FermiNews

The Newsletter of the Fermi National Accelerator Laboratory

WHY FIVE QUARKS AREN'T ENOUGH

What makes physicists so confident the top quark exists?

YOU ARE HERE

When people visit Fermilab for the first time, we often take them to Wilson Hall's 15th floor. From the top of the High-Rise they can look out across the site, while we, their guides, point out the accelerators and beamlines and all the other pieces that make a particle accelerator laboratory. Then we turn to the scale model of the Fermilab site that sits on a stand near the north windows. "You're here," we tell our visitors, pointing to an inch-tall High-Rise, "and this circle is the Tevatron, and that triangular thing is the Anti-proton Source..." We use the model to give visitors a good idea of how Fermilab looks as a whole and how the various pieces fit together, without touring every part of the site in person. That's what a model is supposed to do—give us a good idea of something too big, too small, or too complicated to experience firsthand.

Every field of science uses models to visualize and explain what can't be seen firsthand. Fossil biologists, for example, unearth a few bones and teeth preserved from some ancient animal—perhaps a dinosaur—that no one has ever seen. From the fragments, and following known rules of anatomy, they begin to build a model of the animal as they think it might have looked. The more bones they find, the clearer their idea of how the pieces fit together, and the more confidence they have that their model matches the real thing. If they find nearly all the bones and teeth and claws, they can be almost sure that their model is true to life—and they can predict how the few missing pieces will look when they find them. Legs, for example, come in pairs. If the left leg is in place, but the right leg is missing, the fossil biologist has a fairly good idea how the missing right leg should look and where it fits into the model.

High-energy physicists today are in a position somewhat like that of the fossil biologist who has found nearly all the bones to build a model. Physicists are building a model of matter and energy and how they fit together at the most basic, subatomic level. For 50 years, physicists have been digging for the "bones" to build their model, but instead of the picks and shovels of fossil biology, their tools are high-energy particle accelerators. Fifty years of accelerator experiments have now yielded enough pieces of the model to give high-energy physicists confidence that their model matches reality—and a good idea of how the missing pieces will probably look.

THE GENERATION GAP

The physicists' model is called the Standard Model. Like the parts of a dinosaur, its pieces have names; but instead of bones called "left femur" or "right tibia," the pieces of the Standard Model are subatomic particles called quarks and leptons. Bosons, the force-carrying particles of the Standard Model, might be compared to the dinosaur's muscles. And like the parts of a dinosaur model, the quarks, leptons and bosons fit together in a particular pattern according to certain rules, and

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TOP QUARK

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interact with each other in precise ways. According to the Standard Model, leptons and quarks come in three sets, or "generations," of four — two quarks and two leptons in each generation. (See chart.) Three generations times two quarks per generation makes a total of six quarks. Using particle accelerators, physicists have found five of the six quarks predicted by the Standard Model, but they are still searching for number six, the top. If the Standard Model is right, the top quark is there to be found, to fill the gap in the third generation. But how do we know if the model is accurate? Is it possible the skeleton will fall apart when we try to add the last bone?

The visitor on the 15th floor can look out the window to see if the scale model matches the real Fermilab. Biologists can compare their model dinosaur to others to see if it agrees with principles of dinosaur anatomy. To see if their model holds true, physicists check the Standard Model by doing high-energy experiments designed to test the properties of the pieces of the model and to probe the way the pieces interact. Experiment after experiment has tried to find flaws in the Standard Model's predictions, but ultimately all the experimental evidence supports it. The weight of experimental evidence has grown steadily until there is now enough to convince most physicists that the model does match reality.

GENERATION ONE	GENERATION TWO	GENERATION THREE
up quark	charm quark	top quark (?)
down quark	strange quark	bottom quark
neutrino	muon neutrino	tau neutrino
electron	muon	tau

Past experiments have revealed three generations of particles called quarks and leptons. The bottom quark was discovered at Fermilab in 1977. Today, two Fermilab experiments are searching for bottom's partner, the top quark.

SEEING IS BELIEVING

The Standard Model makes statements we can check, about quarks, leptons and bosons, that strongly point to the existence of the top quark. In one example, experiments have revealed a particle characteristic known as "weak isospin" that describes the way leptons and quarks interact with bosons in the first two generations of the Standard Model. The up and down quarks, for instance, in Generation One, and the charm and strange quarks in Generation Two, each have a sort of isospin buddy system, in which the two quarks together form what is called an isospin doublet. Is the bottom quark, in Generation Three, also half of an isospin doublet, with an as-yet-unknown mystery partner, or is bottom a different kind of quark, an isospin singlet, operating on its own, with no partner? "According to the Standard Model," D0 experimenter Meenakshi Narain says, "if the bottom quark is a member of a doublet, it will behave very differently from the way it will act if it is a singlet. This behavior can be studied in particle collision experiments. They show that bottom behaves like the member of a doublet." Which means bottom must have an isospin partner—the mystery partner called top. The bottom quark's charge and way it decays into other particles also fit the idea that it has a top quark partner.

The Standard Model points to top in another way. After the big bang, according to prevailing theory, the universe evolved from a first, high-energy instant through different stages to a lower-energy state comprising the various particles we observe today. Creating particle collisions at higher and higher energies lets us work our way back toward the energy level of that first instant. Any model for explaining matter and energy as they are today must also pass the test of holding true as we go up in energy or back in time. To pass this test, the Standard Model requires not only a top quark but also a particle called a Higgs boson. (Subject of a future article.)

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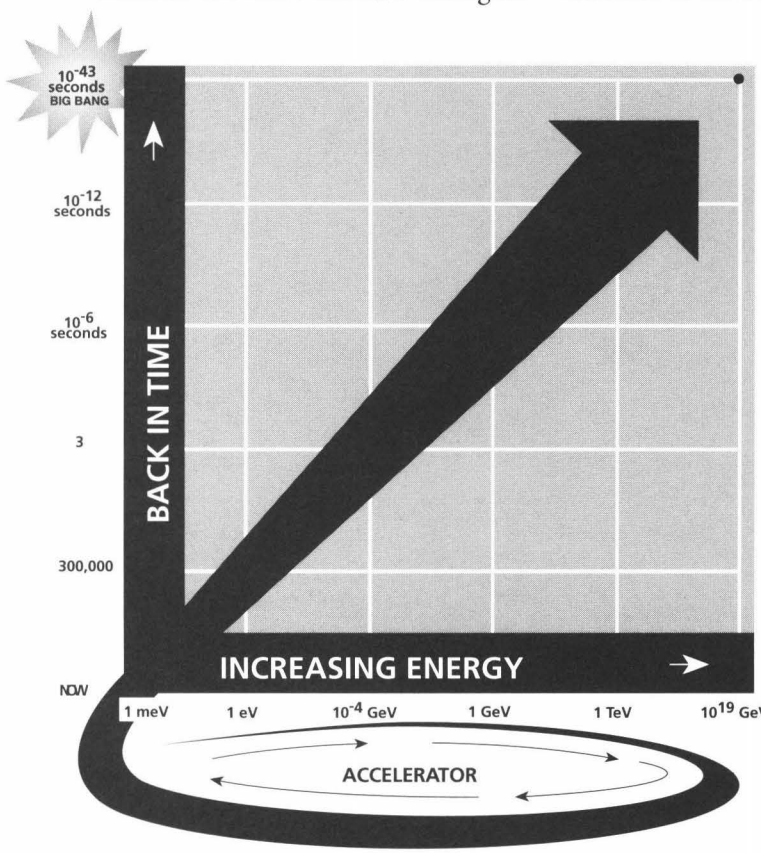

An accelerator can boost particles to energy levels that existed in the early universe after the big bang. Any model of matter and energy must hold true as energies increase.

LAB HONORS INVENTORS

A reception was held on March 16 in the Wilson Hall Second Floor Art Gallery to honor the achievements of Fermilab employees and former employees who filed records of inventions between January 1, 1993 and December 31, 1993. The reception was hosted by JOHN VENARD and PAT OLECK of the Office of Reasearch and Technology Applications.

During the ceremony, each inventor received a cash award and a certificate in recognition of his or her valuable technology contribution. John welcomed the awardees to the ceremony. "The quid pro quo (of the Record of Invention Award) is that we may recognize the inventors with a modest cash award. More importantly, we are here to recognize that you who are being honored have been creative and innovative in your work and in so doing, have continued in the traditions of excellence that are so characteristic of Fermilab." Those honored at the reception were:

S. AHN (RD), R. ANGSTADT (RD), T. DROEGE (RD), M. JOHNSON (RD), B. MACKINNON (CD), S. MCNULTY (RD), M. SHEA (AD), R. THOMPSON (CD) and M. WATSON (RD) for their invention of the VME-based high voltage power supply. This device provides DC high voltage to high-energy physics detectors through the use of low noise, 2 volt precision and VME control.

L. BEVERLY (RD), R. HANCE (RD), A. KRISTALINSKI (RD) and A. VISSER (retired) for their invention of the reduction of third harmonic currents in AC distribution networks. This technology, by the addition of a small choke, dramatically improves the ability of zig-zag transformers in distribution networks to respond to the local harmonics and to reduce harmonics in AC lines.

P. CLIFF (AD) for his invention of a safety lock-out/tag-out device for IEC 320 AC line voltage couplers. This device allows the AC line cord to be used to provide power to an appliance in its open position, but in its closed position, it absolutely prohibits the unwanted introduction of line voltage to that appliance.

R. FAST (retired), C. GROZIS (RD) and A. LEE (RD) for their invention of the isogrid vacuum vessel. This outer vacuum shell was used for the prototype for the SSC's SDC detector solenoid. The shell used a geometric pocket design that provided a very high strength-to-weight ratio and had an effective thickness of 0.413 inches. The smaller effective thickness allowed the high-energy particles streaming out of the detector's collision region to interact with fewer aluminum nuclei, yeilding more desirable physics results.

J. FUERST (AD) and A. ANELLO (RD) for their invention of the hermetic bayonet isolation valve. This valve seals off the process connections (bayonets) on components that have been removed from a cryogenic system and provides a hermetic seal between the process and the ambient when these connections are made up.

R. GOODWIN (AD), M. KUCERA (AD) and M. SHEA (AD) for their invention of the internet rack monitor (IRM). This IRM is an intelligent data acquisition system containing the processor, network connection and the analog and digital I/O in the same chassis. It is a cost effective control data acquisition chassis that can be easily integrated into most modern control systems.

C. JOHNSTONE (AD) for her invention of a tangential focusing lens for a Cerenkov counter and for devising a new technique for beam extraction that employs laser stripping of H^- to H^0. The lens collects light distributed along an arc of a circle and focuses it to a discrete detection point, as in the case of conically-emitted Cerenkov radiation. Carol was also honored for suggesting the creation of a third Linac beam line capable of exploiting unused Linac cycles and incorporating laser techniques. The uses of this line are anticipated to be proton therapy research, detector R&D and accelerator studies.

H. JOSTLEIN (Physics) for his four inventions: a CMM automatic ball bar, a capacitive dimensional probe that self-corrects for stray capacitance, a contour-following capacitance gauging probe and an orbiting, self-correcting capacitive gauging probe. The CMM ballbar provides a fast and highly accu-

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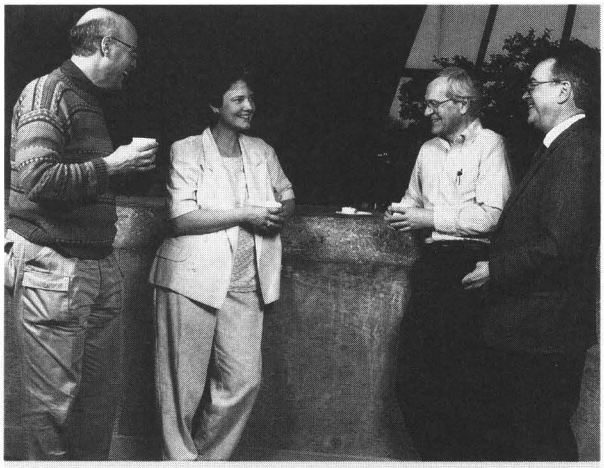

Tom Nash (l) and John Venard (r) talk with award recipients Carol Johnstone and Ray Yarema at the ROI Tea.

FERMILAB REGIONAL SCIENCE BOWL A SUCCESS

Robin Dombeck helps a Science Bowl participant draw for her team's 1st round position.

BATAVIA H.S. PLACES SECOND

Five whiz kids walked away champions of Fermilab's Regional Science Bowl on February 26, but everyone left a winner following a heated event in which 55 sharp students competed to represent the Laboratory at the DOE National Science Bowl in Washington, D.C.

Milwaukee's Rufus King High School took home the championship trophy, edging out runner-up Batavia High School and nine other teams in the final round of the brain-draining competition.

Led by coach John Wheeler, Batavia team members Andy Anderson, Bryan Bertoglio, Kerry Gorman, Seth Jokerst and alternate Rich Montgomery fielded astronomy, biology, chemistry, computer science, earth science, mathematics, physics and current events questions for eight intense rounds. The final round, moderated by Associate Director for Administration, BRUCE CHRISMAN, lasted 18 minutes, with the title going to Rufus King High School.

DOE Chicago Field Office Manager CHERRI LANGENFELD presented awards to the winners. Approximately 250 students, observers, coaches, teachers and Fermilab volunteers attended, and the many Laboratory staff members and outside organizations who contributed their time and expertise to the Science Bowl deserve a hearty thanks, remarked Outreach Coordinator and Science Bowl organizer ROBIN DOMBECK. "The Fermilab Regional DOE Science Bowl was a great success, in part because of everyone's support," Robin said.

The championship team and their coach will travel to Washington, D.C. to represent Fermilab in the DOE National Science Bowl April 22-25, 1994. There they will compete against approximately 50 teams from other regional science bowl events for prizes and science trips.—*Brian Charles*

INVENTORS

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rate means of checking the volumetric accuracy of a coordinate measuring machine. It consists of a ball bar with a built-in precision switch. The capacitive dimensional probe corrects stray capacitance, which can skew responses when using capacitive probes. The contour-following gauging probe measures the gap capacitance of interest and the orientation of a surface. It is a directional capacitive probe that allows precise and continuous contour following guidance. The orbiting, self-correcting probe can be orbited or vibrated by an external drive. When a DC voltage is applied to the orbiting probe, the resulting AC current is proportional to the gap capacitance only, independent of any stray capacitance that otherwise could skew the gap measurement.

M. KOZLOVSKY (RD) for his creation of a precision automatic magnetic flux measurement system. This system allows computer controlled magnetic flux measurements to be made with higher precision than ever before. This is made possible by the use of novel offset voltage and offset voltage drift compensation circuitry and other special features.

M. KUCERA (AD) and M. SHEA (AD) for their invention of industry-pack modules. Industry-pack is the specification for an open standard generated by Green Spring Computers, Inc. and describes a small daughterboard that allows a single interface for custom designs to connect to a host computer via a carrier board. Because field programmable gate arrays are used, a single PC board implementation can serve for different applications by using different FPGA designs.

M. KUCHNIR (TS) and E. SCHMIDT (TS) for their invention of a field angle probe that measures the direction of the magnetic field of a dipole magnet with respect to gravity. It uses a permanent magnet mounted on gimballs instrumented with an electrolytical level sensor.

R. RIHEL (TS), J. CARSON (TS) and D. CONNOLLY (TS) for their invention of a robotic system for azimuthal dimensions of SSC dipole coils. This robotic system provides a means of assuring that only those magnet coils meeting exact mechanical and electrical requirements are assembled into magnets.

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SPECIAL SECTION

FESS-UP

The Confessions of a Section Seeking World Class

FROM THE SECTION OFFICE

As I'm sure you will all agree, this has been a pretty tough winter. The snow, ice and cold temperatures have not only been difficult to deal with on a personal level but have also taken their toll on Fermilab's facilities and grounds. Spring's warmer temperatures will offer some welcome relief, but as the snow and ice melt away, damage caused by the recent harsh weather may become fully apparent. Displacement of sidewalks and stoops due to frost, potholes in roads and hardstands, caulking and weatherstripping problems, and the ever popular roof leak are just a few examples of difficulties we can expect to encounter.

In an effort to respond in a quick and consistent way to problems that arise, FESS would like to urge all employees to work through their respective building or area managers when a problem is discovered. This "funneling" of work requests through the building manager will accomplish two things. First, the building manager will be made aware of all problems and activities that are occurring in the building, and second, like activities can be combined for more efficient resolution. If you are not familiar with the building manager program or do not know who your building manager is, talk with your supervisor or give us a call. We'll be glad to help you out.

FESS fully supports all of the recent progress that has been made with the building manager program and views the program as an important tool that we can use to provide better service to you, our customer. In future issues of FESS-UP, we'll try to explain more about programs like this and about all the services FESS has to offer. The more you understand about the services we offer and how those services can be obtained, the more opportunities we will have to provide you with the satisfaction you deserve.—*Vic Kuchler*, assistant head, FESS

■ MAIN INJECTOR UPDATE

The Main Injector (MI) enclosure project will begin shortly. Please do not travel or walk in the construction area.

A study will be initiated to investigate fire detection systems for the MI-60 surface buildings and tunnels.

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Work Request Center

Telephone x3434, Fax x8769

Mail Station 300

INVENTORS

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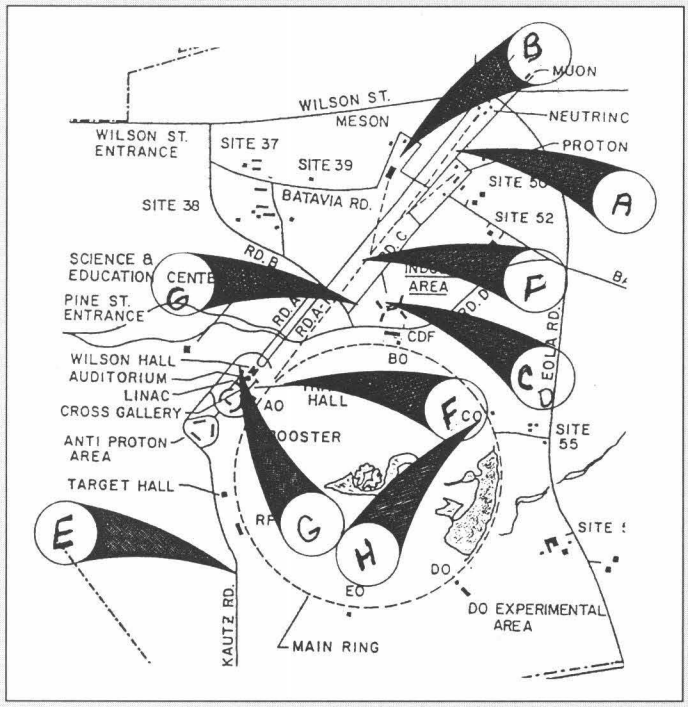
D. SCHOO (RD) for his invention of an automatic go/no-go cable tester. This tester is a pocket sized, portable, battery operated instrument used to quickly evaluate the condition of electrical wiring. The tester is used with a small remote unit, approximately the size of a matchbox, to simultaneously check a cable for a shorted and/or open condition.

J. SMOLUCHA (AD) and M. GLASS (AD) for their creation of a Multibus II CAMAC serial link concentrator. This provides a solution to the problem of efficiently interfacing multiple Multibus II-based single board computers to a single 10Mbit/second serial CAMAC data link. The concentrator interfaces as many as eight Multibus II CPUs.

T. ZIMMERMAN (RD) and R. YAREMA (RD) for their invention of a BVXIII integrated circuit. This circuit is a preamplifier-shaped circuit designed to read out silicon strip detectors with relatively low capacitance and is intended to be fabricated as an integrated circuit to minimize space requirements.

FESS

SPRING PROJECTS UPDATE



FERMILAB FACILITY FACTS:

Fermilab used 80,201.8 gallons of propane in 30 tanks at 24 locations in 1993.

■ BEGINNING TO WORK ON

(A) Preparation in the fixed-target area for new experiments.

(B) Disassembly of MP-9 experimental area, relocation of portacamps and cleaning building out.

(C) IB-2 addition construction.

(D) Ditch relocation at IB-2 in preparation for building addition.

(E) Main Injector site prep road almost complete.

(F) Domestic water hydrant flushing in Research Area and WH footprint area.

(G) Swan Lake and Bullrush Pond - banks to be rebuilt or built out and erosion control installed along banks.

(H) The C0 Service Building water well has been drilled to run water service from the well to the building.

■ FOR YOUR INFORMATION

PAUL ALLEN is the new site manager for Capitol Services, Fermilab's janitorial contractor. Paul brings a wealth of expertise to this position and will be making some changes. Give Paul a call at x2798 to see what changes will be coming your way.

■ ON THE DRAWING BOARD

Wilson Hall Parking/Lighting Project-The west portion of the WH parking lot will be repaved and parking realigned. The entire perimeter of WH parking (east and west) will be equipped with new parking lot lights.

■ IN PROGRESS

In conjunction with Gage-Babcock & Associates, a conceptual design report (CDR) is being prepared for the Wilson Hall fire alarm system upgrade.

■ AT YOUR SERVICE

The Facility Condition Inspection (FCI) Program directly supports the mission of the Laboratory and protects the investment of DOE by systematically and routinely identifying all facility deficiencies and recommending appropriate corrective action that will maintain the facilities in compliance with DOE Order 4330.4A - Real Property Maintenance Management. The inspection staff of Building Inspection and Repair will be meeting with all building managers within the next few months to discuss any FY94 maintenance work that needs to be done. For information on this program, please call BRIAN KANE at x2598.

■ KUDOS

Many thanks to Roads & Grounds personnel and all Laboratory personnel who spent many hours clearing snow, ice, standing water and all things unpleasant during the many days and nights of inclement weather we have all recently endured.

WELL - WHAT DO YOU THINK? DO YOU LIKE THIS COLUMN IN FERMINEWS?

SEND YOUR COMMENTS TO: FESS-UP, M.S. 214

FOR A LIMITED TIME ONLY

VISUAL MEDIA SERVICES OFFER COLOR COPIES WITH DESKTOP CONVENIENCE

Visual Media Services recently installed a color server that provides an Ethernet interface to the color copier located in Duplicating. The new server allows you to print text, graphics, illustrations and photographs directly from your Macintosh, PC or Unix workstation to the color copier.

The server has a spooler utility that can handle up to 500 megabytes of data and allows you to regain use of your computer while the color copier prints your job.

Some of the advantages of this technology are significantly increased printing speed, convenience for the user and the ability to handle 11x17 inch paper.

Duplicating's color copier will still function as a walk-up copier and during morning hours incoming print jobs from the network will not interrupt local walk-up use.

Visual Media Services is testing this server on a 30-day trial basis. The decision to install the technology permanently will be based on customer feedback.

If you are interested in trying out this new product, please call AL JOHNSON at x3349. Al will arrange for you to receive vendor sponsored training and other usage information.

After you have used the copier, Visual Media Services needs your feedback in order to make a purchase decision. Please provide this feedback to FRED ULLRICH on FNAL::FREDU or QuickMail Fred Ullrich.

If you need access to a color printer and are on the Ethernet, this may be your answer. Try out the new server during the 30-day trial period and see how this new service could fit into your production workflow.

NEW IN THE LIBRARY

Workshop on Physics at Current Accelerators and Supercolliders (1993: Argonne) ANL, 1993. QC793.5.H328 W67 1993, main.

International Workshop on Supersymmetry and Unification of Fundamental Interactions (1993: Boston) World Sci., 1993. QC174.17.S9 I59 1993, main.

Test Phantoms and Optimization in Diagnostic Radiology and Nuclear Medicine Nuclear Technology Pub. Co., 1993. QH324.8 .T36 1993, main.

Workshop on Radiation Detectors and their Uses (1993: KEK) QC787.C6 W67 1993, main.

Rencontres de physique de la Vallee d'Aoste (1993) Eds. Front., 1993. QC793 .R46 1993, main.

Int. Workshop on Neutrino Telescopes (1993: Venice) QB464.2 .I58 1993, main.

Conf. on Real-Time Computer Applications in Nuclear, Particle and Plasma Physics (1993: Vancouver) TRIUMF, 1993. QA76.54 .C55 1993, main.

Symposium on Accelerator Science and Technology (1993: KEK) QC786 .SY66 1993, main.

Linear Accelerator Meeting in Japan (1993: KEK) QC787.L5 P74 1993, main.

Int. Symposium Ahrenshoop on the Theory of Elementary Particles (1992: Wendisch-Rietz, Ger.) Zeuthen, DESY-IfH, 1993. QC793 .I574 1992, main.

Science and Culture in Europe London Sci. Museum, 1993. Q175.52.E85 S24 1993, main.

Int. Conf. on Electronics for Future Colliders (1993: Chestnut Ridge, N.Y.) QC797.P73 C6 1993, main.

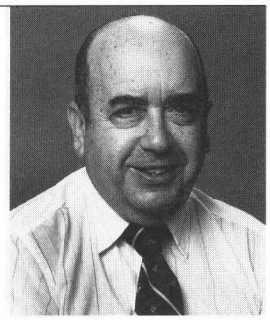
Advanced Light Source Users' Association Meeting (1992: LBL) QC793.5.P422 A28 1992, main.

Int. Workshop on Emittance Preservation in Linear Colliders (1993: KEK) QC787.L5 I57 1993, main.

To get a list of the most recent preprints received, connect to the Library's catalog by doing either: SET HOST FNLIB, or TELNET FNLIB.FNAL.GOV. Username = Library. Use the catalog's "search mode" and search by the latest Tuesday, e.g.: find preprint and cataloged 22-FEB-1994.

People & Events

GENE VALDES TO RETIRE



GENE VALDES, an electrical engineer in FESS/E&P, is retiring from the Laboratory March 31. Gene started working here in 1973 in the Site Service Department, a precursor to Engineering & Planning.

In his retirement, Gene plans to stay in the area and "get things done at home." He and his wife also plan to do some traveling.

Gene said he thought Fermilab was a great place to work. "I always enjoyed the work and the people I've worked with."

GET READY FOR SUMMER

Join the muscle toning class on Tuesday and Thursday evenings March 22 to May 26 from 5:30 - 6:30 p.m. in the Recreation Facility. The cost is $50.00 per person. To register contact Jean at x2548 or FNAL::JEANM. Beginners are welcome. You must be a current gym member to join the class.

NALWO

All Lab women are invited to the Spring Equinox Potluck in the Users' Center on March 21 from noon until 1:30 p.m.

Please prepare a dish to share that is typical of your country's cuisine, or just a favorite and bring the recipe. If you need help writing the recipe in English you may call Mady at x3688 and she will be glad to help you.

Babysitting is available at Playgroup. To register call Connie at x2034.

Help is needed for the set-up or clean-up committees. Please volunteer if you can. For more information call Brenda at x3440.

A PERSONAL THANKS...

My retirement luncheon was great. It is impossible for Hetty and me to personally thank each of you for your generosity and kindness. We were deeply touched by it.

I am sure we will enjoy our retirement years and I will always remember my colleagues and friends at Fermilab as being the greatest people to work with. Terry Grozis deserves a special thank you for successfully organizing the luncheon.

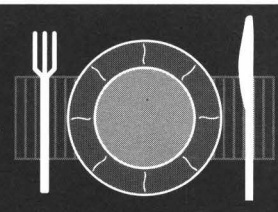
I plan to visit Fermilab occasionally. Good luck to all of you and thanks again.—*Age* and *Hetty Visser*

NALREC

Don't miss an old-fashioned rock and roll party at the Kuhn Barn tonight, March 18, from 5:15 to 9:15 p.m.

Snack on peanuts in the shell and enjoy pizza from Dominick's in West Chicago. Music will be provided by DJ Michael Stinson.

Chez Leon Menu



Lunch (Wed) $13.00 • Dinner (Thurs) $23.50
Reservations: x4512

Wednesday, March 23 • *Salad Nicosia, roast pork tenderloin w/orange & rosemary sauce, vegetable of the season, pear tart*

Thursday, March 24 • *Cheese tortellini w/pesto, veal w/Marsala sauce, vegetable of the season, romaine salad w/anchovy dressing, amaretti mousse*

Chez Leon will be closed March 30 and 31

STOCKROOMS TO CLOSE

The Fermilab Stockrooms will be closed for annual inventory on the following schedule:

■ Wilson Hall Stockroom:
Closed Friday, May 13 at 12 noon. Reopen Monday, May 16 at 12:30 p.m.

■ Site 38 Stockroom:
Closed Monday, May 16 and Tuesday, May 17 all day, both days.

Call the Supply Office at x3808 if you have questions.

MOVIES

The Fermilab International Film Society presents movies at 8 p.m. Fridays in Ramsey Auditorium. Admission is $3 for adults, $.50 for children 12 and under.

March 25: *Enchanted April.* Four British women escape the drabness of their lives by renting a castle in Italy for a month. Life and fantasy exquisitely contrasted. Michael Newell, dir., Great Britain, 1992 (107 min.).

HEART DISEASE SEMINAR

Deborah Doud, M.D., a cardiologist from the Edward Cardiovascular Institute in Naperville, will be speaking on women and cardiovascular disease on March 22 from noon until 1 p.m. in WH1West. All Fermilab employees, retirees, users and contractors are invited to attend.

LAB TO HOLD WEIGHT WATCHERS SEMINAR

The Wellness Works Committee will sponsor an introductory Weight Watchers session on April 6 from noon until 1 p.m. in Curia II. The program is a nutritionally balanced, flexible and safe method for weight reduction.

If 25 people are interested, the 10 week one-hour sessions would be offered at Fermilab. If you are interested in enrolling in the program, please sign up in the Medical Office. The cost is $130 payable at the introductory session.

AMA GUIDE OFFERED BY MEDICAL

The Wellness Works Committee is considering offering the *American Medical Association's Guide to Your Family Symptoms.* The guide is endorsed by the AMA and has met with the approval of the Fermilab Medical Department.

This concise medical reference has special sections for men, women and children. Its charts concentrate on the most common symptoms and illnesses.

A copy is in the Medical Office for viewing. Orders for the guide can be made in Medical. A minimum of 50 total books must be ordered before the Medical Office will place the order. The cost is $8.25. The signup sheet will be available in Medical until April 8, 1994.

Harper's Index

Average percentage increase in a wife's blood pressure during an argument with her husband: **6**

Average percentage increase in a husband's blood pressure during an argument with his wife: **14**

NEW FROM STOCKROOM

The following items are now available from the stockroom:

1360-1030 Pen, ballpoint, retractable, w/pocket clip and refillable, Papermate P/N 900-61 only, medium point, blue ink.

1360-1031 Pen, refill for Papermate, medium point, Papermate P/N PAP-443-04, black ink.

1360-1032 Pen, refill for Papermate, medium point, Papermate P/N PAP-441-01, blue ink.

1780-0568 Tape, mini date cartridge, formatted capacity 120 MB, 5 tapes per box, 3M P/N DC2120XIMT.

1780-0689 Disc, recording, micro, IBM PC compatible, formatted, 1.44 MB, double sided, double density, 3.5 in., 3M P/N 12882.

1780-0691 Disc, recording, micro, IBM PC compatible, formatted 1.44 MB, double sided, high density, 3.5 in., 3M P/N 12881.

1780-0693 Disc, recording, micro, Apple Mac., formatted 1.40 MB, double sided, double density, 3.5 in. 3M P/N 40758.

TOP QUARK

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The Standard Model says there is a top quark, and experiments give us good reasons to trust the Standard Model. Nevertheless, seeing is believing, and science is notoriously full of surprises. It sometimes happens that biologists dig up a fossil bone that looks completely different from the one they expected to find; then they must change the model of the creature they are building to fit the new evidence. The only way to know for sure that the top quark exists is to find it in experiments, and measure its properties. Finding top in particle collisions, and learning how it interacts with other particles, would be a strong indicator of the accuracy of the Standard Model. Finding something else, something unexpected, might mean changing the model to fit a surprisingly different creature. ■

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(This is the first in a series of *Ferminews* articles written by Laboratory staff on the search for the top quark.)

CLASSIFIEDS

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1986 Plymouth Caravelle, turbo, 4 dr., AC, PS, AT, AM/FM/cassette, 87k miles, reliable, great family car, $2,300. Call Ray at x2278 or 708-393-7821.

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