satellite to the Data Management Facility every hour.

Having data available in real time was always a goal of the program, said Argonne's Doug Sisterson, ARM operations manager.

The ARM climate research sites are the world's largest collection of surface-based remote sensing instruments studying climate change.

RBL

(Continued from page 1)

The division, which has provided assessments for projects ranging from the Trans Alaska Pipeline System to nuclear power plants, is a central part of Argonne's nationally recognized expertise in environmental protection and remediation.

The NIH, as the lead funding agency, and the DOE, the landlord for the RBL site, will jointly

approve the assessment. A draft of the assessment will be ready in late summer and available online at www.ch.doe.gov.

Argonne and university personnel are also planning the integration of the RBL into the laboratory's existing programs for physical security, cyber security, emergency management and hazardous materials transportation.

To learn more about the RBL, visit the Web site at www.html.uchicago.edu/. The site has an e-

mail contact form.

For information about the Regional Center of Excellence and its projects, contact associate director Debra Anderson through the center's Web site (www.glrce.org) or by e-mail at info@glrce.org.

Comments on the environmental assessment may be addressed to Brian Quirke, DOE senior public affairs specialist, at (630) 252-2423 or brian.quirke@ch.doe.gov.

\$420,000 pledged to national, local charities

Argonne employees pledged to give more than \$420,000 to charitable and health agencies through the lab's 2003 Argonne Combined Appeal (ACA).

This result marks the third year that contributions to the annual campaign have totaled more than \$400,000.

Almost two out of every three

regular Argonne employees participates in the ACA — a campaign that has raised money for local and national agencies for the past two decades.

In the past eight years alone, the ACA has raised more than \$2 million through employee donations.

This year, the three agencies

receiving the most donations are United Way of Metro Chicago, the American Cancer Society and the American Heart Association. Argonne employees pledged more than \$160,000 to these agencies.

The Combined Appeal supports 22 agencies, ranging from the Heart Association to Downers Grove FISH, an area food pantry.

Chamber music concerts open to the public

The public is invited to hear some of the best international chamber music ensembles in concert at Argonne-East.

Arts at Argonne, the laboratory's fine arts program, presents performances by professional artists and art and photography exhibits. The program is partially supported by the University of Chicago and the Illinois Arts Council. Arts at Argonne is a member of the Chicago Dance and Music Alliance, a not-for-profit organization for producers and presenters of dance and music events in the Chicago area.



Arts at Argonne sponsored a recent concert by the renowned Brentano String Quartet at Argonne-East.

The 2004-2005 season begins in November and will include I Solisti Di Venezia, the Nether-

lands Wind Ensemble, the Zehetmair String Quartet and Martin Stadtfeld.

For a schedule, more information and an online ticket request form, see the Arts at Argonne Web site at www.anl.gov/ARTS/intro.html. To order tickets, call (630) 252-3751, e-mail arts@anl.gov.

Visitors who are U.S. citizens need photo identification to enter the site, and should call to register before the concert. Non-U.S. citizens must register before the events. Call (630) 252-3751 during business hours.

Lab offers free e-mail updates

What's New at Argonne is an e-mail newsletter that summarizes stories from Argonne's home page and other Argonne news and provides links to additional information.

What's New at Argonne is e-mailed to all subscribers on the first working day of each month.

To subscribe to this free service, visit the Argonne Home Page at www.anl.gov and click on the "What's New" link.

City students introduced to science careers

It's not exactly face-to-face, but high school students are meeting scientists and engineers from Argonne to learn more about scientific careers.

A new video conference series, conducted by Argonne, the Chicago Public Schools and the Chicago Workforce Board, is aimed at sophomore, junior and senior students. The Science Careers series consists of monthly interactive sessions with Argonne researchers, as the scientists and engineers speak with the students from their laboratories about their careers and the steps they took in preparing for them.

"Most high school students have little or no opportunity to meet and interact with working professionals in scientific and technical fields," said Fred Hartline of Argonne's Division of Educational Programs.

Background materials and pre- and post-conference lessons are available on the project's Web site, so teachers can introduce their students to career issues ahead of time and follow up sessions with meaningful activities. During the program, students can question presenters via live videoconference link.

The Science Careers series is sponsored by the Illinois Department of Commerce and Economic Opportunity.



Above, the winning team from Morgan Park shows off its trophy. Morgan Park also won the 2003 contest. At right, a member of the Riverside-Brookfield High School team explains the sports-themed machine to the judges.



Goldberg machines inspire future engineers

Forget the intricacies of caucuses, primaries, delegates and superdelegates. Chicago area high school students have found a way to make voting really difficult.

As part of Argonne's ninth annual Rube Goldberg Machine Contest for high schools, student teams created machines that take at least 20 steps to select, mark and cast an election ballot.

Morgan Park Academy took first place in the contest held Feb. 13 at the Chicago Children's Museum. Their machine "looks like a cross between a sewer and loom," said the team's faculty advisor, Larry Brown.

As part of their first place win, team members will tour Argonne and demonstrate their machine at the laboratory.

Argonne sponsored the event in collaboration with Chicago Children's Museum, and the National Rube Goldberg Machine Contest, held annually at Purdue University. The event is licensed by Rube Goldberg, Inc.

More information about the national contest and the Argonne contest is online at www.anl.gov/OPA/rube/.

'White deer'

"White Deer" are some of Argonne National Laboratory's most famous residents. They're actually fallow deer, escapees from a menagerie kept by the former owner of the Argonne site. About 40 fallow deer roam the Argonne-East site. The site is also home to many other species of wildlife, from racoons to red-tailed hawks.



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**ARGONNE
UPDATE**
The community
newsletter of
Argonne
National
Laboratory



- Biocontainment center on track for 2005 groundbreaking
- Meet an Argonne scientist
- Chamber music concerts open to the public
- Take a bite out of jet lag

New ceramics extract hydrogen from fossil fuels

Ceramic membranes developed at Argonne could bring fuel-cell cars closer to reality by efficiently and inexpensively extracting hydrogen from fossil fuels.

"Ceramic membranes make possible the widespread use of hydrogen," said senior ceramist Balu Balachandran. "Hydrogen is a fuel of choice for the future. This technology provides the means to get there."

Though the membranes currently used for research are only a few millimeters across, once scaled up for industrial use they could be installed at existing refineries or at individual refueling stations.

Interaction of light, nanoparticles observed

Researchers at Argonne are making strides towards understanding and manipulating light at the nanoscale by using the

unusual optical properties of metal nanoparticles, opening the door to microscopic-sized devices such as optical circuits and switches.

Metal nanoparticles, such as extremely tiny spheres of silver or gold, can concentrate large amounts light energy at their surfaces.

The light energy confined near the surface is known as the near-field, whereas ordinary light is known as far-field. Many scientists believe that by understanding how to manipulate near-field light, new optical devices could be built at dimensions far smaller than is currently possible.

Argonne-developed diet can reduce jet lag

An Anti-Jet-Lag Diet, developed at Argonne, is now online. Argonne-developed software that computes individualized diet plans to help travelers avoid jet lag has been licensed exclusively to AntiJetLagDiet.com LLC.

The software, available for public use online at www.AntiJetLagDiet.com, is based on the famous Anti-Jet-Lag Diet, developed at Argonne and used to avoid jet lag by hundreds of thousands of travelers over the last 20 years.

Research shows that travelers who use the Anti-Jet-Lag Diet are seven times less likely to experience jet lag when traveling east and 16 times less likely when traveling west.

For a small fee, the online software will calculate a detailed, easy-to-follow Anti-Jet-Lag-Diet plan tailored to an individual traveler's itinerary.

Argonne, car industry to study junk-car recycling

The "junk" from junked cars will find new uses under a new research partnership for recycling plastics.

A five-year cooperative research agreement brings together Argonne, the American Plastics Council and the Vehicle Recycling Partnership of USCAR, a consortium of DaimlerChrysler Corp., Ford Motor Co. and General Motors Corp.

The agreement will build on recycling technology developed at Argonne to create a cost-effective process for recycling end-of-life vehicles.



Argonne Update is published by Argonne National Laboratory's Communications and Public Affairs Division. Argonne is operated for the U.S. Department of Energy by the University of Chicago. See the Argonne Web site at www.anl.gov for more information on the laboratory's activities, people and projects.