

Welcome to

ARGONNE NATIONAL LABORATORY



Open House
Saturday, October 7, 2006
9:00 am to 4:30 pm

Celebrating Our 60th Anniversary!

About Argonne

Argonne National Laboratory is one of the U.S. Department of Energy's largest research centers. It is also the nation's first national laboratory, chartered in 1946. The open house is part of the Laboratory's 60th anniversary celebration.

Argonne is managed by the UChicago Argonne, LLC for the U.S. Department of Energy. The Laboratory has about 2,900 employees, including about 1,000 scientists and engineers, of whom about 750 hold doctorate degrees. Argonne's annual operating budget of about \$475 million supports upwards of 200 research projects in five broad areas: basic science, scientific facilities, energy resources, environmental management, and homeland security. Since 1990, Argonne has worked with more than 600 companies and numerous federal agencies and other organizations.

Argonne is a direct descendant of the University of Chicago's Metallurgical Laboratory, part of the World War II Manhattan Project. It was at the Met Lab where, on Dec. 2, 1942, Enrico Fermi and about 50 colleagues created the world's first controlled nuclear chain reaction in a squash court at the University of Chicago. After the war, Argonne was given the mission of developing nuclear reactors for peaceful purposes. Over the years, Argonne's research expanded to include many other areas of science, engineering, and technology. Argonne is not and never has been a weapons laboratory.



Visitor Safety . . .

Argonne is dedicated to safety in all our activities. Observance of a few rules and safety precautions will make the 2006 Open House more enjoyable for everyone:

- Please adhere to all Illinois traffic laws. Helmets are required while on site if you are riding a motorcycle, bicycle, or using any wheeled sporting equipment.
- In case of serious illness, injury, or vehicle accidents, please use any Laboratory telephone to dial 911. Contact any Argonne staff member to give you assistance.
- Alcohol, firearms, and weapons are not allowed on site.
- Incoming calls for information or emergency situations should be made to 630-252-2525.
- In the event of inclement weather, a siren will sound. Please follow an Argonne host wearing a white baseball hat imprinted with Argonne National Laboratory to the nearest building and seek shelter.

If You Have a ?
Question or Need
Assistance. . . ? ?

The information booths near Buildings 203 and 362 are open throughout the day for questions about activities or services. Information is also readily available around the Laboratory from Argonne hosts wearing white baseball hats imprinted with Argonne National Laboratory.

Shuttle Service

Free on-site shuttle service is available throughout the day. It is recommended that visitors park their vehicles and use the shuttle service. Included in our fleet is a hydrogen-powered internal combustion engine shuttle bus (see Bldg. 362 Transportation for more information). Please see the map for the location of parking and shuttle stops around the site.

Free off-site shuttle service is available for visitors parking at Argonne Park, located on Cass Avenue. This service will continue until 5 pm.



If You Only Have an Hour. . .

Limit your visit to either the 200, 300, or 400 areas. Follow the signs to walk to one or two highlights.

Some Possibilities:

Most of the buildings in the 200 area will take approximately 45 minutes to one hour to tour, depending upon your interest.

Others are:

- Building 362 - Advanced Transportation Technologies, Technical Services, Cancer Research, & the Hyde Park Art Center
- Buildings 401 and 440 – Advanced Photon Source & Center for Nanoscale Materials
- Buildings 360 and 366 – Intense Pulsed Neutron Source & High Energy Physics

Food Service



Food and beverages are available for purchase at Buildings 213 and 401. Refreshments and snacks are available for purchase near Buildings 200 and 362.

Featured Presentations

There is limited seating for all shows. Use the on-site shuttle service to all presentation locations.

Getting Excited About Science – Bldg. 200 on the lawn
30-minute show at 10 am, 12 pm, 2 pm

Physics of the Blues – Bldg. 401 auditorium
45-minute show at 10:30 am, 1:30 pm

Glassblowing Demonstration – Bldg. 401 auditorium
30-minute show at 11:30 am, 12:30 pm, 2:30 pm

The Science of Hydrogen and Hydrogen Safety – Bldg. 200 auditorium
(stairs only to auditorium) 30-minute show at 10:45 am, 12:45 pm, 2:45 pm

Photos Permitted. . .

Taking of photographs and videotaping is permitted.



About the White Deer. . .



Visitors to Argonne are sometimes startled by the white deer roaming the site and occasionally speculate on the nature of the experiment that produced their unusual coloring.

But the deer are perfectly normal fallow deer (*Dama dama*), a naturally light-colored species native to North Africa,

Europe and parts of Asia. There are about 40 on the Argonne site.

The white deer herd began as a herd of 38 animals roaming the estate of Gustav Freund, inventor of “skinless” casings for hot dogs. It had grown from eight or nine, a gift or purchase from Chicago clothier Maurice L. Rothchild. Argonne is located on the old Freund estate.

The deer roam freely on the Argonne site; sometimes wandering through the entrances and ending up as far away as Lockport, 12 miles from the Laboratory, and Fermilab, 17 miles away. But most stay within the Laboratory’s confines. Argonne does not own the deer, or feed them.

The Laboratory is also home to about 60 native white-tailed deer, commonly referred to at Argonne as “brown deer” to distinguish them from their light-colored cousins. The two species tolerate each other. They tend not to compete for food: whitetails are browsers, eating mostly leaves, while the fallow deer are grazers, partial to the abundant mown grass on the site. White-tailed and fallow deer cannot interbreed.

Look Us Up on the Internet

After your visit to the Laboratory you can find more information about the projects you have seen, as well as regularly updated news about Argonne’s research findings, on our web site at www.anl.gov. Tell us about your open house experience by completing our on-line survey.



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Argonne

Acknowledgments...

Argonne would like to acknowledge and thank the following organizations for their assistance and/or participation in the 2006 Open House:

Adler Planetarium
Argonne Amateur Radio Club
Argonne Credit Union
Bright Horizons Family Solutions
BWX Technologies, Inc.
Caterpillar, Inc.
Chicago Biomedical Consortium
DaimlerChrysler Corporation
DuPage County Emergency Management and Homeland Security
Electro-Motive Diesel, Inc.
Fermi National Accelerator Laboratory
Ford Motor Company
General Motors Corporation
Guckenheimer Enterprises, Inc.
Hyde Park Art Center
IBM
Illinois Institute of Technology
Jacobs Engineering Group Inc.
National Cancer Institute
National Institute of General Medical Sciences
Northwestern University
Sodexo
UChicago Argonne, LLC
United States Department of Energy
University of Chicago

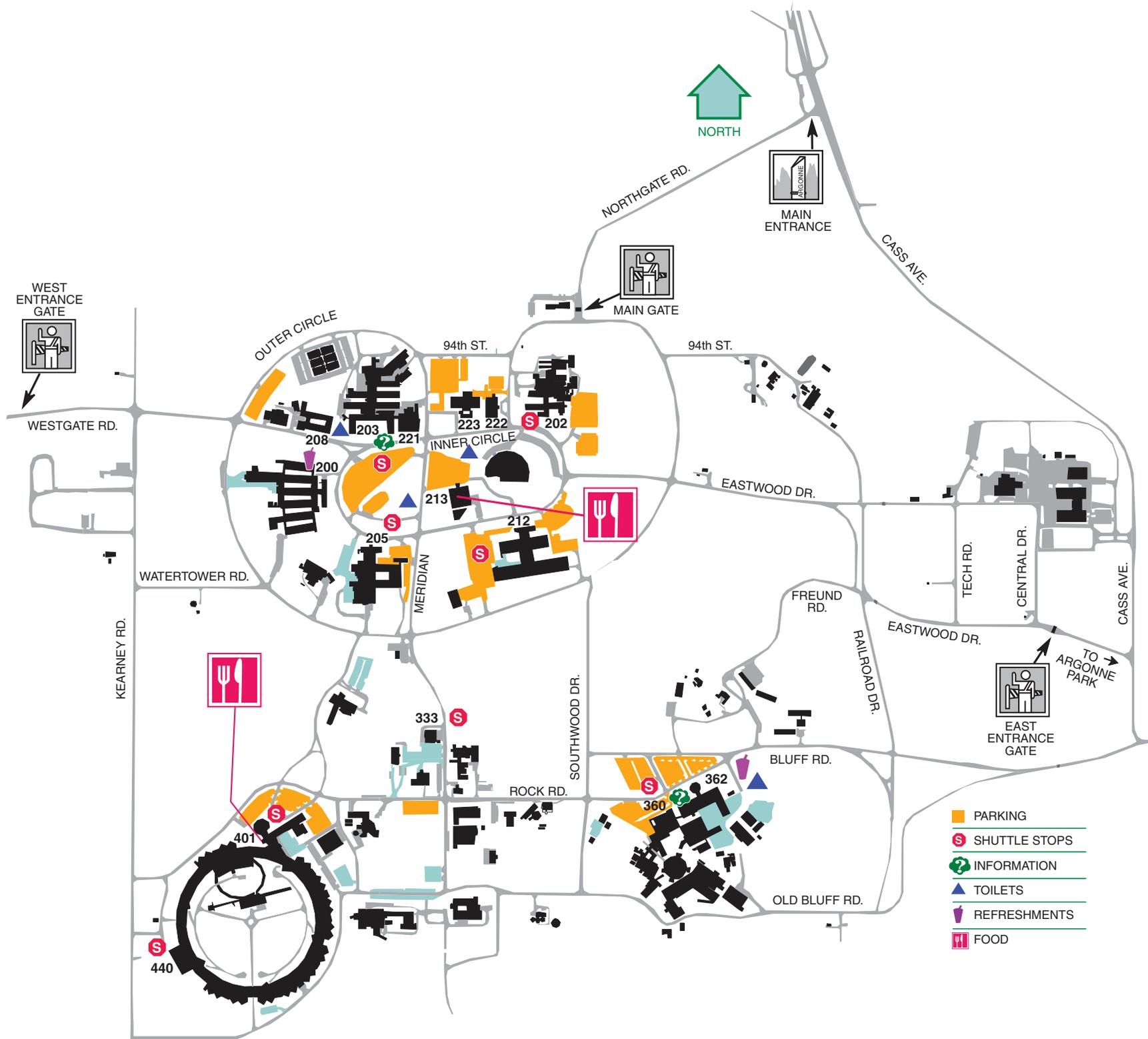
- Cancer Research Center and the Center for Clinical Cancer Genetics
- Center for Elementary Math and Science
- Chicago Materials Research Center
- Chicago Public Schools Internet Project
- Kavli Institute for Cosmological Physics
- Science and Technology Outreach and Mentoring Program
- University Admissions

University of Chicago – Argonne National Laboratory Joint Centers

- Advanced Simulation and Computing/Alliances Center for Astrophysical Thermonuclear Flashes
- Computation Institute
- Consortium for Nanoscience Research
- Emergency Resuscitation Center
- Howard T. Ricketts Regional Biocontainment Laboratory
- Joint Institute for Nuclear Astrophysics

University of Illinois at Chicago
University of Illinois at Urbana-Champaign
University of Wisconsin-Madison
University of Wisconsin-Stevens Point

.... And a special thank you to all the Argonne staff for volunteering their time to this event.



-  PARKING
-  SHUTTLE STOPS
-  INFORMATION
-  TOILETS
-  REFRESHMENTS
-  FOOD

Events & Activities

202 Biosciences

Inside the building

- Learn about NanoBio and nanotechnology; how is it changing biological and medical research?
- See how a robot system is used for molecular biology experiments; “Race the Robot” in a speed challenge.
- Learn about microbes to the rescue — remediation using naturally occurring processes.
- See a demonstration of protein purification, crystallization, and structure determination; view 3-D images of novel protein structures.
- View human capillaries and brain cells in culture under a microscope.
- Learn about proteins from rust-breathing bacteria that clean up the environment and produce electricity.

On the lawn

- Learn about osteoporosis and the environment – what is your risk?
- View membrane protein crystals under a microscope.
- Learn about biofuels – they can be homegrown in Illinois to help reduce our dependence on petroleum.
- Play the Beanbag Enzyme game.
- Find out about Argonne’s biochip for detection and diagnostics.
- Learn about the Howard T. Ricketts Center Regional Biocontainment Laboratory; participate in a hands-on demonstration of how germs are transmitted.
- Visit the Chicago Biomedical Consortium exhibit; learn about proteomics.

222 Computing and Information Systems

Visit the experts and learn about:

- Using wireless networking at home.
- Integrating digital music libraries.
- Sharing files and printers in a home network.
- Children and the Internet – cyber security.

223 Educational Programs, Astronomy, Astrophysics & Science Careers

Inside the building

- Strap on special 3-D glasses to explore the outer edges of the Universe.

On the lawn

- Learn about Argonne’s educational programs.
- See demonstrations on (1) The Science of Toys, (2) Electricity and Magnetism/Air Pressure, (3) Forensics, (4) Microscopy, and (5) Cryogenics.
- Visit with the Adler Planetarium and Astronomy Museum for daytime telescope viewing of the Sun; find out about global climate change and future energy technologies.
- Play on-line and board math games.
- Virtually explore Ancient Mesopotamia, the Middle East, the stars, and more.
- Find out why stars blow up; learn how we understand things we cannot see.

- Explore the stars through books and drawing; participate in a painting workshop.
- Find out about the CNO cycle and play the CNO Card Game.
- Play on-line games in nuclear astrophysics.
- Use colored light to identify stars by their fingerprints.
- Make your own impact craters and learn what they can tell us about violent collisions like the giant meteorite impact that may have killed the dinosaurs.
- Discover the power of hydraulics.
- See how telescopes in Antarctica can detect ancient light from the infant universe.
- Learn about careers at Argonne.
- Network with Argonne scientists and engineers about growing research and development areas.
- Build models and learn how big and far apart things are in the solar system.
- Help make and taste ice cream made with liquid that is over 300 degrees Fahrenheit below zero.

221 Mathematics and Computer Science

- Visualize blood as it flows through arteries on an 8’x15’ tiled display wall.
- View Argonne’s supercomputers and learn about teraflops.
- Learn how scientists use bioinformatics to compare the evolution of protein families.
- Check how good your diet is by using our web-based optimization software.
- Watch the formation of a hurricane.
- Learn how Argonne is addressing the world’s energy problem through the use of biofuels.
- Try your luck at math games – child vs. adult teams welcome.
- Watch a star explode on a 12-million pixel, high-resolution tiled display.
- See how physician-scientists share stereo 3-D x-rays among multiple locations.
- Find out what Zoid, Selfish, and Ktau have to do with Blue Gene/L, one of the world’s fastest supercomputers.
- Learn about the science that can be done with a petaflop of computer power.

203 Physics, Environmental Science, Climate Research, Technology Transfer & Education

Inside the building

- Watch a light and optics show.
- Explore the valley of stability.
- Find surprising sources of radioactivity.
- Chat with a physicist about the Universe.
- Walk through an accelerator and learn how to control one.
- Learn about Ion-Sourcery.
- Have fun with extreme cold.
- View a chain reaction.
- Turn matter into energy ($E=mc^2$)
- Visit the Gammasphere seen in the movie “The Hulk.”

On the lawn

- Find out about the Mae Phosop Simulation System.
- Learn about weather and climate research.
- Learn about Fermilab, home of the world’s most powerful particle collider, see if you can outrun the gravity accelerator or make a piece of conductor float in the air.

- Find out about the “hottest” technologies from the past four decades, including start-up companies using Argonne’s technologies; view samples of past and present work.
- Visualize our local, national, and international environmental projects with interactive 3-D maps.
- Explore projects in energy (wind energy, tar sands, ocean), the environment (chemical and radioactive remediation, meteorological measurements) and in national security (monitoring the conversion of Russian nuclear weapons).
- Build your own 3-D earth.
- Participate in a survey on environmental issues.
- Explore the mysteries of magnets.
- Visit with members from the Women in Science and Technology Program.

208 Nuclear Engineering & Environment, Safety, and Health

Inside the building

- Learn how a nuclear reactor works.
- Learn how nuclear energy can help meet America’s needs for safe and secure energy without contributing to global warming.
- Visit the nuclear energy history exhibit that highlights our pioneering role in developing peaceful uses of nuclear technology used by major nuclear power plants throughout the world.
- “Virtually” visit nuclear facilities and power plants around the world by computer.
- Learn about Argonne’s key role in the worldwide effort to use advanced nuclear technologies that enhance energy security and promote nonproliferation.
- Learn what Argonne is doing to convert research reactors around the world to the use of non-weapons-grade materials to reduce the spread of nuclear weapons.

On the lawn

- Learn how we helped NASA return the Space Shuttle back to flight after the Columbia accident.
- Learn how millimeter/microwaves can be used to remotely detect explosives or toxic chemicals.
- See some of the exotic equipment and tools used to decontaminate and decommission nuclear facilities.
- Learn how Argonne monitors its air, water, and soil to protect the environment at the Laboratory and surrounding communities.
- See how Argonne workers are protected, including a display of personal protective equipment.
- Receive a Material Safety Data Sheet for common chemical products.
- Watch a radiation monitoring demonstration.
- Hear about Argonne’s land management and habitat restoration programs.

200 Chemistry & Emergency Resuscitation

Inside the building

- Learn about new “green” solvents for industrial processes.
- Be enlightened! See demonstrations about light and its scientific uses, from x-rays to lasers.
- Learn how natural processes affect water quality.
- Learn about light moving through nanostructures, trajectory calculations, and roaming atom reactions.
- Gain insight into the structure of matter using particles of light.

- Test your sense of smell against an electronic nose – who will win?
- Discover some of the fundamental mechanisms and materials for converting solar energy into electricity and fuels.
- See “The Science of Hydrogen and Hydrogen Safety” in the auditorium (see Featured Presentations for more information).

On the lawn

- Learn about the past, present, and future of Cardiopulmonary Resuscitation (CPR): participate in a 30-minute CPR class conducted every hour starting at 10 am until 4 pm for participants 18 and older. Register early. Limited availability.
- See how ice slurry can be used to sustain the heart and brain cells after a cardiac arrest.
- Watch the “Getting Excited About Science” show (see Featured Presentations for more details).

205 Chemical Engineering

In the building

See how chemical engineering is helping to shape your energy future:

- Find out how batteries, fuel cells, and alternative fuels can give us “petroleum-free roads.”
- Learn what the nuclear fuel cycle is and how it can be “closed.”
- Learn what Argonne is doing that can help minimize nuclear waste and recycle nuclear fuel.

On the lawn

Be a chemical engineer!

- Work in a glovebox.
- Test your skills using a robotic manipulator.
- Do hands-on “experiments” and “analysis.”

401 Advanced Photon Source

- Tour the Advanced Photon Source (APS), the billion-dollar U.S. Department of Energy research facility where scientists use the Western Hemisphere’s brightest x-ray beams to gather new information that promises to impact nearly every aspect of our lives.
- Learn how researchers from around the world study the molecular structures of man-made materials and natural organisms in order to (1) further the development of our critical technologies and disease-fighting pharmaceuticals; (2) learn more about outer space and inner Earth; and (3) make our nation more secure.
- Get an up-close look at some of the cutting-edge technology that produces the x-ray beams; talk to researchers behind the science and technology.
- Hear the “Physics of the Blues” in the auditorium as the commonalities between music and science are explored in words and sounds (see Featured Presentations for more detail).
- See a “Scientific Glassblowing Demonstration” in the auditorium (see Featured Presentations for more detail).
- Watch skilled craftspersons as they demonstrate a variety of machines used in the creation of one-of-a-kind tools and instruments used by Argonne researchers; receive a souvenir.
- View a display of the optical components used in the APS beamlines.

440 Center for Nanoscale Materials — Nanotechnology, Physical Sciences & Materials

- Visit the Center for Nanoscale Materials (CNM), Argonne's newest research facility, built with funds from the U.S. Department of Energy and the State of Illinois.
- Learn about the building blocks of fundamental science at the nanoscale, the world of the very small.
- Hear how CNM research will address the challenge of creating inexpensive, abundant, and efficient energy alternatives that meet America's energy security needs.
- Learn how ultrananocrystalline diamond films are helping to restore sight to people blinded by retina degeneration.
- Find out where materials science meets art and art meets materials science.
- What is the "nano" revolution – what do nanoscientists study?
- See demonstrations on nanocrystals' interaction with light and nanostructured magnetic materials for high-density hard drives.

333 Fire Department, Emergency Management & Medical

- View displays and interactive demonstrations of fire department apparatus and firefighting equipment.
- Learn about Argonne's Emergency Management Program.
- Visit emergency management mobile command posts from DuPage County and talk with emergency management personnel.
- Learn about the Avian Flu and the potential for a Pandemic.
- Receive information on hypertension, cholesterol, and diabetes.
- Check your blood pressure.

300 Area Shuttle Tour for Bldgs. 360 and 366

360 Intense Pulsed Neutron Source

- Tour the Intense Pulsed Neutron Source Facility (IPNS).
- Learn how neutron beams are produced and how they are used.
- Explore the machines that scientists are using to look into atoms and molecules, and to discover the structure of matter.
- Learn how IPNS science is helping to pave the path into the future.

At the end of your IPNS tour, ride the Buildings 360/366 shuttle bus to High Energy Physics.

366 High Energy Physics

- See electrons accelerate by surfing on electromagnetic waves; get up close and personal with the Wakefield Accelerator.
- Learn about the compact accelerator that could be near you in your doctor's office.
- See cosmic rays from space in a cloud chamber.
- Discover how physicists identify particles created by a high-energy collision.
- View cosmic rays as the Tracking Imaging Cerenkov Experiment telescope images cosmic air showers.
- Detect cosmic rays from other galaxies, meteors, airplanes, and lightning using a reflected TV signal and simple antenna.
- Learn how to detect particles that can easily pass through, but not interact with, the earth.
- What is a gluon? Why do we need such a large particle accelerator? Do physicists really have charmed quarks? Ask these and other questions at the Ask a High Energy Physicist booth.
- Learn about Fermilab and Argonne's role in the International Linear Collider.
- Receive a free bag of popcorn.

362 Advanced Transportation Technologies, Technical Services, Cancer Research & the Hyde Park Art Center

Inside the building

- Learn about cancer detection, prevention, diagnosis, and treatment with 30-minute presentations in the auditorium every hour.
- Discover your risk for cancer; learn how your family history increases the risk.
- Participate in an interactive computerized risk assessment on cancer.
- Explore the cancer risk measures that most likely apply to you.
- Learn about hereditary cancer syndromes and genetic testing.
- See how designers and engineers use computers to build and visualize representations of complex designs for scientific projects, including a virtual 3-D walk-through of some examples.

On the lawn

- Learn how Argonne's transportation research program is partnering with industry to reduce America's petroleum dependence.
- See laser images of fuel injector sprays from deep inside a diesel locomotive engine; learn about improvements in locomotive engines.
- See hybrid-electric and fuel cell vehicles; learn how a fuel cell works.
- Ride in the shuttle bus powered by a hydrogen internal combustion engine (Bldgs. 360/366 shuttle).
- View the "more electric truck" that could revolutionize the heavy-duty trucking industry.
- Learn about Argonne's advanced battery technology research.
- Learn about advanced vehicle student competitions; see the 2006 University of Wisconsin's ChallengeX vehicle.
- See ethanol vehicles; learn about Argonne's GREET model that shows ethanol's role in reducing petroleum use.
- See the Mobile Automotive Technology Testbed for evaluating advanced powertrain technologies, including the plug-in hybrid vehicle.

- Learn about the Powertrain Systems Analysis Toolkit used by government and industry to develop hybrid vehicle powertrain controls.
- Find out how an Argonne process recycles the plastic and foam from junked vehicles and home appliances to convert recycled materials into quality products.
- Learn how reducing heavy vehicle idling can save energy and reduce emissions.
- Learn about Argonne's near-frictionless carbon coating.
- Relax and enjoy our mini-theater:
 - Learn about the design, creation, and use of precision scientific instruments created by Argonne Central Shops.
 - Fire up those neurons! Test your knowledge of science and Argonne trivia gathered by Argonne librarians.
- It's you against the laws of physics; try your hand at the Beanbag Toss and claim your prize.
- Prove your ability to time travel; pose for a photo with Einstein or another historic luminary.
- Play with probability; register for a chance to win prizes.
- Learn what your bones are made of and what makes your body move.
- Find out if different kinds of oranges have different amounts of Vitamin C. Discover which apple is the sweetest.
- Join the Hyde Park Art Center to learn how technology is making possible innovative new art forms; unleash your creativity with exciting hands-on activities.
- View a scaled-down demonstration of Random Sky, the inaugural piece for the Hyde Park Art Center's 80-ft long x 10-ft high projection façade.
- Visit with a representative from the University of Chicago to learn about admissions and financial aid from 11 am to 2 pm.
- Learn about the Community Leaders Round Table.
- Visit with representatives from Bright Horizons Family Solutions and learn about Argonne's Child Development Center.
- Talk to representatives from the Argonne Credit Union.
- Purchase Argonne logo wear.

212 Electron Microscopy Center

Visit the Electron Microscopy Center that houses several electron microscopes. Learn how scientists are able to view a sample with magnification of over 1 million times while atoms from the accelerator impact it. Through careful choice of the types of particles, their speed, the sample type, and the sample temperature, learn how scientists study:

- Basic properties of materials by introducing defects into their crystal structures and observing the interactions between the defects and their surroundings.
- The processes by which crystalline materials become glass.
- The performance of materials being developed for future nuclear reactors, in a simulated reactor environment.
- The suitability of materials for nuclear waste storage over long periods.
- The changes that take place in space dust over billions of years.

213 Argonne Partnerships

- Hear why it takes more than scientists to do great science.
- Find out about Argonne's 60-plus year relationship with The University of Chicago and learn about the UChicago Argonne, LLC, Argonne's new management organization. Hear about the role industrial partners, Jacobs Engineering Inc. and BWX Technologies, Inc., will play in the operation of Argonne and learn about the LLC's important alliances with Northwestern University and the University of Illinois at Urbana-Champaign and the University of Illinois at Chicago.