

A new look at old fission mysteries

by Todd Hanson

When theoretical physicist Peter Möller of Nuclear Physics (T-16) worked on his thesis at Los Alamos in 1973, his calculation of the nuclear potential energy for 175 different nuclear shapes, or grid points, pushed the limits of existing computational power. Using one IBM computer punch card to define each grid point, Möller's total input data card deck for the calculation was about one inch thick.

Much has changed in the field of high-performance computing and modeling since Möller did that calculation. Punched cards are obsolete, computing has become ubiquitous and Laboratory physicists like Möller now use computers to explore their theoretical models in previously unimaginable detail. Faster, more powerful computers mean that the number of grid points or data sets (in this case the number of nuclear shapes) that can be investigated can now run in the hundreds of thousands or even millions.

Recently, Möller, together with David Madland and Arnold Sierk, both



Theoretical physicist Peter Möller of Nuclear Physics (T-16) shuffles a deck of computer punch cards made obsolete by modern computers. The Avalon cluster of 144 interconnected computers, in the background, greatly expands the scientist's ability to define different nuclear shapes. Photo by LeRoy N. Sanchez

of T-16, and Akira Iwamoto of the Japan Atomic Energy Research Institute, had yet another chance to push the limits of computational power at Los Alamos and at the same time help to further unravel one of the great mysteries in nuclear science — the process of nuclear fission.

Since its discovery in 1938, the phenomenon of fission has frequently been explained in terms of a liquid drop. In such a depiction, when a nucleus starts to deform the energy increases, caused by the surface tension of the drop. If the nucleus deforms but is stopped early in the deformation process, it snaps back to its original

shape just like a rubber band that is pulled out and released. But if the nucleus is deformed beyond a certain configuration, beyond a point of no return, it snaps and, like the rubber band, the two fragments fly apart.

Möller's computer model is based upon a similar analogy of a ball being pushed up toward a mountain pass. The pass itself represents the point of no return: after being crossed the ball will roll down into another mountain valley. The height of the mountain pass corresponds to the threshold energy of the fissioning nucleus. Since a five-dimensional energy

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The following is an excerpt from Director John Browne's congressional testimony before the Strategic Forces Subcommittee of the Senate Armed Services Committee on April 25.

The Laboratory believes that there are three distinct areas that must be addressed to ensure infrastructure sustainability to meet our mission set. These areas include the following: Implementing formal facilities consolidation and cost reduction initiatives to reduce facility footprints, which in turn reduces operating costs and improves safety, security and scientific interactions; addressing unfunded, high-priority facility maintenance backlogs before they become expensive emergency repairs; and investing in new construction projects,

where appropriate and economically feasible, to ensure that the Laboratory can meet programmatic mission needs over the next 20 to 40 years.

These all require commitments to achieve positive results, but will realize return on investment through reduced operating costs (maintenance and energy) and increased technical productivity. In addition, each addresses safety and security needs and allows Laboratory facilities to be sustainable over the next 20 to 40 years.

Past and present difficulties notwithstanding, we are hard at work in the National Nuclear Security Administration and are meeting our assigned tasks to the best of our abilities. I believe strongly that there is no more competent and dedicated group of people for these tasks than can be found in the NNSA laboratories and production plants.

A new look ...

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landscape cannot be visualized on a two-dimensional sheet of paper, unlike that of a geographical map, a challenge in the group's research was to establish which of the many passes in the five-dimensional energy landscape represented the relevant fission threshold. This problem was solved by considering, in the computer model, imaginary water flowing in five dimensions.

Möller's model used nearly three million physical grid points to define critical shape coordinates related to various aspects of elongation, neck diameter, emerging fragment deformation and mass division in the fission of radium and fermium.

Because several million grid points and five shape dimensions are required to reach a sufficient level of physical detail to adequately describe fission, structures such as those revealed in the calculation by Möller and his collaborators had never before been seen or identified in nuclear structure calculations.

The results of this groundbreaking research have allowed a number of fundamental conclusions to be drawn about the fission process. First, there are several fission paths possible for most heavier nuclei, which means the

fission process is more complex than is accounted for in most existing models. Second, for lighter actinide elements like radium and thorium, two paths dominate: one mass asymmetric, with division into unequal fragment masses, and another mass symmetric with equal fragment masses. Finally, the calculations are in agreement with experimental observations for elements lighter than fermium — that agreement being that the average kinetic energy is higher for the asymmetric mode than for the symmetric mode. The calculations also reproduce, for the first time, the average fragment masses observed in fission. A detailed account of the work appeared in the Feb. 15 issue of the journal *Nature*.

The net result of this research is a greater and more comprehensive understanding of nuclear structure and the underlying mechanisms behind nuclear fission. The new insight into fission obtained from the computer studies by Möller and his colleagues are expected to lead to improvements in related models associated with science-based stockpile stewardship, the safe storage of nuclear waste and even the synthesis of elements in supernovae.

The group's most recent calculations required about 2,000 CPU days of computer time to process and were performed on the Avalon cluster at

Los Alamos — a group of 144 interconnected computers running at 500-MHz each. Funding from the Department of Energy's Offices of Defense Programs and Science supported Möller's work.



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Seeing orange in the TA-3 area

Barrels and cones mark construction

by James E. Rickman

Myriad construction projects in the Lab's Technical Area 3, from roadways to building demolition, provide workers and passersby with ample opportunities to practice patience and safety awareness. Here is abbreviated information about some of the projects. See the online Daily Newsbulletin (May 23 and 29) for complete stories.

Changes to roads, traffic signals and signs already have begun and will continue for the next several weeks. Roads affected are

- Diamond Drive from Omega Bridge south to Pajarito Road;
- East and West Jemez roads;
- Pajarito Road from Diamond Drive to N.M. 4; and
- West Road from Fairway Drive to West Jemez Road.

East Jemez Road — Crews eliminated a passing zone located between the County Landfill entrance and Royal Crest Mobile Home Park.

Two passing zones between the Protection Technology Los Alamos Firing Site and the beginning of the westbound uphill passing lane will be eliminated.

Diamond Drive/Eniwetok Road intersection — Redundant signals for left-turn movement off Diamond Drive have been added in both directions. Crews also have eliminated right turn signals on Eniwetok for motorists entering Diamond Drive from that road.

West Jemez/Bikini Road intersection — Crews have changed the stoplight at the intersection from flashing to a fully operational mode.

Diamond Drive/Sigma Road intersection — Redundant signals for left-turn movement off Diamond Drive are being added in both directions. Crews also will be eliminating the protected left-turn arrows on both sides of Sigma Road, potentially affecting motorists turning onto Diamond Drive from Sigma Road.

Pajarito Road — Crews are eliminating or modifying some of the passing zones on Pajarito Road to accommodate minimum acceptable passing sight distances.

The upcoming project on Diamond Drive from Omega Bridge to Pajarito Road will change that section of road to one lane in each direction with a continuous center turn lane and designated left-turn bays at Eniwetok Road, Sigma Road and Pajarito Road.

Pedestrians using the sidewalks parallel to Diamond Drive in that area may be affected by the road work. The changes also will affect West Jemez Road motorists who want to travel southbound on Diamond Drive or Pajarito Road and those who want to travel northbound on Diamond Drive, because those motorists will have to merge into one lane of traffic.

Laboratory employees located near the "Horseshoe" area of Technical Area 3 may experience some inconveniences as crews begin demolishing the Sherwood Building and the old Credit Union Building.

Crews are scheduled to begin fence-siting work around the demolition area. The fence perimeter will be marked with small white flags. In addition, workers have begun rerouting utilities lines in preparation for actual building demolition work.

The work will affect those located in the environs of the Sherwood

Building (SM-105); the old Credit Union Building (SM-452), former home of the Business Operations (BUS) Division Office; and trailers that formerly housed the Institute for Geophysics and Planetary Physics (SM-400, -401, -402 and -403). Construction crews are asking people, for safety's sake, to steer clear of the area during the fencing, utilities relocation and demolition phases of the project.

Employees near the demolition area should be prepared for noise. Huge truck-mounted jackhammers will break up the buildings and heavy equipment will scoop up the rubble.

In addition, the motorcycle parking spaces located between the Otowi Building and the former BUS Division Office will disappear because of the scheduled demolition work on SM-105 and SM-452.

Questions or concerns about the project? Contact Henry Nunes, Facilities and Waste Operations (FWO-D) at 7-2970, or write to hpnunes@lanl.gov by e-mail

Check the Daily Newsbulletin at <http://www.lanl.gov/newsbulletin> for information updates on road construction projects. Any questions about the road construction and related changes should be directed to Dick Fox of Utilities and Infrastructure (FWO-UI) by calling 7-9116 or by writing to fox@lanl.gov by e-mail.



Work to prepare the buildings that formerly housed the Institute for Geophysics and Planetary Physics (IGPP) for removal stepped up earlier this month with construction workers jackhammering off entrance stairs. In addition, shrubbery was removed to accommodate getting the structures off site. Photo by LeRoy N. Sanchez



Espionage while on foreign travel

by Kevin Roark

Are employees ever really targeted for espionage while on foreign travel?

The answer is yes. In the past three months, there have been 52 incidents involving Department of Energy travelers in foreign countries.

An incident is defined generally as any unusual occurrence that a traveler reports to counterintelligence, which is part of the Lab's Internal Security (ISEC) Division. Some of the incidents reported include travelers having their hotel rooms or luggage suspiciously searched, their laptop computers disturbed, their belongings tampered with and having their visit hosts mysteriously know a lot more than they should.

Employees, both in person and by e-mail, have been directly and indirectly solicited for secret, confidential, sensitive and proprietary information, export-controlled materials and inappropriate information about colleagues. Some of the individuals soliciting the information have misrepresented their true identities, as well.

"The message here is that while on foreign travel, Laboratory employees really have to be aware of

intelligence gathering methods," said Ken Schiffer, ISEC director. "This applies for both official travel and unofficial travel."

DOE Order 470.2 requires cleared employees to report any unofficial travel to sensitive countries. The traveler also must undergo counterintelligence pre-travel brief and post-travel debrief. This may apply even if an employee's clearance has been terminated within a five-year period.

All employees on unofficial travel must report any attempt to access classified or sensitive information, technology or special nuclear materials. It also is required to report any suspicion or belief that you may be a target of an attempted exploitation.

According to DOE Order 551.1A, all employees, cleared and uncleared, who go on official travel to a sensitive country or official travel to any country that in any way involves a sensitive subject must report the travel and participate in both a brief and debrief. In addition, they must submit a trip report within 30 days of returning to their duty station and receive both annual counterintelligence awareness and annual security briefings.

For more information on foreign travel requirements and counterintelligence contact ISEC at 5-6090.

NEWS FROM UC

One-time UCRP Service Credit Allocation

If you have worked as a temporary staff employee at some time during your University of California career, you may be eligible to receive additional retirement plan service credit, and increase the value of your future retirement benefits, under a special program called the One-time UCRP Service Credit Allocation. The Regents recently approved this program to provide UC Retirement Plan service credit to certain eligible UCRP members in recognition of past time worked in temporary positions.

Later this year, employees who meet the program's criteria will be notified that they've received an automatic allocation of either one or two years of UCRP service credit. This automatic allocation is based on the best available records, and it is possible that it will not identify everyone who is eligible. If you do not receive notice that you received the automatic allocation, you still may be eligible to request an allocation based on your past time worked in a temporary position.

To be eligible to receive the service credit allocation, you must first meet all three of the following basic criteria:

- You must have been in active staff appointment at UC on Jan. 1
- Either you must have been an active UCRP member on Jan. 1 or if

you were not, you must become an active UCRP member by Dec. 31.

- You must have had a period of temporary employment at UC that lasted at least six months.

Certain individuals are not eligible for this program. These include UC employees who, as of Jan. 1, were working in a job category exempt from UCRP membership.

You should not try to obtain payroll records or submit an appeal until the allocation and appeals processes are in place. Watch for updates in your local newsletters and on the UCbencom Web site at www.ucop.edu/bencom for more information about this program.

See your Human Resources (HR) Division representative for more information.

Don't get burned this Fourth of July

by Judy Goldie

In a short time, we will be celebrating the birth of our nation. Tradition dictates that we set off fireworks to mark the occasion. This year, however, the fire danger in the area is so severe that roman candles, cherry bombs and sparklers may well be prohibited. In Los Alamos, for example, all those and firecrackers and rockets are banned. Just in case you do find occasion and the law permits, here are some guidelines to keep you safe from the Consumer Product Safety Commission and the National Council on Fireworks Safety.

It is extremely important to know the difference between a legal firework and a dangerous explosive device. Items such as M-80s, M-100s and "blockbusters" are not fireworks; they are federally banned explosives. They can cause serious injury or even death. Stay away from anything that isn't clearly labeled with the name of the item, the manufacturer's name and instructions for proper use.

Fireworks are not toys. Fireworks complying with strict regulations enacted by the U.S. Consumer Product Safety Commission in 1976 function primarily by burning to produce motion and visible or audible effects. They are burning at approximately the same temperature as a household match and can cause burn injuries and ignite clothing if used improperly.

Never give fireworks to young children. Close, adult supervision of all fireworks activities is mandatory. Even sparklers can be unsafe if used improperly.

Select and use only legal devices. If you choose to celebrate the Fourth of July with fireworks, check with your local police department to determine what fireworks can be legally discharged in your area. If you are aware of anyone selling illegal devices, contact your local police department.

Homemade fireworks are deadly. Never attempt to make your own devices, and do not purchase or use any kits that are advertised for making fireworks. Mixing and loading chemical powders is very dangerous and can kill or seriously injure you. Leave the making of fireworks to the experts.

Illegal fireworks continue to be a serious problem. Over the past 10 years, 25 to 30 percent of the injuries associated with fireworks have typically been caused by illegal explosives or homemade fireworks.

Fireworks Safety



Tips for a safe Fourth of July

- Always read and follow label directions
- Have an adult present
- Buy from reliable fireworks sellers
- Ignite outdoors
- Have water handy
- Never experiment or attempt to make your own fireworks
- Lite one at a time
- Don't handle "duds" — remove to a water-filler container with a shovel
- Never re-ignite malfunctioning fireworks
- Never give fireworks to small children
- Store fireworks in a cool, dry place
- Dispose of properly — first soak expended fireworks in a metal container overnight
- Never throw fireworks at another person
- Never carry fireworks in your pocket
- Never shoot fireworks in metal or glass containers

Did you know ...

- The first fireworks recorded in America were set off by an Englishman, Capt. John Smith, famous in the story of Pocahontas.
- Colored fireworks didn't exist until the 1800s.
- Three sparklers burning together generate the same heat as a blow-torch.
- The world's largest single firework was set off at a festival in Japan in 1988. The shell weighed more than half a metric ton and the burst was more than a kilometer across.
- Most firework injuries are caused by incidents in the street, closely followed by accidents at family backyard displays.
- Fireworks are prohibited on Laboratory property

Research Library receives quality award

by Chris Pearcy

In the wake of being named the Federal Library of the Year in 1999 by the Federal Library and Information Center Committee, the Lab's Research Library recently received a second award — the prestigious New Mexico Roadrunner Quality Award from the board of directors of Quality New Mexico.

The Research Library began its quality-improvement efforts in 1995 with customer-focused, process-driven business solutions that improved customer satisfaction and introduced product innovations to better serve the Laboratory community. By actively soliciting feedback from library patrons and then implementing changes based on

that feedback, the library was able to improve processes and increase or improve services offered to its patrons.

The New Mexico Quality Roadrunner Award recognizes organizations and businesses in New Mexico that have made significant progress on the road to excellence and have undergone an in-depth assessment and evaluation by a board of examiners for the New Mexico Quality Award.

For more information about the Research Library's quality improvement program, contact Lou Pray at 7-5906.



Ombuds Office increases services to students

by Judy Goldie

Emphasizing the importance of the Laboratory's student programs, the Ombuds Office has named Pavlo Quintana to head up that office's outreach effort to students.

Quintana has been employed at the Lab in different capacities as a student since June 1997 and has been with the Ombuds Office since November 1999. A graduate of Pojoaque High School and the University of New Mexico, Quintana was awarded his masters of administration and organizational management from the University of Phoenix last year.

Recognizing that all students, high school cooperative to postdoctoral levels, are the lifeblood not only of this institution but the basis for the successful future of science and engineering nationwide, the Laboratory has stepped up its services to that population to include a tailored Ombuds function.

Director John Browne has held student "town hall" meetings to listen to students' concerns and questions. The Lab wants its students to have worthwhile work experiences and to consider the Lab as an employer of choice.

In designing a new program for students, Ombudsman Bruce MacAllister said, "It is crucial for the future success of the Lab to ensure that all the students here have positive experiences during



Pavlo Quintana

their tenures." Meaningful work, well-prepared mentors and adequate compensation are necessary to nurture the student work force, he added.

"Much as when I started at the Lab, many students find themselves unaware of what's available to them

to make their experiences as pleasant and productive as possible," Quintana said. "I hope my experiences allow me to relate to students on a more personal and relevant level. The current average age of Lab employees is 48, so needless to say, generational differences can be awkward at times. I hope to help mesh the talents, philosophies and lifestyles of all the Lab's generations to benefit the institution now and into the future," said Quintana.

As will all other Ombuds Office services, confidentiality, neutrality and informality are underlying tenets, as is adherence to The Ombuds Association code of ethics (see the Ombuds Web site at <http://www.lanl.gov/ombuds/>).

This Ombuds initiative is designed to address concerns raised by the Student Association, former as well as current students and the general underlying perception that students have felt under-represented and uncomfortable using

various employee resources, much less knowing just what those resources are. This "student focused" Ombuds program is being implemented to better students' performances, work lives and overall experiences at Los Alamos.

Quintana can be reached at the Ombuds Office, directly by phone at 7-9330 or through options@lanl.gov, a special e-mail address for students. The Ombuds Program Office also has an "Ombuds Student Homepage" at <http://www.lanl.gov/ombuds/Studenthome.html>. See the Ombuds Program Office Web site <http://www.lanl.gov/ombuds/> for additional information about Ombuds Program policies, services and philosophy.

In Memoriam

Michael E. Jones

Laboratory employee Michael E. Jones passed away unexpectedly June 6. He was 49. Jones received his doctorate in plasma physics from Auburn University in 1978. Jones came to work for the Lab as a staff member with the former Particle Beam (T-15) group in 1978. At the time of his death, Jones was group leader of Plasma Physics (X-1).

June service anniversaries

5 years

Paul Arellano, NMT-8
Randy Balice, ESH-20
Geoffrey Brown, C-SIC
Michael Collier, SNS-03
Susan Coulter, CCN-5
Jason Cox, MST-OPS
Leslie Hansen, ESH-20
James Howse, CCS-3
Elizabeth Keating, EES-6
Alex Lacerda, MST-NHMFL
Anthony Ladino, ESH-20
Kathy Lao, C-ACS
Nancy Lujan, C-ACS
C.W. McConaha, NMT-3
Peggy Montoya, NMT-4
Robert Parker, NIS-5
Donivan Porterfield, C-AAC
Alice Slemmons, NMT-13
Yi-Ming Wang, SNS-02
Clare Webber, BUS-DO

10 years

David Bell, LANSCE-6
M. Carolyn Briles, P-21
Eric Brosha, MST-11
Jeffrey Bull, HR-7
William Buttler, P-23
Karen Cummings, LANSCE-5
Alverton Elliott, ESH-7
Christen Frankle, NIS-6
Richard Luce, STB-RL
Theodore Martinez, ESA-WE
Filippo Neri, LANSCE-1
Donna Richardson, NW-MM
Steven Taylor, EES-11

15 years

Joysree Aubrey, X-5
Bill Bennett, ESA-TSE
Barry Bryan, ESA-WMM
Gary Cooper, LANSCE-12
Helen Deaven, CCN-12
Jimmie Frybarger, CCN-18
Darryl Garcia, MST-OPS
Leroy Gonzales, BUS-5
Anthony Grieggs, ESH-19
Russell Gritzco, C-INC

Michele Gubernatis, C-AAC
George Hagedorn, ESA-WMM
William Harker, NIS-5
Marie Homan, HR-7
Florence Houghton, D-11
James Knudson, LANSCE-7
Charles Lee, IM-3
Robert Manzanares, NIS-6
Jody Niesen, ESA-WMM
Dennis Phillips, C-INC
Allyn Pratt, EES-9
Laurie Quon, IM-1
Donald Siebe, D-10
James Sturrock, LANSCE-6
Judith Valerio, MST-11
Michael Weaver, ESA-WE
Carol Wilkinson, DX-8

20 years

Rudy Abeyta, NMT-8
Ernesto Archuleta, CCN-2
Philip Barker, NIS-CSSE
Joachim Birn, NIS-1
Robert Brewer, IM-4
Maurice Bryson, NIS-NAC
Mary Carson, NIS-DO
Richard Castro, MST-6
Felix Chavez, NMT-8
Kerry Coffelt, BUS-2
Roderick Day, C-AAC
Donald Dreesen, EES-11
Barbara Herrera, NIS-9
Joyce Herrera, IM-4
Kenneth Hargis, E-WMOSR
Jack Hills, T-6
Lynn Jones, CCN-7
Donathon Krier, EES-6
Gene Maes, ESA-WMM
Benny Martinez, NIS-7
Myrna McDonald, NMT-15
Johnny Montoya, NMT-16
Carl Myers, E-DIV
Bart Ortiz, NMT-8
Stevan Patillo, MST-7
Richard Picard, D-1
Michele Poling, PM-DS
Carol Smith, BUS-4
Thomas Starke, E-ESO

Andy Steck, LANSCE-6
Glenn Thornton, MST-11
Patricia Trupp, NMT-4
Kenny Vigil, NMT-5
Mary Ann Vigil, DX-DO
Velda Volz, CCN-7
Richard Wallace, NIS-RNP
Stephen Wender, LANSCE-3
Lucretia Williams, ESH-1
Walter Wright, DX-2

25 Year

Shirley Busos, HR-5
Sarabel Bryson, NW-IFC
Julia Clements, MST-6
Laurence Creamer, DX-1
Marcella Cromeenes, BUS-1
Leopoldo Garcia, ESH-5
Frank Gonzales, HR-7
Jerome Kolar, NIS-4
Kathy Lovell, LANSCE-12
Gloria Martinez, BUS-1
Loyda Martinez, CCN-2
Marcella Mathieson, BUS-4
Randall Priddy, BUS-4
Joseph Raybun, LANSCE-7
John Roybal, NMT-5
Cheryl Sanchez, DX-2
Cecilia Sandoval, NMT-16
Benny Vigil, CCN-DO
Jesse Vigil, BUS-8
Marcus Voltin Jr., ESH-12
Roger Volz, CCN-2

30 Year

Esther Duran, BUS-2
L. Thomas Gonzales, NW-MM
Henry Olivas, DX-8
Roland Salazar, NMT-16
James Sanchez, ESH-1
Thomas Weaver, NIS-IT

35 Year

Jon Martin, B-2
Reid Zirkle, FWO-IIM

40 Year

Carl Henry, NIS-IT

This month in history

June

June 20, 1782 — Congress approves the Great Seal of the United States

June 8, 1887 — Herman Hollerith received a patent for his punch-card calculator. (Hollerith founded the Tabulating Machine Co. in 1896, which, through a series of mergers and reorganizations, eventually became IBM)

June 8, 1940 — Edwin M. McMillan and Philip Alberson announce the discovery of neptunium

June 1944 — Censorship is lifted on what was then believed to be one of the great discoveries of World War II — DDT

June 11, 1945 — The Franck Report urges a peaceful demonstration of atomic weapons rather than their use in war

June 14, 1951 — The world's first commercial computer, Univac I, is demonstrated in Philadelphia

June 29, 1954 — The Atomic Energy Commission votes against reinstating J. Robert Oppenheimer

June 28, 1974 — Vannevar Bush dies; he and his students built several early analog computers called "Differential Analyzers" to solve difficult differential equations. The machines became crucial to atomic research during World War II.

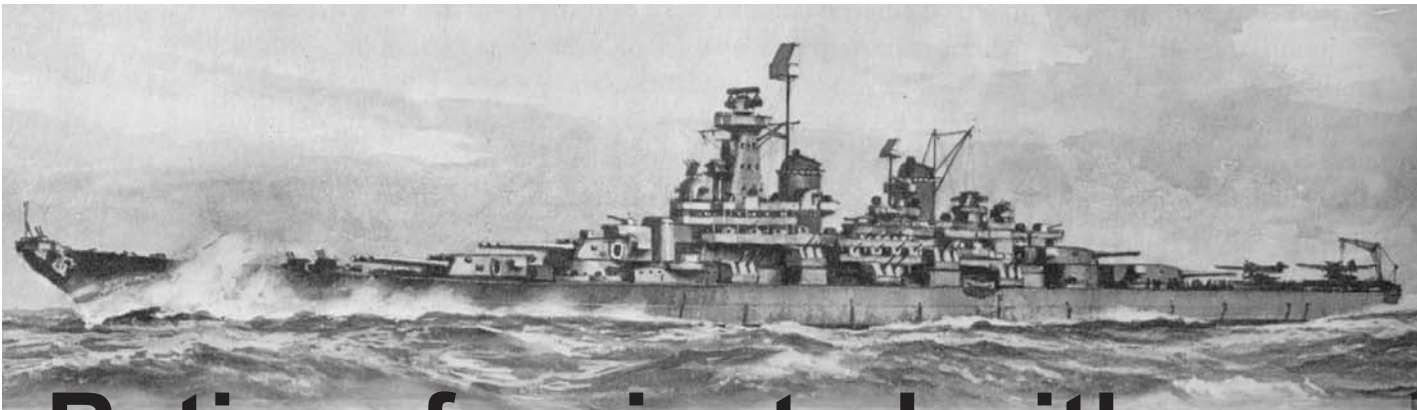
June 9, 1981 — Xerox introduces a PC, Xerox 820, the first office products company to enter the personal computer market

Lab to open its doors in September



The Laboratory has scheduled a "Family Day" on Saturday, Sept. 15, from 8 a.m. to 3 p.m. Access to secure areas for employees and their families is from 10 a.m. to 2 p.m. (pre-registration required by Aug. 15).

For more information and for secure-site registration, see the Family Day Web site at <http://int.lanl.gov/orgs/cr/familyday/>.



Retiree fascinated with history of battleships



**Lash
Hansborough**

by Michael Carlson

Lash Hansborough is officially full-steam ahead with his retirement from the Los Alamos Neutron Science Center (LANSCE), spending much of his free time constructing his own vessel, a 1/96 scale model of a Montana-class battleship.

He has been researching the fate of the Montana class, curious as to why the Navy canceled construction of five ships: USS Louisiana, USS New Hampshire, USS Maine, USS Ohio and USS Montana.

Congress ordered construction of the five ships in 1940. They would have been 925 feet long with a standard displacement of 60,500 tons, the largest battleships ever built. But the need for aircraft carriers, amphibious and antisubmarine vessels during the war resulted in the suspension of the Montana program in 1942.

And by 1943, it had been clear that battleships were no longer dominant in sea power, according to information on the Navy's Web site.

Hansborough believes a "perceived" wartime steel shortage contributed to the cancellation of the ships.

He has constructed the hull of a radio-controlled vessel and had most of the fittings at his retirement home in Crested Butte, Colo. The model will be more than 9-and-a-half-feet long, 15-inches wide and weigh about 160 pounds. Power for the four propellers will be supplied by a 12-volt automobile battery.

Not content with merely a radio-controlled vessel of war, the four main turrets will have working guns designed to fire BBs.

Because there are no commercial businesses that supply kits for projects of this scale, Hansborough must fabricate many of the parts himself.

"I love to design and build hardware, from concept to something that works," said Hansborough.

He worked on ion and electron accelerators, H⁺ and

H⁺ injectors including two projects that earned distinguished performance team awards. But he never forgot his other love: history in general, naval history in particular and specifically the history of battleships.

Born in Tyler, Texas, Hansborough is a retired Naval Reserve captain who wanted to study history as an undergraduate but instead chose mechanical engineering as a career. After completing Naval nuclear power training, Hansborough was stationed on the USS Enterprise in 1969.

A few years ago he participated in a documentary about the 1969 fire aboard the USS Enterprise that resulted from the detonation of an overheated rocket warhead. The fire took 27 lives, injured 34 and destroyed 15 aircraft, according to information on the Navy's Web site.

"During the fire, I was in an engine room below waterline with my crew, trying to keep up the supply of fire-fighting water while hearing explosion after explosion and wondering what was going on over our heads," said Hansborough.

Now a Lab associate, he believes retirement should not be without challenge. "A major personal priority is to get the model ship in the water and underway," he said.

Los Alamos News Letter

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