

Technology transfer theme of FIA meeting

Fermilab hosted the eleventh annual meeting of the Fermilab Industrial Affiliates (FIA) on Thursday, May 30 and Friday, May 31. Recent federal legislation has created new opportunities for industry and federal laboratory cooperation. This spring's meeting focused on innovative ways for industry and Fermilab to work together.

Throughout the conference, experts from Fermilab, industry and government offered their thoughts on industrial/laboratory teamwork. Director **John Peoples** began the Thursday afternoon session with an overview of the importance of technology transfer. He explained that while inventions may seem little more than pure science at their birth, they often prove useful later on. Superconducting wire, for example, was a "curiosity" in the late '60s; now it is used in the life-saving magnetic resonance imaging and other cutting-edge technologies.

Later in the session, **Steve Holmes** (AD/Main Injector) reported on progress on Fermilab III—the Main Injector. According to Steve, the building of the Main Injector will extend America's discovery potential in high-energy physics during the years leading up to the SSC's completion. The Main Injector would save the Fermilab \$3.2 million in operating costs annually, and would yield better results due to the increased luminosity of the beam.

Dan Green (RD/SDC) followed Steve's presentation with an update on plans for a particle detection experiment to be carried out at the Superconducting Super Collider facility in Texas. The Solenoid Detector Collaboration, or SDC, is comprised of 700 physicists from the United States, Europe, China, Japan, the U.S.S.R and Canada. The *Chicago Tribune* recently dubbed the detector the "Super Collider brain." Dan said he hopes the SDC will gain insight



URA President John Toll and Congressman Dennis Hastert discuss the role of the national labs in technology transfer.

into such questions as "Why is there mass?" He added that the collaboration must enlist the help of industry, because the SDC is "too complex and costly to be left to physicists."

The Thursday session continued with a panel discussion. The panel, moderated by Fermilab Deputy Director **Ken Stanfield**, reviewed examples of cooperative activities in infrared technology, computers and accelerators. **Cheri Langenfeld**, the DOE's spearhead in organizing for greater industrial cooperation, closed the session. Panelists included **Jack Pfister** (CD/Division Ofc.), **Alan Bross** (RD/DØ Constr. Dept.) and **Rolland Johnson** (AD).

C.B. Galvin, Senior Executive Vice President and Assistant C.O.O. of Motorola, spoke at the Thursday evening banquet.

Friday morning began with "a Washington perspective on industry/laboratory collaboration" from **Dennis Hastert**, Republican representative for the Illinois 14th District of Congress. Called "a great friend of Fermilab" by **John Peoples**, Hastert told the FIA about the importance of technology transfer. "To preserve the future of Fermilab, we need to do a better job of taking Fermilab's story to Congress," he said. "We're having a hard time keeping competitive internationally...we need to be on the cutting edge to keep the U.S. an economic force." Hastert stressed that representatives from industry must let government officials know about practical applications of pure science research, such as magnetic resonance imaging and cancer treatment.

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Laboratory to industry:

In the second of a two-part series on Fermilab Inventors, *FermiNews* focuses on four individuals who have made contributions to research and development efforts at the Laboratory. The innovative work of these employees led to the issuance of U.S. patents between August 1, 1988 and July 31, 1990 and forms the heart of technology transfer at Fermilab—a program designed to move technology born in our national laboratories out to industry.

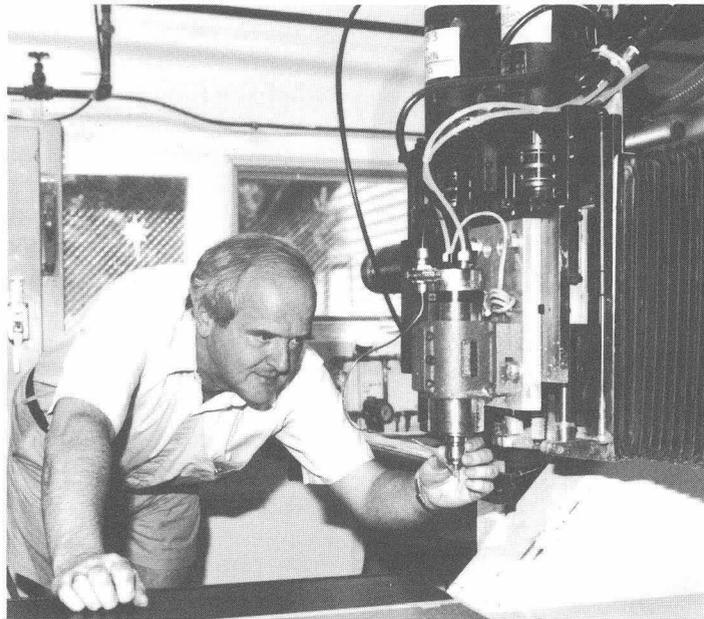
Technical Specialist William Williams (RD/EE Dept.) along with former Fermilab engineer Jon Hawkins (now at Argonne National Laboratory) developed the Laser Pulse Stretcher Method and Apparatus specifically for holography in the Fermilab 15-foot bubble chamber. William and Jon received a patent on the work in February 1990, and the technology was used in the last several runs before the bubble chamber was dismantled, William said.

The project had been initiated by a group from Oxford University using a slightly different method that was not successful. Then William's group became involved. William pursued a different angle with different circuitry and attained the results that were required.

"It worked quite well," said William. "The experiment-



William Williams patented the Laser Pulse Stretcher Method and Apparatus in February 1990.



Hans Jostlein demonstrates his "lucky" invention, the dynamic seal for rotor apparatus.

ers were quite happy with it. They took between 300,000 and 500,000 pictures with it." The "pictures," were actually holographic images of particle tracks from neutrino inter-

actions in liquid neon. The laser discharges energy when it is pulsed, and impurities in the bubble chamber liquid would absorb this energy, causing the chamber liquid to boil. This made the

tracks appear fuzzy, and they needed to be clearer.

The answer to the problem was found in lowering the power density of the laser pulse by increasing its length from its initial thirty-to sixty-nanosecond spread to between two and forty microseconds. Lowering the power density by a factor of 1,000 allowed the heat to dissipate and resulted in a sharper image. Coincidentally, increasing the pulse length also increased the coherence length and allowed experimenters a greater depth of field in the chamber area.

William said that the depth of field may prove to be the most useful industrial application of the laser pulse stretcher. "If you're taking a holographic picture, you want to get as much in focus as you can," he said.

The apparatus might have uses in computer-controlled holographic modeling or perhaps in communication technology. Already, William said he has had several inquiries from West Coast companies, a major university and from an experimenter in England. "It's possible that it could generate some revenue," he said.

Physicist Hans Jostlein (Physics Section) admits he lucked across his invention. Jostlein had a computer-controlled routing machine in Lab 8 of the Physics Department used to make components for large detectors, such as the DØ muon detector, and scintillation tiles for

continued on page 3

keeping the cutting edge

CDF and SSC calorimeters. Problematically, the spindle machine used air-lubricated precision bearings into which glass from cut material would enter, destroying the bearings.

"That was surprising because the fibers moved against the air stream," Hans said. "Typically, after three days of operation, the spindles would fail."

To solve the problem, Hans first visualized the damaging process and then tried to conceive ways of getting around it. Hans's first attempt was a crude test that required installing kapton foil, a translucent polyimide organic foil about 1/5000 of an inch thick, in front of the bearing as a protective shield. The foil touched the shaft, but when the air started to flow through the bearing, it lifted the foil off the shaft, saving the foil from wear and tear. The first solution he tried worked.

"With other things, you work very hard for a long time," Hans said. "This one, it was very lucky. We stumbled on a good solution on the first try. It's like a fifty-cent solution to a 500-dollar problem."

The method proved quite effective in keeping particles out and earned Hans a patent for the dynamic seal for rotor apparatus. He has not experienced a turbine failure since.

According to Hans, the satisfaction received from solving the problem and earning a patent is twofold. "The immediate sense was



Frederick Krueger (left) and John Larson developed the Log Survey Meter, a radiation survey device.

that we got our job done and our spindles stopped failing," he said. "Of course, it's always nice to come up with something that works and is recognized by other people."

Frederick Krueger (DO/Safety) and **John Larson** (DO/Safety) had an assignment to develop a logarithmic response Geiger counter. The device would replace existing radiation survey instruments, allowing three decades to be read on one meter without manually changing ranges.

While the instrumentation then in use had been available for some time, a device that gave a fast response without switching ranges was not commercially available, Fred said. It needed to be invented.

"There were certain things we wanted, so we set out to

design one ourselves," Fred said. Creating such a device required overcoming one large hurdle. In any counting circuit, there is an effect called dead time in which no event can be counted while a previous one is being counted. Methods that had already been developed to correct the dead-time problem gave inaccurate measurements, Fred said.

After much experimentation, John discovered a mathematical relationship between dead time and live time. The relationship could be described electronically, and Fred and John implemented it in the hardware.

"I realized that if I had this other signal, which is the live time, then we could electronically combine the two to generate this other signal which is the logarithm," John said. The circuit they created com-

pensated for dead time over a wide range of count rates by producing a dead-time pulse for each detected event and a live-time pulse spanning the interval between dead time pulses, averaging the value of these pulses over time. After obtaining the logarithms of each of the averaged values and subtracting them, a signal proportional to the logarithm of the count rate is produced that is corrected for the effects of dead time.

Their Log Survey Meter (LSM) improved on existing technology by correcting for the dead time inherent in a Geiger counter. It also achieved the wide range of response Fred and John set out to attain, operating from two-2,000 mr/hr without a range switch.

"It works better than the old way. You don't have to make a lot of adjustments," John said.

One vendor of radiation survey equipment is currently looking at one of the Krueger- and Larson-designed prototypes, and fifty are in use around the Lab.

Thinking back on the conception of the circuitry for their LSM, Fred recalls that John called him over and asked, "Will you check this relationship and see what you think to see if I'm thinking right?"

Fred says he checked the relationships as asked and replied "I think we've got something here."

—Brian Dick

Bulletin from DOE

The Department of Energy recently commissioned a study of radiation exposure and mortality rate among workers at the at Mound Facility near Dayton, Ohio. The study has been completed, and DOE has asked that the following information be released.

The Journal of Occupational Medicine will publish a paper titled "Mortality Among Workers Exposed to External Ionizing Radiation at a Nuclear Facility in Ohio." The study was carried out by Dr. Laurie Wiggs and colleagues at the Los Alamos National Laboratory under contract with the Department of Energy.

Using personnel records, the investigators identified 4,183 white male workers employed between 1947 and 1979 at the Mound Facility. The study focused on white men because the numbers of women and non-whites were small, and the total career radiation doses among the women were lower than those among the men.

Occupational external radiation exposure information was available for 3,229 of the Mound workers. In general, the median total career external radiation dose received by the workers was quite low, about the amount an average person would receive from natural sources over a period of ten years. Eighty-two percent of the men had a recorded total radiation dose of less than fifty millisieverts (mSv, 10mSv=1 rem), the current annual dose limit. These workers were divided into two categories: those who had a total dose of less than ten mSv, and those whose external dose was higher than ten mSv. No differences in death rates were found between the two groups.

The researchers also compared death rates among the 3,229 monitored white male Mound workers with those for white men in the United States' general population who were of similar age. The Mound workers had a lower mortality rate from all causes combined than did white men in the United States' general population (304 deaths were observed among white male Mound

workers and 387 were expected. Sixty-six deaths from all types of cancer combined were observed and seventy-five would have been expected based on rates for United States white men of the same age.)

A more detailed analysis was done to see if the risk of death increased with increasing external radiation exposure. No relationship with dose was seen for all causes of death combined, all cancers combined, digestive cancers or lung cancer. There was an increase in the risk of leukemia in workers in the "high" radiation exposure category compared with those in the lowest exposure category, but this finding was based on only two deaths from leukemia in the "high" exposure category. One of these deaths was due to chronic lymphatic leukemia, which is not generally considered to be caused by exposure to ionizing radiation.

In general, the Mound workers had lower mortality rates than United States men, a finding supported by data from other studies of DOE workers. Recently, an excess

of leukemia mortality was reported among white male DOE workers at the Oak Ridge facility, but this was not associated with recorded level of occupational radiation exposure. Additional follow-up of this and other DOE worker cohorts are necessary before any conclusions can be drawn regarding the relationship between leukemia and occupational exposure to radiation or other materials in DOE facilities.

NOTE: Another analysis of mortality rates among Mound facility workers by date of hire and duration of employment is available in Los Alamos Report #LA-11997-MS.

This Bulletin was prepared by the Office of Health to share data from health studies throughout the DOE complex. For more information, contact: Dr. Terry L. Thomas, Director, Health Coordination and Communication Division, Office of Epidemiology and Health Surveillance, U.S. Department of Energy, Washington, D.C. 20585.

Benefit notes

SRA performance illustrations

Performance illustrations comparing TIAA-CREF Retirement Annuities, TIAA-CREF Supplemental Retirement Annuities, Dreyfus, Fidelity and T. Rowe Price

mutual funds as of December 31, 1990 are available from the Benefits Office. Stop by and pick up a copy at WH15SE or call extensions 3395, 4362 or 4361. ■

Congratulations to:

Reidar E. Hahn (LS/Photography) and his wife Laura on the arrival of their first child, a son, Andrei. Andrei joined the Hahn household on May 20. ■

Harper's index

Number of U.S. universities that offer a bagpipe major: 1

Average number of peanut butter and jelly sandwiches an American consumes before reaching adulthood: 1,500 ■

Applause applause applause

Olesen and Richardson earn diplomas

Technical Specialist **Ken Olesen** (AD/Cryo Systems) and Senior Design Drafter **Dave Richardson** (AD/Cryo Systems) recently earned special diplomas in Supervisory Management from Aurora University's Management Center.

Olesen and Richardson attended weekly classes in subjects such as organizational behavior, leadership and motivation, communication and basic supervisory management. Richardson enrolled in an elective course on personal computing, while Olesen studied personal psychology.

The employees, who were sponsored by Fermilab, agree that they have reaped substantial benefits from the two-year course of study. "Instead of flying by the seat of my pants when I try to solve a problem, I now use a system," said Olesen. The ex-Marine said that the military style of management he was accustomed to was "not a good approach to motivate people. Now I have different goals. You help people; they help you."

Richardson has found his new communication skills useful. "The program helped me with the 'people' part of management more than anything," he said. "I've tried to communicate with people on their own level. I've asked employees what they think they should be doing, what their talents are, and worked with that." Both Olesen and Richardson also say that they have gained a better understanding of their own managers.

Turner writes winning essay

Michael Turner (AD/Astrophysics) recently won first place and \$2,000 in the Gravity Research Foundation's Awards for Essays on Gravitation. Michael's essay, titled "The Tilted Universe," will be published in an upcoming issue of the *Journal of General Relativity and Gravitation*.

Michael, who had entered the contest just once before, spends part of each week as Professor in the Department of Physics and Astronomy & Astrophysics at the University of Chicago. He joined the Fermilab staff in 1983, and now serves as the Deputy Head of the Astrophysics Group.

Two more employees of the NASA/Fermilab Astrophysics Center were selected for Honorable Mention in the 1991 contest. The Gravity Research Foundation cited Associate Scientist **Joshua A. Frieman** (RD/Astrophysics) and Research Associate **Ben-Ami Gradwohl** (RD/Astrophysics) for their essay, "Dark Matter and the Equivalence Principle."

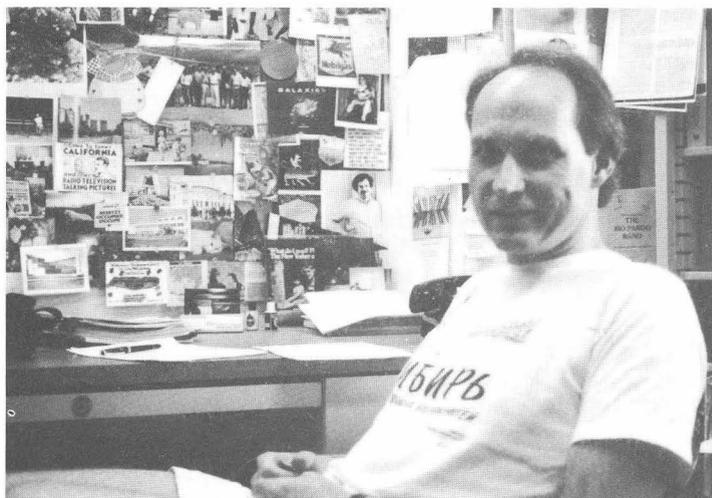
The Awards for Essays on Gravitation were presented for the forty-second year in 1991. Past winners include Roger



From left: Ken Olesen, Management Center Director David Doud, Group Leader Barry Norris (AD/Cryo Systems) and Dave Richardson.

The Management Center, run by Aurora University's School of Business and Information Science, provides personnel from local companies with professional management and pre-management training. Area managers teach the courses, which include examinations, case studies and writing assignments. The work can be difficult, Richardson said, "but when it was hard, it was because I was pushing myself."

For information about the Management Center, contact Ruth Christ, X3793. ■



Michael Turner's essay garnered first place in a Gravity Research Foundation competition

Penrose, G.F.R. Ellis, and LiZhi Fang, a recent visitor to the Laboratory. ■

Quality corner

The following suggestion was received by the QA office. If you have a suggestion on how to improve the quality, efficiency, reliability or effectiveness of a Laboratory service or operation, please send it to Mark Bodnarczuk, MS200 or BITNET Bodnarczuk @ FNAL

Suggestion: On numerous occasions, I have observed Lab vehicles parked in front of the Feynmann Computing Center with their engines running, most in excess of five minutes. It's no longer necessary (and hasn't been for some time) to get out of the vehicle and "crank" it, so I have a hard time understanding why these drivers can't shut off the engines.

Response: This suggestion is not specific to which Laboratory vehicles are left running for extended periods so I can only give a general reply. In a broad sense, all drivers of Laboratory vehicles, whether full-time drivers or only occasional users of vehicles who might be picking up printouts at Feynmann should be energy conscious and attentive to saving fuel. The FNAL Vehicle Maintenance Department publishes a reminder every month on the mileage report request forms that states, "Help conserve energy...check your tire pressure regularly. Don't

leave your vehicle running unnecessarily." Some judgment must be exercised here because there are times when it is appropriate to leave a vehicle running. Examples of this might be the taxis, vehicles that need to operate powered lift gates, vehicles that must maintain radio communication or operate accessories that draw a significant amount of electrical power, vehicles that need to maintain a somewhat constant temperature for operator comfort in extreme weather conditions or vehicles which stop for very brief periods only.

This brings up an interesting question: What is a "brief" period? Or more precisely, in a free market economy, where is the break even point between:

- a) the cost of fuel consumed and engine wear while idling, and
- b) the cost of fuel used starting an engine and increased wear and maintenance due to turning an engine on and off?

Opinions and study results vary on this subject. Only some factors may be readily quantified. *Fleet Equipment: the Specifying and Maintenance Magazine of Trucking*, (page 49, February 1991; Irving-Cloud Publishing Co., Lincolnwood, IL) estimates that an idling diesel engine burns approxi-

mately one gallon of fuel per hour. It is also important to remember that most engine wear occurs during starting. Energy is used in the production of new parts. Given the variety of answers regarding the break even point, it is perhaps safe to estimate that unless there

are other factors that necessitate leaving the engine running, a gas engine should be turned off if the stop is expected to be more than a few minutes. ■

Response prepared by David Carlson, Support Services Manager

Give it your energy

More than one-third of the petroleum we use in this country is burned as fuel for private automobiles and light trucks. In addition to saving oil, energy-conscious driving and good car maintenance can save the average family \$70 to \$100 a year in gasoline and diesel costs.

We can improve our conservation efforts on the road. Try these tips:

- Use public transportation, a motorcycle, a moped or a bicycle, or walk to work.
- Share your ride. Join a carpool or a vanpool. About one-third of all private automobile mileage is for commuting to and from work. If the average occupancy (currently 1.3 people per commuter car) were increased by just one person, each commuter would reduce his or her costs, energy consumption and driving stress. And

the nationwide gasoline savings—which would reduce our reliance on more expensive imports—would be more than 600,000 barrels per day.

- Eliminate unnecessary trips. Can you find one driving trip per week that could be handled by telephone or combined with another trip?

- Vacation at home this year. Discover nearby attractions. But, if you are going away, remember to turn off lights, lower heating temperatures in winter, and turn off air-conditioning in summer.

- Choose a hotel or campground close to where you live. A nearby hotel or campground often can provide as complete and happy a change from routine as one that is hundreds of miles away. ■

Tips for Energy Savers, U.S. DOE

Employee recognition

In order for the Laboratory to provide the proper recognition and publicity, the Publications Office would like to be notified if an employee is elected or appointed to office in a professional or civic organization or receives a professional

or civic honor, award or recognition. Please send this information to the Publications Office, MS107, X3278, FNAL::TECHPUBS. ■

Education Office enters school/business partnership

Fermilab Joins the Greater Aurora Chamber of Commerce School/Business Partnership Program

The 1990-91 school year saw the beginning of an exciting new partnership between C.F. Simmons Middle School of Aurora East School District 131 and Fermilab's Education Office.

The partnership was established through the Aurora Chamber of Commerce School/Business Partnership Program, which connected 28 businesses with schools this year.

Simmons Middle School is a seventh- and eighth-grade school that reflects the diversity of Aurora's population: 40% Hispanic, 25% African-American and 35% Caucasian. Through the partnership, student groups typically underrepresented in science had the opportunity to study current topics in science. Students were exposed to technologies, careers and concepts they would not ordinarily see. Activities sponsored to help the school enhance their science curriculum featured teacher training, tours and educational materials and events.

As part of the partnership, many teachers at Simmons attended inservice programs at Fermilab. In January, two seventh-grade teachers enrolled in *Beauty and Charm at Fermilab*. (Two eighth-grade teachers already have been trained and currently use the unit.) Also in Janu-

ary, two eighth-grade teachers attended the *Hands-on Science* training session, which enabled them to receive the traveling exhibits.

Students and teachers have taken tours of Fermilab. In April, two eighth-grade teachers arranged for forty students to take a *Beauty and Charm* tour of Fermilab. Forty seventh graders, their teachers and Fermilab guide **Rudy Dorner** (BS/Emergency Services) took an Ecology Tour of Fermilab's grounds.

The Laboratory provided classroom materials for the school, and the *Hands-on Science* interactive teaching stations traveled to Simmons in March. The Education Office also provided copies of its newsletter *Sciencelines* and the reference book *Resources for the Science Classroom*.

Simmons' science fair, a school-wide event, took place on March 16th. **Robin Dombeck**, Education Office Outreach Coordinator, assisted in judging and recognition of the top physics-related science fair projects. Eighth graders Rhee Loberg and Ben Kobulnicky earned the honors in this event with their projects "Can You Turn Paper Waste into Useful Energy?" and "How Does the Temperature of Batteries Affect Their Energy Output?"

Loberg and Kobulnicky won certificates, and they received a congratulatory letter and a Science Education



From left: Science teacher Jim Auer, Robin Dombeck, Ben Kobulnicky, Dennis Theriot, Rhee Loberg and principal Chuck Maveus.

Center T-shirt at the science fair awards ceremony. The winning projects were displayed for two weeks at Fermilab. On May 15, the students attended a luncheon in their honor, hosted by the Education Office. Luncheon guests included teacher Jim Auer, Principal Chuck Maveus, the winners' parents, Fermilab Assistant Director **Roy Rubenstein**, **Gina Rameika** (RDSiteOp), **Tom LeCompte** (E705), **David Anderson** (RDPart.Det) and **Stanka Jovanovic**, **Marge Bardeen** and **Robin Dombeck** (LS/Ed Office).

The final event for the 1990-91 Fermilab/Simmons Middle School Partnership was a Cryogenics Show. **Mike Urso** (RD/Cryo) presented two programs to the entire Simmons student body of 600 students on May 24th.

Simmons Middle School provided Fermilab employees

with the opportunity to interact with seventh- and eighth-grade students in many situations. Examples include their spring fine arts performance, a tour of the school with Principal Chuck Maveus and the annual Simmons science fair.

Veronique Schramme, Greater Aurora Chamber of Commerce School/Business Partnership Program Chairman, said "Simmons is very lucky to have Fermilab as its business partner. The culturally diverse student population has experienced hands-on applications and technology to which they might not otherwise have been exposed."

School principal Chuck Maveus indicated that his school is looking forward to renewing this Greater Aurora Chamber of Commerce educational partnership for the 1991-92 school year. ■

Cla\$\$ified ad\$

Motorized Vehicles

1982 Chevy Citation, 2-door hatchback. Power steering, automatic, 85,000 miles, V-6, Good work car! \$550. Call Ron X4663 days or 708-466-7109 evenings.

1985 Nissan Pulsar NX red, sunroof. 1 owner, low mileage, excellent condition. 33 mpg city, 45 hwy. Call 312-431-3224.

1987 BMW 325, automatic transmission, A/C, AM/FM stereo, tape deck, sun roof, security system, low mileage, excellent condition, \$14,800. Call Paula, 708-879-5178.

Miscellaneous

Freezer, Older Westinghouse upright. Works well. \$25. Call X3374.

8-horsepower riding mower, \$450. Contact Pat at X8030.

Macintosh computer, 512 Kb memory, 800K internal floppy disk drive, external 400K floppy disk drive, keyboard, cables. Asking \$400. Call Joe Lach, X4103, MS 219, WH11W.

New Stereo System, still in box and under warranty, with CD player, B and C cassette recorder, receiver-amplifier, 25 w/ch, list price

\$750, only \$350. Must sell immediately, am leaving country September 1. Call Soloviev, X2260 or X2444 (days), X4240 (evenings).

Ensonic model ESQ1 **synthesizer/sequencer** with memory upgrade, \$600. Yamaha model RX5 **Drum Synthesizer**, \$500. Acoustic model 114, 100 watt **guitar amplifier**, \$150. All for \$1,000. Will separate. Contact Thom Schuhow, X4538, or 708-896-2266, MS355.

Large bookshelf cabinet, custom-made. Easily a \$500 retail value, sell for \$150. **Stereo system cabinet**, O'Sullivan brand, cost \$140 new, sell for \$75. Both items in very good condition. Call Larry, X3377 or X3378.

House in Batavia. 3-bedroom, split-level, 3 miles from Fermilab. 1 3/4 bathrooms, living room, family room, kitchen, utility room, A/C fireplace, 2-car garage with electric garage door opener. Great neighborhood for kids. Please call 708-829-1489 between 6 p.m. and 9 p.m.

Wanted

Responsible roommate wanted to share non-smoking two-bedroom duplex on the west side of Batavia. Call John Ellis, X4050. ■

Volleyball league sponsored

Attention bumpers, setters and spikers! The Recreation Office is organizing refereed volleyball beginning June 26. Teams play Wednesdays and Thursdays on the outdoor volleyball courts.

Teams or individuals interested in participating should contact Jean Guyer, X3126 or Sheri Alderman, X4544 no later than June 17. Rosters are available through the recreation of-

FIA meeting continued

The representative pledged to keep working to secure adequate funding for the Laboratory. "If we lose these types of facilities, or the ability of these facilities to function at their very best, we lose a very important tool to keep that sharp competitive edge in this country," he said. Fermilab, industry and government must work together to keep the edge. According to Hastert, "No one entity can keep us ahead of the curve."

After Hastert's remarks, representatives from Fermilab and industry came together for a Roundtable on Fermilab/industry collaboration. Roundtable participants from Fermilab were **Dan Green** and **Gale Pewitt**. Green and Pewitt were joined by delegates Anthony Favale from Grumman Space and Electronics Systems Division, Walter LeCroy from LeCroy Corporation and Carl Rosner of Intermagnetics General Corporation.

Another feature of the Friday program was a presentation of medical technology developments in which Fermilab was involved. Dr. James Slater, Head of Radiology at Loma Linda University Medical Center, reviewed the first months of

operation of the powerful new Loma Linda medical accelerator, which was built by Fermilab. Professor Robert Beck, responsible for medical imaging research at the University of Chicago, told the FIA about developments in medical imaging and Positron Emission Tomography (PET).

According to **Dick Carrigan**, Head of the Office of Research and Technology Applications, Fermilab established the Industrial Affiliates in 1980 to improve university-industrial communications and foster technology transfer from the Laboratory. The annual meeting provides an opportunity for senior personnel from the Affiliates and other companies to visit Fermilab. Currently, thirty-two companies, including technology-oriented companies on the Fortune 500 list, are Fermilab affiliates. ■

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