Reflections

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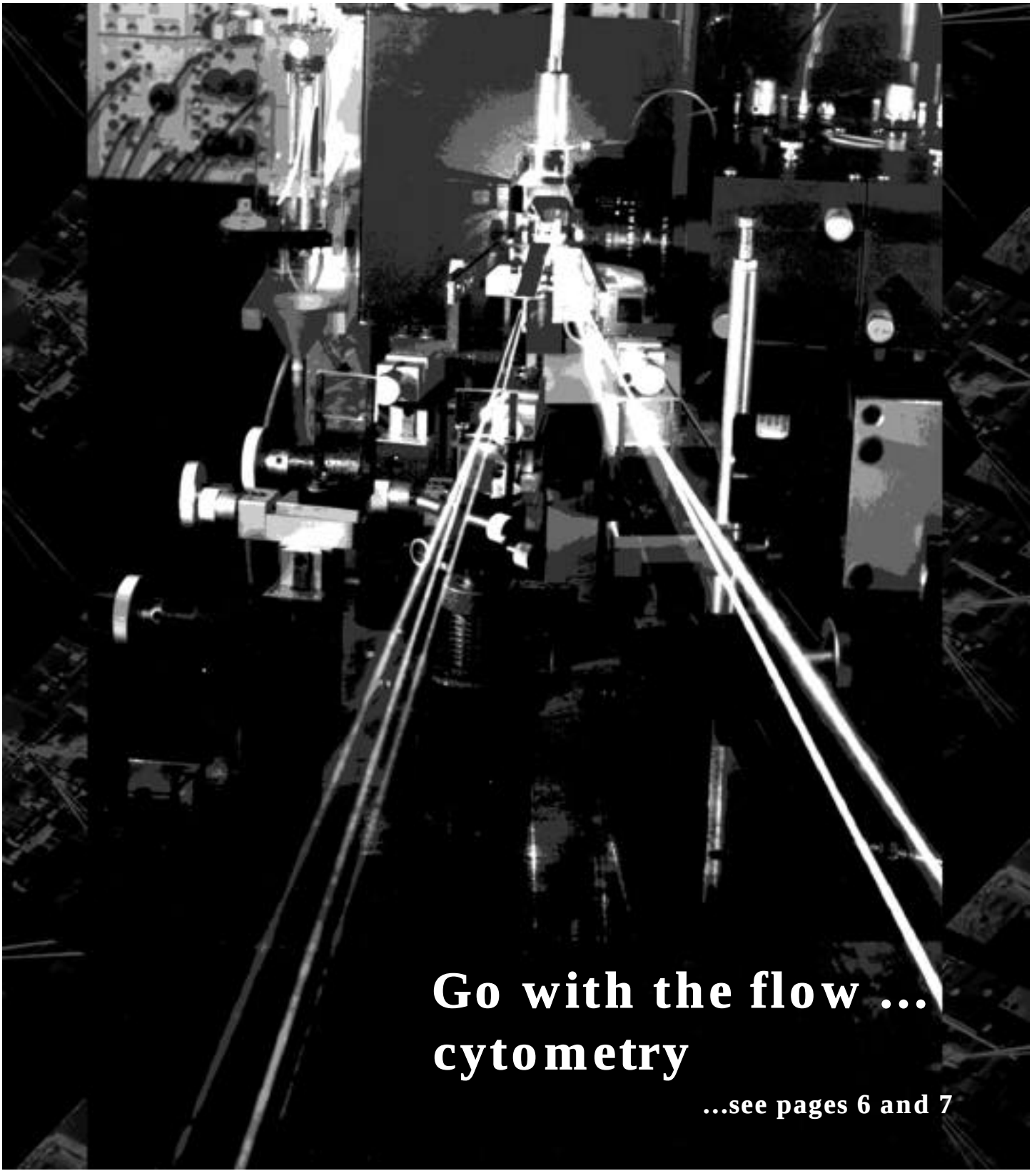

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Cover photo illustration by Edwin Vigil

Reflections

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editor's journal

Two, four, six, eight, the Lab's helping to educate ...

Earlier this year, I attended the Los Alamos County Science Fair and the Regional Science Fair at New Mexico Highlands University in Las Vegas. These science fairs are open to students from upper elementary through high school, and I was very impressed with many of the projects that were entered. I also noted that a number of the adult volunteers involved with the fairs were from Northern New Mexico institutions, such as the Laboratory.

A few weeks ago, the Laboratory hosted the Expanding Your Horizons Conference, a program designed to expose middle school girls to, and stimulate their interest in, science careers. Many people in the organization that sponsored the event — the Los Alamos chapter of the New Mexico Network for Women in Engineering and Science — also are Lab employees, as are those who worked with the students and served as role models while they visited the Lab. These events got me thinking about how much the Laboratory does and can do to foster science and education in Northern New Mexico.

In checking, I found that the Lab and Lab employees, many on their own time, have done plenty to promote education in Northern New Mexico and are looking for ways to do more. For instance, through the Science and Technology Base (STB) Education Programs Office the Lab has a range of educational programs that reach out to students and teachers in the local area, the state and the country — and the quality and value of these programs has not gone unnoticed by the Department of Energy, which funds most of these efforts (see story on Page 4).

But because more can be done to help area students get the training they need for science and engineering careers, the Laboratory is developing the Los Alamos Employees' Scholarship Fund program. Through this program, employees will be able to donate between $1 and $10 each paycheck to establish a college scholarship fund for students from Northern New Mexico communities. The scholarship program, which is the brainchild of Diversity Council members Gene Farnum of Structure/Property Relationships (MST-8) and Robert Romero of Facility Operations/CMR (NMT-13), will be managed by the not-for-profit Los Alamos National Laboratory Foundation. (See the Daily Newsbulletin archives, Feb. 9 issue, at http://www.lanl.gov/projects/PA/News/newsarchive.html for an article on the scholarship fund.)

In addition, Laboratory employees can make tax-deductible donations directly to kindergarten through undergraduate-level institutions in Northern New Mexico through the Laboratory Foundation, which will match these employee contributions. This Matching Gifts for Education program will accept contributions from active employees and Laboratory retirees and match them, up to a total of $50,000 a year.

And that's not all. The Lab recently joined with local school districts and higher education institutions to promote improved educational opportunities in Northern New Mexico, for students as well as for Lab employees. (See page 4).

With one of the most educated workforces in the country, it is not surprising that we value education here at the Lab, nor is it surprising that many employees want to share their love of science and knowledge with young people. Past efforts by the Lab have helped many students toward their goal of getting an education, and some have joined the Lab workforce. But it is especially encouraging to know that the Lab is now making an even stronger effort to foster education among Northern New Mexico youth and to include many of these future "home grown" scientists, engineers and professionals among its best and brightest employees.

Bill Chen of Mathematical Analysis and Modeling (T-7) at work in his office in the Theoretical (T) Division Building at Technical Area 3. *Photo by Fred Rick*

Mathematician pursues dream

by Steve Sandoval

In the late 1970s, Yong-Chuan "Bill" Chen was a high school student bracing for the possibility of having to go to work on a farm as part of the Chinese government's cultural revolution and "re-education" of its citizens.

But he knew he could avoid being sent to the Chinese countryside if he passed a national entrance examination and was accepted in a university.

Chen wanted to become a scientist but wasn't sure if he'd get the chance to pursue a scientific career. China traditionally reveres its scholars. But Chen also knew that someone's career or future occupation often was selected for them by the government.

"During that time in China, you did not have many choices," he said.

Chen took and passed the national entrance exam, and in 1980 he enrolled at Sichuan University, where he earned a bachelor's degree in math. He would go on to earn a doctoral degree in applied mathematics from Massachusetts Institute of Technology in 1991.

Nearly two decades have passed since those uncertain times for Chen, who is now a mathematician in Mathematical Analysis and Modeling (T-7). He works at Los Alamos half the year and spends the other half teaching at Nankai University in Tianjin, which is near Beijing in China's northern province.

Late last year, Chen received the Javed Husain Prize for young scientists from the United Nations Educational, Scientific and Cultural Organization. The award is given by UNESCO every two years for outstanding pure research by young scientists in the natural sciences, social sciences or technology.

"I could not assume I would get it," the unassuming Chen said. "This is really an honor."

At Nankai University, Chen teaches combinatorial mathematics, the study of complex systems in terms of their elementary parts.

"Combinatorial mathematics has applications not just in scientific fields such as physics, biology or chemistry, but also in important areas such as banking and management," said James Louck, also of T-7 and Chen's mentor at the Lab. "It's a discipline now coming into its full being, the kind of mathematics that China, and even the world, needs for economic development."

Chen came to the Laboratory in 1991 as a J. Robert Oppenheimer fellow. Louck and Vance Faber of Computer Research and Applications (CIC-3) were Chen's co-sponsors for the Oppenheimer fellowship.

Chen remembers meeting Louck when he arrived in New Mexico and credits Louck for helping him integrate into the Lab. "He's really a nice person," Chen said of Louck. "My family is very close to his family … I can ask him something anytime.

"It's always a pleasure to work with him. Jim is a dedicated scientist of the highest caliber."

Of high caliber himself, Chen said he had offers to conduct research at institutions other than Los Alamos, but chose the Lab because of its international reputation. "I was deeply attracted to the reputation of the Lab," said Chen. "But to be frank, I had absolutely no idea of what Los Alamos would be like … I thought Los Alamos was a beautiful city [but] from Boston to Los Alamos was quite a change."

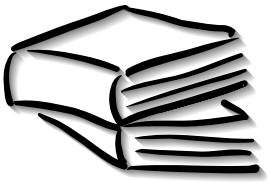
Chen especially likes his dual role as scientist and researcher at Los Alamos and teacher at Nankai University. He said his group at the Lab supports this arrangement, noting that the Lab benefits from scientific links Chen creates between the two institutions. He hopes to stay at the Lab and continue stimulating collaborative research in combinatorics throughout the world.

Reflecting on the education that helped prepare him for his dual role, Chen said he thinks the quality of education offered today in China's schools probably has declined. "When I was in grade school, everyone was serious. You went to class and sat there for 50 minutes," he said. "We went to school in the morning, and we went back to school at night. [Today] I see students in college not working very hard," he said.

And while Chen also admits to reservations about the quality of American schools, he wants his two children to receive an education in a less structured environment than he had when he was a child.

"We have a saying in China that everyone wants their kids be a dragon, to do something great," said Chen. "As a parent, I don't want my kids to be too intense, but I want them to be serious about school."

The Chinese government most likely wants all its students to be serious about school too, especially since Chen says the government is now emphasizing the major role science and technology will play in China's future global economic efforts. China can't, for example, continue to rely on exports of handicrafts to survive in a global economy. More high technology industries are needed, he said, noting that Chinese government officials see science and technology as paving the way for a more diversified economy. "They want science and technology to make the country prosper," he said.



Alliances advance educational opportunities

by Steve Sandoval

The Laboratory is partnering with local school districts and higher education institutions to promote improved educational opportunities in Northern New Mexico and for Lab employees.

The Lab is part of the Northern New Mexico Council for Excellence in Education, or NNMCEE, as well as the Tri-County Higher Education Association, or THEA.

NNMCEE is a cooperative venture with several other entities, including the Department of Energy; University of California; the state Department of Education; school districts in Los Alamos, Pojoaque, Española, Santa Fe and Santa Clara Pueblo; University of New Mexico and UNM-Los Alamos; Santa Fe Community College; New Mexico Highlands University in Las Vegas; Northern New Mexico Community College in Española; New Mexico Institute of Mining and Technology in Socorro; and Century Bank in Santa Fe.

Tom Garcia, the Lab's acting deputy director for business administration and outreach, is chairman of the council.

The council promotes education and workforce development in Northern New Mexico, explained Dennis Gill, of the Lab's Science and Technology Base (STB) Education Programs Office.

It originally was a Lab/UC initiative, Gill said, with the goal of soliciting input from nearby communities about education. He said the council was reconstituted last year with a new goal of asking what the Lab can do to improve education in Northern New Mexico. It meets monthly to solicit input and discuss new ideas for education programs the Lab might consider implementing, he said.

And while the council reviews existing Lab education programs, Gill said it is interested in implementing educational programs it develops.

"We have always for many, many years evaluated our programs very strongly," Gill said of existing Lab education programs. "Almost every year we stop one or two programs and start new ones.

"The council is a body that we can ask for input and ideas for new programs that we might want to start. We've always had close contact with the communities, but it hasn't been in this formalized fashion."

Gill said NNMCEE has identified "School-to-Work" as a top priority. The council developed a set of guidelines related to the School-to-Work issue — preparing students directly for employment whenever they leave school at whatever level.

The Tri-County Higher Education Association is made up of the Laboratory, UNM-LA, Santa Fe Community College, Northern New Mexico Community College and the UNM-LA Graduate Center. It focuses on training and education for Laboratory employees and prospective employees in areas of Lab employment needs. Anne Khoury of the Training Integration Program Office of Human Resources (HR-TIO) is the Lab's point of contact for THEA.

Gill said THEA is a cooperative agreement between the Lab and participating institutions for training and education of Lab employees.

"Presumably, there are some types of courses that the colleges and

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Lab programs get good grades

by Steve Sandoval

Laboratory science education programs are receiving high marks from the Department of Energy in Washington, D.C., according to a Lab science education program director.

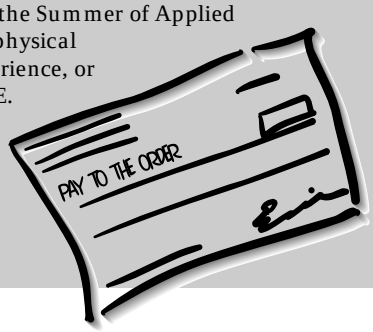
For the 1998 fiscal year which began last Oct. 1, the Lab is receiving $3,521,000 from DOE's Defense Programs Office, or slightly more than one third of the entire $9 million budget for education-related programs, said Dennis Gill of the Lab's Science and Technology Base (STB) Education Programs Office.

Bevery Berger of the Office of Defense Programs Laboratory and Reimbursable programs for DOE said the Defense Programs Office has criteria for awarding funding for education-related programs.

Among other requirements, education programs must be consistent with the Defense Program Office's mission, draw upon unique Lab capabilities, engage partners and collaborators and leverage existing resources, be cost effective and have measurable goals and objectives, complement private sector roles in science education, and complement other science education initiatives.

"Los Alamos makes fine proposals that compete very well against the other labs," said Berger. "Los Alamos has a fine program."

Lab programs funded by the Defense Program Office include the Critical Issues Forum; Teacher Opportunities to Promote Science; the new Educational Pipeline for Student Initiatives Linked on the Network, or EPSILON; and the Summer of Applied Geophysical Experience, or SAGE.



'Health is the key …'

Editor's note: May 20 is National Employee Health and Fitness Day in the United State, but at the Laboratory, the entire month of May is dedicated to employee health and fitness. For a health and fitness tip every work day this month, check the online Daily Newsbulletin at http://www.lanl.gov/newsbulletin.

by Steve Sandoval

Good health is the key to productivity, according to Ida Romero of Facilities Project Delivery (FSS-6). When Romero learned that organizational representatives were needed to champion the Lab's new Positive Health Directions program, she jumped at the chance to be her group's representative.

Romero is one of about 200 health-promotion representatives supporting the Positive Health Directions program across the Laboratory.

"We attended a meeting where the program was introduced, and I had no reservation about taking this up," said Romero. "Health is the key to happiness and success.

"It's the same thing as with safety; this is something we have to take very seriously."

Jessica Kisiel of Occupational Medicine (ESH-2), the Positive Health Directions program coordinator, said the organizational health-promotion representatives act as liaisons between the program and their organizations to help promote health and wellness within their group.

"They're our messengers and spokespersons because we can't possibly reach all the employees," said Kisiel. "We appreciate the efforts of the health-promotion representatives in supporting healthful lifestyle behaviors at the Lab."

Kisiel said employees who want to learn the name of their representative can go to the Positive Health Directions home page at http://www.hr.lanl.gov/html/positive_health/. Organizations not represented can call Kisiel at 5-4368 or write to *jkisiel@lanl.gov* by electronic mail.

Romero is FSS-6's training coordinator. She's worked at the Lab 10 years and sits on an environment, safety and health council in the Facilities, Safeguards and Security (FSS) Division. Being the health-promotion representative in her group fits right in, she said, with some of the issues the division's safety and health council discusses.

Romero sees her role as informing and educating the 130 employees in her group about health and fitness programs offered within the Lab and surrounding communities.

"One of the main things that I strive for is bringing employees information," she said.

"It's really nice to have people come to me and say 'Hey, can you get me involved in this?' "

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A late-morning conditioning class at the Laboratory's Wellness Center drew a room full of employees. Here, participants work to strengthen pectorals. *Photos by Fred Rick*

Kristi Carlson of Distributed Computing (CIC-8) works out on a ski machine at the Wellness Center.

The Wellness Center has several treadmills for putting in some miles. Shown right to left are Steve Bender of Astrophysics and Radiation Measurements (NIS-2), Ross Tapia of Business Support Services (BUS-8), Don Montoya of Communication Arts and Services (CIC-1), Jim Kamm of Hydrodynamic Methods (X-CM) and Amy Regan of RF Technology (LANSCE-5).

'Health Fest 98'

The Laboratory's Wellness Center (ESH-2) is coordinating the annual "Health Fest 98" from 10 a.m. to 2 p.m. May 7 in the Otowi Cafeteria side dining rooms.

Health Fest is the kickoff for Employee Health and Fitness Month at the Lab, according to Phyllis Webb of the Wellness Center, which is part of Occupational Medicine (ESH-2).

Activities at Health Fest 98 include free screenings for cholesterol and blood pressure; biofeedback and ergonomic demonstrations; self-care, nutrition and exercise information; food tastings and raffle prizes.

Lab employees, subcontract personnel and Lab retirees are welcome to attend. For more information, call 7-7166.

Lab pioneers flow cytometry technology

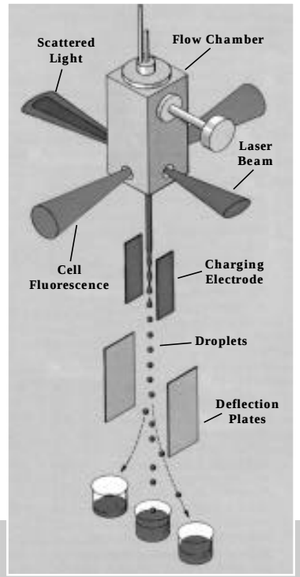
by Ternel N. Martinez

Let's face it. Flow cytometry does not carry the same kind of headline-grabbing power as supercomputing or stockpile stewardship, although it has been around much longer. However, if you were to ask researchers familiar with the history of flow cytometry, they would quickly point out that Los Alamos has been at the forefront of flow cytometry technology development for decades, and most likely will remain in this position for decades to come.

Flow cytometry, a discipline encompassing chemistry, mathematics, physics and electronics, is helping biomedical researchers worldwide better understand how cells function normally and how they malfunction in diseases and disorders such as leukemia, lymphoma, other types of cancer and AIDS. It has provided new insights in the area of transplant rejection. In short, flow cytometry is helping researchers unlock the mysteries of some of the world's most challenging medical and scientific problems, giving millions hope that cures for these and many other ailments may one day be found.

So what is a flow cytometer? In simple terms, it is a device that combines lenses, lasers, computers and other high-tech equipment in a way that allows researchers to analyze, characterize and sort biological cells, chromosomes and molecules, usually with the help of fluorescent "markers" to tag specific components. Flow cytometry can determine the size, shape, complexity and functions of hundreds of thousands of cells in a span of just minutes. Researchers can then separate the "tagged" particles, such as abnormal cells, from the rest for further analysis.

There are many types of lasers and fluorescent markers used in flow cytometry today; the appropriate combination depends on the kind of analysis an investigator is performing. For example, to stain DNA for analysis, a researcher could use a fluorescent marker known as PoPo-3 excited by a doubled Nd:YAG laser; to measure acid levels in an organism, the researcher could use a fluorescent marker called SNARF-1 excited by an argon laser.



A sample in which cells have been dyed to identify specific properties enters a flow chamber, where the cells are excited by laser light and emit fluorescent light that is detected and analyzed. The laser light passing through the cells is scattered and also analyzed. The sample is broken into uniform droplets by a transducer. The droplets containing cells of interest can be charged, then sorted from the uncharged stream. *Drawing courtesy of Los Alamos Science*

Go with the flow

What does it mean to be designated a National Flow Cytometry Resource? It means being recognized as a leader in flow cytometry research and development by the National Institutes of Health's National Center for Research Resources. It also means making state-of-the-art flow cytometric instrumentation available to the biomedical research community. The Lab is the only research institution worldwide designated as a National Flow Cytometry Resource.

An important component of the NFCR is at the University of New Mexico School of Medicine. Larry Sklar of UNM's Department of Pathology and co-director of the NFCR provides a vital link to the biomedical community and directs one of the NFCR technology development projects.

The Lab recently underwent a critical peer review, in which it received broad-based acclaim for its research and renewed funding for a fourth five-year period. Over the years, the Resource has been funded by the NIH and the Department of Energy's Office of Biological and Environmental Research. All told, flow cytometry research and development is funded from several sources at about $6 million annually.

To qualify as an NFCR, the Lab must actively engage in the following five areas: research and technology development, collaborative research, service projects, training and dissemination. James Jett of Cytometry (LS-5) estimated the Lab has been involved in the training of about 600 people over the past three years alone. Every other year, in fact, the Lab hosts the annual Flow Cytometry Applications Course, which educates the cytometry community and offers the latest NFCR technology available. Jett also estimated that the Lab collaborates with about 40 research and medical institutions annually.

Robb Habbersett of Cytometry (LS-5) sets the instruments on "Little Geek," a new 3-foot-long flow cytometer that can be used to analyze single molecules, one of many technological advances the Laboratory has made in the field of flow cytometry since the 1960s.

Flow cytometric cell analysis has several applications, including immunophenotyping (analysis of white blood cell characteristics); DNA and RNA analysis; apoptosis (a normal physiological process that regulates cell death); and analysis of mitochondria (the organelles inside a cell responsible for most of its respiration and energy production).

"With flow cytometry, we often look for the rare event in biology," said Scott Cram, deputy director for the Life Sciences (LS) Division. "More specifically, we try to determine the early events that take place in cells as they progress toward becoming tumor cells." He added flow cytometry is analogous to looking for a needle in a haystack. "You can't look at the whole haystack at once. You have to look at each individual straw, both from a quantitative and qualitative point of view. Clinical flow cytometry is all about prognosis, diagnosis and monitoring."

As an example, Cram said flow cytometry helped researchers determine what cell types increased or decreased after someone has undergone chemotherapy for nonsolid tumors. Also through flow cytometry, researchers were able to monitor which white blood cell-types are affected by the AIDS virus; this vital information helps clinicians focus on the appropriate therapy.

And the Human Genome Project, the worldwide effort to identify all of the estimated 80,000 genes in human DNA and determine the sequences of the 3 billion chemical bases that make up human DNA, is significantly enhanced by flow cytometry's ability to isolate single chromosomes and measure the size of small strands of DNA.

The Laboratory is considered the birthplace of flow cytometry, although similar concepts were being explored at research institutions in New York and Germany. The first cell-sorting flow cytometer was built at the Laboratory in 1966 by graduate student Mack Fulwyler, said Cram. "Clearly, the majority of researchers worldwide view the Lab as the leader in the development of flow cytometry technology today," he added.

"Back in the old days, we worked with single cells 10 to 15 microns in diameter," recalled James Jett of Cytometry (LS-5). "Later on, in collaboration with Richard Keller and co-workers in the Chemical Science and Technology (CST) Division, we successfully performed single-molecule detection. Now we can isolate and analyze a single strand of DNA." This latest breakthrough earned the Lab an R&D 100 Award last year, one of four such awards among many others that the Lab has earned for its work in flow cytometry. "No one is developing technology on the scale that we are at Los Alamos," added Jett.

Above: Robb Habbersett checks the readings on the 13-foot-long array of lasers, chambers, tubing, electrodes, sensors and other sophisticated electronics that make up a flow cytometer known locally as "Big Geek." The device, which is operated by Habbersett, analyzes, sorts and characterizes cells, chromosomes and other biological samples. *Photos by Fred Rick*

Left: A sample is carefully placed into a holder from where its content can be fed through the flow chamber and analyzed. The Lab's flow cytometers can determine the size, shape and functions of thousands of cells in seconds, and they are used for up to a dozen different experiments a week.

Such technology development has included flow cytometers that range in size from about 2 1/2 cubic feet to one that occupies 60 cubic feet of space. "Most of our cytometers we made here," said Jett. For instance, the Lab has designed and constructed flow cytometers for optical selection of chromosomes, multiparameter analysis and sorting, phase-sensitive detection and small-fragment DNA sizing. Some of these cytometers are the result of the long-standing collaboration between LS and Keller's group in CST Division, Jett noted.

There's even a portable flow cytometer that the Lab developed for the U.S. Army for detecting biological and chemical agents in the field, he noted. LS also owns four commercial flow cytometers.

There also have been numerous industrial spin-offs of flow cytometry technology, the most recent example being the development of the Mini-FCM, a device for detection of biological warfare agents. This compact instrument, developed by a team led by Gary Salzman of LS-5, is being replicated by Bio-Rad Inc. for the Army.

So great are the Lab's contributions and achievements in flow cytometry that for the past 16 years it has been designated the National Flow Cytometry Resource by the National Center for Research Resources, a branch of the National Institutes of Health. Jett is director of the NFCR at the Lab (see accompanying story).

Cram and Jett agree that flow cytometry still has plenty of growth potential in the commercial market. "For example, in terms of industrial applications, one could use flow cytometry to look for biological or other particles in water, milk, paint — any place where you would want to detect and analyze particles, whether biological or otherwise," said Cram.

Two named AGU officers

William Feldman

Jack Gosling

Laboratory scientists **Jack Gosling** and **William Feldman** of Space and Atmospheric Sciences (NIS-1) have been elected officers of one of the constituent sections of the American Geophysical Union.

Gosling was selected president-elect of the space physics and aeronomy section of AGU, while Feldman was selected secretary for solar and heliospheric physics. Their two-year terms begin July 1. Gosling will serve an additional two years as president.

The 35,000-member American Geophysical Union works to advance geophysical sciences as a whole. Officers guide the work of their respective sections.

The American Geophysical Union also has constituent sections for atmospheric science, geodesy, geomagnetism and paleomagnetism, hydrology, ocean sciences, planetology, seismology, tectonophysics and volcanology, geochemistry and petrology.

Jacobs elected to MESA board

Dolores Jacobs

Dolores Jacobs of Science Education (STB-SE) has been elected to the board of directors of New Mexico Math, Engineering, Science Achievement Inc.

Jacobs, team leader for Science Education, was invited to serve on the board by the program's director and then elected to a two-year term by the board at its quarterly meeting in March.

Other board members are from higher-education institutions around the state, private industry and New Mexico congressional offices.

New Mexico MESA is a not-for-profit organization that promotes educational enrichment for pre-college students from historically underrepresented ethnic groups. It prepares these students for college careers in science, math and related fields.

Twenty-six school districts, encompassing 71 middle and high schools around the state, take part in the MESA program.

Jacobs has been involved in science education programs since she joined the Laboratory in 1988. She has a bachelor of science degree in education from New Mexico State University in Las Cruces. She also has done graduate work in education at the University of Texas at Austin and the University of Tennessee.

Berger chairs state task force

Mike Berger

Mike Berger of the Environmental Management (EM) Programs Office is chairing a Governor's Blue Ribbon Task Force on water in New Mexico.

Berger, acting deputy director for EM, was named to the task force by Gov. Gary Johnson last fall.

The 14-member committee will make recommendations to the governor that he can take to the State Legislature on near-term water issues, such as water allocations and implementation of water-conservation strategies. It also will make recommendations to the Legislature on rewriting water law for the state.

Berger has been at the Lab 24 years. He joined Los Alamos as a nuclear weapons designer in the Theoretical Design (TD-4) Group. He earned his bachelor of science, master's and doctoral degrees in mechanical engineering from the University of New Mexico. Berger also is special chair of the advisory committee to the Mechanical Engineering Department at UNM.

In Memoriam

Edward H. Essignton

Edward H. Essington of Environmental Science (EES-15) passed away suddenly Oct. 31. Essington had been at the Laboratory since 1973. He worked primarily on studies of contaminant transport at the Nevada Test Site and Los Alamos, using his expertise on environmental sampling to enhance experimental design and implementation. Essignton received a bachelor's degree in soil science from California State Polytechnic University and a master's degree from the University of California, Los Angeles. Before coming to Los Alamos, he was employed by Teledyne Inc. as a geochemist and by UC's Experimental Radiation Division as a senior technician.

David Blevins

Retiree David Blevins died March 12 after a short bout with lung cancer. He was 75. Blevins received his bachelor's and master's degrees in mechanical engineering and machine design from Kansas State University. He came to the Lab in 1950 but left three years later to work for General Electric. Blevins returned to the Lab in 1958, where he worked on such projects as Rover design, superconducting magnet design, optomechanical devices, X-ray positioning devices and Meson Facility Beam Stop Region redesign, spanning several Lab groups. The design engineer became a Lab consultant in 1984 and a Lab associate in 1987. He fully retired in 1991.

Arthur Beaumont

Retiree Arthur Beaumont, 77, died March 5 after a brief illness. Beaumont received his bachelor's degree in education from Panzer College in New Jersey in 1943; he later received his master's degree in educational administration from the University of New Mexico in 1950. He came to the Lab in 1951 from the Zia Co., working in Plutonium Chemistry and Metallurgy (CMB-11). He also worked in High-temperature Chemistry (CMB-3) during his career. Beaumont retired in December 1985, but soon afterward became a Lab associate working in Nuclear Fuel Development and Facilities Operations (MST-11). He also worked for such groups as Facilities Management (NMT-8) and Training and Support (NMT-10) before fully retiring in 1994.

April employee service anniversaries

35 years
Martin MacRoberts, ESA-DO

30 years
Bandel Bezzerides, X-PA
Mary Gentry, CIC-5
Thomas Harlow, ESA-MT
Jose Leyba, CIC-11
Joan Trujillo, CIC-13

25 years
James Archer, NIS-4
Francisco Galvez, BUS-8
Gabriel Garcia, ESA-WE
Estevan Griego, NMT-2
R. Douglas Johnson, X-NH
John Lyman, CST-6
Kenneth McKenna, DoD-PO
Wayne Meadows, EES-8
Daniel Prono, DX-DO
Frank Valdez, CST-11

20 years
Karen Bish, HR-1
Pleas Bowling, LANSCE-8
Alfred Cucchiara, ESH-1
David Duchane, EES-DO
Richard Heaton, CST-11
F. Joseph Hauser, CST-2
Hsiao-Hua Hsu, ESH-4
Michael Jones, X-PA
Barbara Maes, LANSCE-4
Alexander Martinez, NMT-1
Robert McKee Jr., DX-3
John Meier, CIT-BS
Ted Miller, ESA-WE
John Pompeo, FSS-12
Presley Salaz, CIC-9
Christella Salazar, X-DO
Janet Sander, NIS-5
James Sprinkle, NIS-5
Ellen Stallings, EM-TD
Patrick Stanley, ESA-DE
Marcel Torres, NMT-8
Robert Weaver, X-TA
Michael Williams, TSA-4
Ainslie Young Jr., DoD-PO

15 years
Barbara Cort, NMT-11
Sandra Bogenholm, NIS-7
Edward Guillen, ESH-1
Cynthia Little, NIS-3
James Mercer-Smith, NWT-PO
Jami Morgan, ESH-1
Troy Nothwang, NMT-11
Mark Paffett, CST-18
David Seagraves, ESH-4
Eddie Trujillo, NMT-6
Martin VanDyke, DX-4

10 years
Roger Cardon, FSS-9
Robert Donohoe, CST-4
Michael Hall, X-TM
Omar Juveland, CIO
Leslie Maestas, BUS-8
Beverly Martin, EM-WM
Veronica Martinez, HR-5
Kevin McCabe, NIS-4
Patricia Osterburg, BUS-5
Roger Roberts, X-TM
Penelope Springer, CST-4
Floyd Strub, FSS-6
Sandra Wagner, CST-7

5 years
Lev Boulaevskii, T-11
Roger Brewer, ESH-6
Michael Brown, TSA-4
John Budzinski, X-NH
William Flor, ESH-10
Andre Michaudon, LANSCE-3
Davod Modl, CIC-8
Sean McDonald, NMSM-PO
John Tanski, ESA-EPE

Educational opportunities ...

continued from Page 4

universities could offer more cost effectively than the Laboratory could on its own," he explained. "And at the same time, by doing this, [the partnership] strengthens the local colleges and universities and makes them more viable for other companies' employees' training. It's a snowball sort of thing."

A draft memorandum of understanding states that the three local colleges are prepared to offer flexible, high quality, customized training and education programs to Lab workers.

The association also will facilitate communication between the Lab and participating educational institutions, ensure that it complies with all Lab policies and procedures and provide periodic reports on training and education programs it conducts for the Lab.

Khoury said THEA already is providing some benefits to the Lab. She said THEA is developing a network administrator school-to-work project for Desktop (CIC-2).

Implementation of this associate degree program and Lab employment and job training collaboration will involve THEA sharing curricula, instructors and facilities, said Khoury. She added that CIC-2 expects to begin hiring students who complete this program this fall.

Health ...

continued from Page 5

Being a health-promotion representative has also caused Romero to pay more attention to her own personal health, she said.

"The sad part about it is a lot of people don't have time to do the things necessary to stay healthy," she said. "That's where it's nice that our employer is trying to do things to make it better for us."

'We used to always have donuts or cake before our group meetings, but now we save the cake for service awards and have fresh fruit at monthly meetings.'

Like Romero, Barbara Addessio of Software Design and Development (CIC-12) chose to be a health-promotion representative because she also handles environment, safety and health compliance issues for her group. "This job seemed to fit right in," said Addessio.

Addessio passes along information about the Positive Health Directions program to employees in her group. "I also send out a monthly e-mail I call 'HealthBits,' with additional tidbits of information promoting good health practices," she said.

There are about 36 employees in CIC-12, and Addessio said she wants the notion of exercise and physical fitness to be fun for her co-workers. "To have a Lab-sanctioned program is really great," she said. "For example, the Wellness Center offers a variety of programs at all levels and our group leader is very supportive. He rides his bike almost every day.

"We have a lot of active people in the group, and we encourage others to participate in healthful activities or classes," she said. "We used to always have donuts or cake before our group meetings, but now we save the cake for service awards and have fresh fruit at monthly meetings. At our last group picnic we went on a hike, which many people seemed to enjoy."

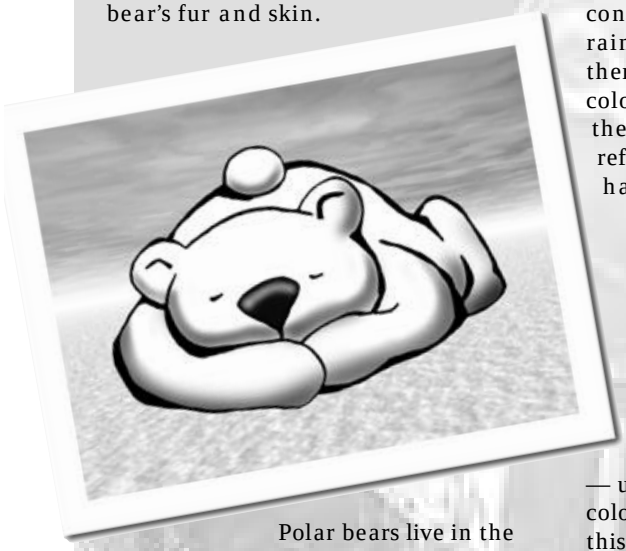
Being a health-promotion representative also has helped Addessio personally, she said. "I've always been pretty active, but when things get busy it's easy to skip the exercise."

science fun

This month's science experiment is presented by Bradbury Science Museum educator Garry Franklin, who demonstrates scientific facts and fun for students and other museum visitors as part of the Laboratory's science education efforts. We encourage readers to share it with their families.

What color is a polar bear?

If you guessed white … guess again! Try these experiments to determine the color of a polar bear's fur and skin.



Polar bears live in the Arctic, near the North Pole. They are warm-blooded animals, so they can generate their own heat, but they also must be able to use the sun's heat to warm themselves. They also need thick fur to help them keep heat loss to a minimum. Discover how polar bear fur (hair) and skin are adapted for Arctic climates by experimenting with the transmission, reflection and absorption of light energy.

What color is the fur of a polar bear? Why does it look white?

You will need a flashlight, a clear drinking glass and a dark sheet of paper or cloth for this experiment. Do the experiment in a place where the light from outside and from lamps is dim. Place the dark paper or cloth behind the drinking glass. Shine the flashlight on the front of the glass. What evidence can you find that the glass transmits some light — allows it to pass through?

A polar bear's hair transmits light, too. To transmit light the hair must be like the glass — clear or transparent.

What evidence do you see that the glass also reflects (bounces back) some light?

Reflected sunlight makes the bear's hair appear white. Sunlight contains all of the colors of the rainbow, but looks white because there are equal amounts of all colors. When the light is reflected by the bear's hair, all of the colors are reflected equally. That is why the hair looks white.

But what color is the bear's skin to use the transmitted light?

Some colors are better at absorbing (soaking up) the sun's rays than others. Polar bear skin — under all of that hair — is the color that absorbs sunlight best. Try this (on a sunny day) to discover whether that color is black or white.

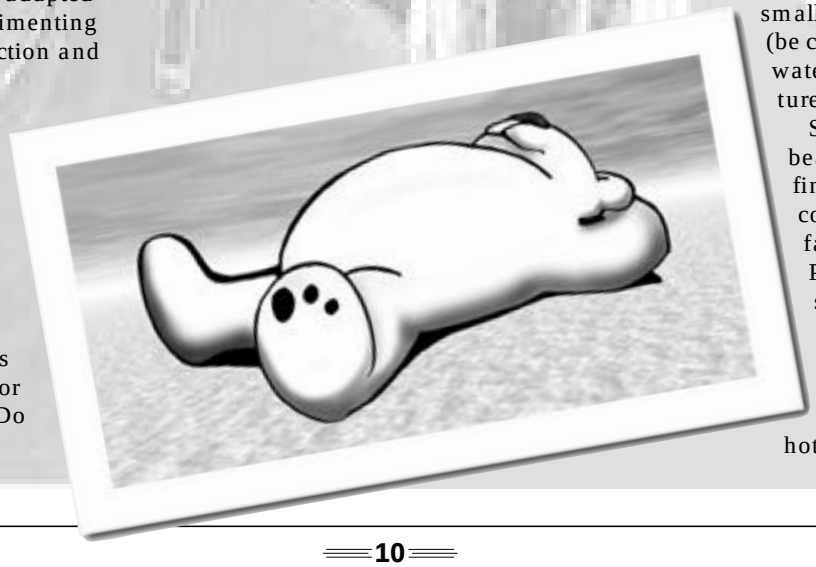
You will need two aluminum soda cans, a piece of white construction paper, a piece of black construction paper, scissors, some tape, water, a measuring cup and, if possible, two small thermometers.

Cut a piece of white construction paper and a piece of black construction paper, each big enough to be wrapped around the soda cans. Wrap one can with white construction paper and tape it so it does not fall off. Wrap the second can with the piece of black construction paper and tape it in place. Fill each can with one cup of tap water. If you have thermometers, place one in each can. If you do not have thermometers you can still do the experiment, but it will take a little longer.

Place both cans in full sun. Tilt them so that as much sunlight as possible hits the sides of the cans. Prop them in place with a book.

If you have thermometers, record the temperature of each can every five minutes for a half hour. If you do not have thermometers, you will have to use your finger to test the temperature. Every 15 minutes stick your finger in the water or pour a small amount on your finger (be careful not to spill the water). Take the temperature for an hour.

So what color is polar bear skin? You should find that black or dark colors absorb heat much faster than light colors. Polar bears have black skin. You can see this best on the face of the bear near the nose. What color would keep you coolest on a hot, sunny day?



This month in history

May

1804 — Lewis and Clark begin their exploration of the territory acquired by the Louisiana Purchase

1884 — The Institute for Electrical and Electronics Engineers is founded

1930 — The Adler Planetarium in Chicago is the first planetarium to open to the public

1945 — Germany surrenders, ending World War II in Europe

1954 — The first rocket to fly higher than 150 miles is launched from the White Sands Missile Range

1977 — The movie "Star Wars" is released

1981 — Physics Division Leader Jay Keyworth is appointed scientific adviser to the president

1983 — Production begins on the Lab-designed and developed W85 warhead, which was used for the Pershing II missile

1988 — The INF Treaty to eliminate intermediate-range nuclear weapons is ratified

1991 — The first New Mexico High School Supercomputing Challenge concludes with day-long activities at the Laboratory

1991 — DOE approves the start-up of the Weapons Engineering Tritium Facility

1993 — President Clinton extends a nuclear weapons testing moratorium for at least 15 months

Syndicated material. Removed at the request of the syndicate

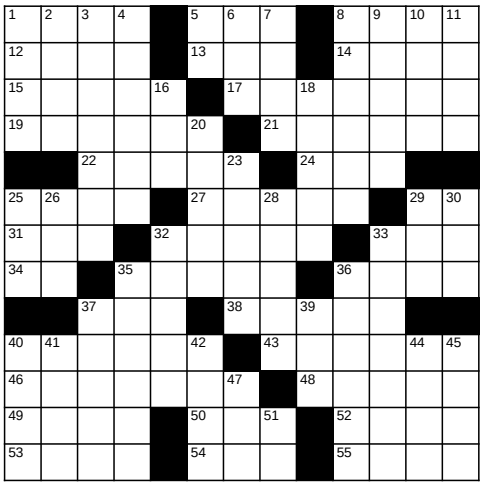
Play ball

ACROSS

1 Bold, reckless
5 Provide weapons
8 Puts out a base-runner
12 National governing body for tennis
13 Former manager Durocher
14 Mental concept or image
15 Rows, ranks
17 Major league team
19 17th century composer
21 "Field of —"
22 A sudden quick light
24 Uniform Resource Locators
25 Plunder, rob
27 Big trucks
29 In order that
31 Petroleum
32 Surrendered formally
33 Round vessel
34 Hall of Famer Plank
35 Capital of France
36 Liability, obligation
37 Where doubles are often hit
38 Heap of stones
40 "The Secret —" by Conrad
43 Batter's posture
46 Big hit (2 words)
48 Hall of Famer Warren
49 Accessible
50 Snare
52 City in Oklahoma
53 Division in each league
54 Type of sauce
55 Standards (abbrev.)

DOWN

1 Hall of Famer Babe
2 Continent
3 Hall of Famer Casey
4 Barely
5 Hall of Famer Kaline
6 Hall of Famer Ruffing
7 Atmosphere
8 Major league team
9 "Let's make —!" (2 words)
10 Organism that usually produces disease
11 Back talk
16 View
18 Member of ancient religious order
20 Device that produces focused beam
23 First-aid provider in combat
25 First mystery writer
26 Discard
28 High plateaus with steep sides
29 Weep
30 Hall of Famer Mel
32 Criminal plan
33 Symbol of league championship
35 Mother or father
36 Curtains
37 Baseball contests
39 Possessive pronoun
40 Players' nickname for the majors
41 Aspire
42 Scores, in baseball
44 Reproved mildly (alt. sp.)
45 Finishes
47 Prefix indicating different or modified
51 Hall of Famer Cobb



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spotlight

From complainer to Woman of the Year

by Ternel N. Martinez

This story begins one day in 1987 with a complaint. The complainer is Debra Archuleta of Instrumentation and Control (DX-7), and the complaint is being levied against the organization Española Valley Community Activities.

On that fateful day, the Española native went to EVCA's office to complain about the volleyball program for women. Rather than defend themselves, the people there instead asked Archuleta if she would be interested in joining the EVCA Board.

The computer technician, somewhat taken aback by their response, then did something that even surprised her. She said yes — that very moment.

"I was always involved in sports when I was in high school. I played softball, I played basketball, I played volleyball — and I know how important sports were in my life," the 10-and-a-half-year Lab employee recalled. "I felt joining the EVCA would allow me to help kids do more than just watch television, play Nintendo or, worse, be out on the streets at night."

So she started her volunteer career as director of basketball in EVCA, overseeing a coed program for first-through-eighth-graders. Then, as the old saying goes, "One thing led to another."

She now is the organization's secretary, although she still directs its basketball and T-ball programs. Archuleta's other current outreach efforts include the Española Fiesta Council (children's parade chair), the Rio Arriba 4H/FFA County Fair Board (president) and the National Youth Sports Coaches Association (chapter director). She also has coached and officiated in several sports.

To be sure, Archuleta cannot do all of these things at once, and she is grateful — if not fortunate — that many of the activities listed above are seasonal. But her outreach efforts didn't stop with the above-mentioned activities. Over the past 10 years, Archuleta also has been the following:

- member of the Española Recreation Committee
- member of the Board of Directors for the Northern New Mexico Pop Warner Football and Cheerleading Conference
- vice president of the Española Pop Warner Football and Cheerleading Conference
- public relations chair for Habitat for Humanity

Of all her past and present duties, Archuleta said she gets the most satisfaction out of working with EVCA. "More than half of the high school basketball players in Española started out in the EVCA," she said. "Every time I listen to a basketball game on the radio and hear some player's name, I get excited, because I personally know them."

Debra Archuleta, left, of Instrumentation and Control (DX-7) checks with the scorekeeper to make sure the rosters for the next basketball game are properly filled out during the Española Valley Community Activities Coaches Tournament held March 21 at Española Middle School. Archuleta helped coordinate activities for the coed tournament for fifth-and-sixth graders. *Photo by Ternel N. Martinez*

Of course, doing all of this outreach isn't without its little drawbacks, even in EVCA. "The most common complaints I hear from parents are the ones you would expect to hear from them — their kids aren't playing enough, the referees are lousy, the fees are too high — but overall, it has been such a pleasure doing what I do," said Archuleta.

It doesn't hurt that Archuleta makes both parents and coaches sign the NYSCA Code of Ethics before allowing children or coaches to participate in EVCA activities.

She particularly is proud of the fact she has earned the respect of her male colleagues. "All of the programs I'm involved in are male-dominated," she explained, "but they have been so very supportive of everything I've done."

Her outreach service culminated in her being named the Española Valley Chamber of Commerce's Woman of the Year for 1996. Archuleta even applied one time for the position of chamber of commerce director, but later withdrew her application.

"If I had gotten the position, I would have been required to not only leave the Lab, but give up all of my other outreach activities. That was something I just wasn't willing to do."

So what does lie ahead for her? Would you believe politics? Archuleta is seriously considering running for public office one day, perhaps as councilor or even mayor of Española. She acknowledged she didn't know when she'll run for office, but that it is something she definitely has in the back of her mind.

Reflections
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