

Future of Science Key Topic of Users' Meeting

The 1986 Fermilab Annual Users Meeting offered great expectations for the future of Fermilab, high-energy physics (HEP), and science in general, while shedding light on the problems and concerns which threaten to cloud that future. The range of speakers included representatives of HEP, cosmology, the executive and legislative branches of government, and (something new) scientific disciplines outside HEP. And through it all, like a whispered subtext, ran the Superconducting Super Collider (SSC), and the impact of Gramm-Rudman-Hollings budget legislation on all sciences.

The meeting was opened by Neville W. Reay, Chairman of the Users Executive Committee (UEC), who noted the UEC's involvement in a number of areas of concern to users, including representation at the SSC review meeting, adjustments in health coverage for users, and the UEC's active role in the establishment of the Vax Cluster at Fermilab. Reay noted that this year marked the end of nearly 13 years of R&D and construction work on the Saver/Collider complex, and observed that 1986 would be a year of budgetary retrenchment at all levels, local, state, and scientific, in light of the impact of Gramm-Rudman-Hollings.

Fermilab Director Leon Lederman reviewed the year's high points, taking care to state emphatically that Fermilab is operated by universities for universities as a university facility "intimately tied to the state of health of research in universities."



Participating in the panel discussion "How Do We Sustain Good Science?" at the 1986 Annual Users Meeting were (left to right) R. Stephen Berry (James Franck Institute, U. of Chicago), Bertrand I Halperin (Harvard U.), Riccardo Giacconi (Space Telescope Science Institute), James W. Cronin (U. of Chicago), and Daniel Kleppner (MIT). Not pictured: panel moderator Edward Knapp, URA President.

Stating that the Lab has perceived a need for long-range planning for the evolution of the Tevatron, and with the qualification that "a 15-year plan does not guarantee institutional immortality," the Director presented the outline of a soon-to-be-published "15 Year Institutional Plan" intended to carry the Lab through the year 2001. The "base philosophy" of this plan entails fixed-target physics predicated on several major detectors, new initiatives including a major heavy-quark spectrometer, Accumulator/Collider add-ons, Pbar Source upgrades, vigorous SSC R&D in the beamlines, and other activities covered by the Lab's accelerator upgrade program, such as a new Linac, a new Main Ring measuring 5/8ths the circumference of the present Main Ring, luminosity upgrades to 5×10^{31} ("a major challenge to our detectors"), a 75% accelerator efficiency rate, an accelerator running period of six months per year for colliding beams, and Tevatron modifications. "These upgrades," the Director said, "can be accomplished in 1988

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Stockroom Reminder

The Fermilab stockrooms, located in the Wilson Hall Catacombs and the Site 38 Warehouse, will be closed for annual audited inventory during the week of May 19-23.

The Wilson Hall stockroom will be closed **May 19th and 20th.**

The Site 38 stockroom will be closed **May 21st through May 23rd.**

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through 1992, provided R&D funds are available next year." The plan will "assume frontier science [at Fermilab] until SSC comes on in 1995, plus or minus one."

Presenting three options for SSC siting (at Fermilab, elsewhere, or not at all) the Director said that "SSC has a crucial influence on physics in general. In my opinion, it is essential in all three [siting] cases for Fermilab to carry out Collider upgrades and fixed-target exploitation."

In summary, the Director reminded his audience that years of Tevatron construction had yielded the highest energy fixed-target physics until 1990, the highest energy collider physics until 1993 or '95, and sophisticated fixed-target spectrometers and collider detectors.

Speaking next, newly-elected Universities Research Association (URA) President Edward Knapp called this summer and fall

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Letters to the Editor . . .

FermiNews will print letters to the editor from employees in response to articles appearing on these pages. Letters for publication will be selected by the editor.

Only signed letters will be considered and authorship will be verified prior to publication. FermiNews reserves the right to edit for space while preserving each letter's intent. Submit to: Letters, Fermilab Publications Office, MS 107.



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Agreement (critical, statistical, and otherwise) is unanimous: the 1985 Fermilab Annual Report is a hit.

"It would be the Great American Novel, or at least one chapter, if it weren't all true..." N. Mailer.

"Right up there with the rest of the Right Stuff..." C. Yeager.

"From the Cosmic Soup to the nuts and bolts of detectors, a recipe for successful physics..." C. Claiborne.

"I couldn't put it down - but, then, it's so big I could barely pick it up!..." T. Capote.

"One could hardly wish for a more perspicacious and, ummmmmmmmm, erudite vantage point from which to survey the circumvallation of colonial high-energy physics..." W. F. Buckley, Jr.

"It is good." E. Hemingway.

Find out what all the brou-hah-hah is about. The 1985 Fermilab Annual Report is now available at your local Publications Office, Wilson Hall, 3SE. For mail station delivery, call ext. 3278. Copies are limited, so act now.

Director's Review of Accelerator Status and Upgrade Program to be held in Curia II.

May 20, 1986, from 9:00 a.m. to 12:30 p.m.: "Status Report on a Proposal to Increase the Pbar Source Accumulation Rate to 4x10¹¹/hour," (M. Gormley, G. Dugan, V. Bharadwaj, J. Peoples, J. Marriner, R. Pasquinelli, J. McCarthy, and J. Griffin).

THE NEW YORK TIMES BOOK REVIEW Best Sellers

This Week	Nonfiction	Last Week	Weeks On List
1	1985 FERMILAB ANNUAL REPORT by Leon Lederman et al. (Fermilab, Free) A guided tour of the Fermilab True Organizational Chart and attendant activities in 1985 A.D.		8
2	WAYS TO PARADISE, by Leo Buscaglia (Sleek/Morrow, \$18.95) A short trip with the ebullient advocate of the virtues of love.	2	12
3	NECESSARY LOSSES, by Judith Viorst. (Simon & Schuster, \$17.95.) Life is a series of losses, the author argues, and we must confront them in order to grow.	16	2
4	WHEN ALL YOU'VE EVER WANTED ISN'T ENOUGH, by Harold S. Kushner. (Summit, \$16.95) A rabbi discusses "the search for a life that matters."	5	3
5	THE GREAT GETTY, by Robert Lenzner. (Crown, \$18.95.) The life and loves of J. Paul Getty, who was the richest man in the world.	4	9
6	THE MAN WHO MISTOOK HIS WIFE FOR A HAT, by Oliver Sacks. (Summit, \$15.95.) The loss of the faculty of recognition and other strange neurological disabilities.	3	5
7	BLESSINGS IN DISGUISE, by Alec Guinness. (Knopf, \$17.95.) The autobiography of the distinguished English actor.	6	6
8	YEAGER: An Autobiography, by Chuck Yeager and Leo Janos. (Bantam, \$17.95.) From West Virginia hillbilly to World War II fighter pilot...	10	43

Conference on Teaching Modern Physics Held at Fermilab

Below are some scenes from the Conference on the Teaching of Modern Physics at Fermilab, which was held April 24 - 27, 1986.



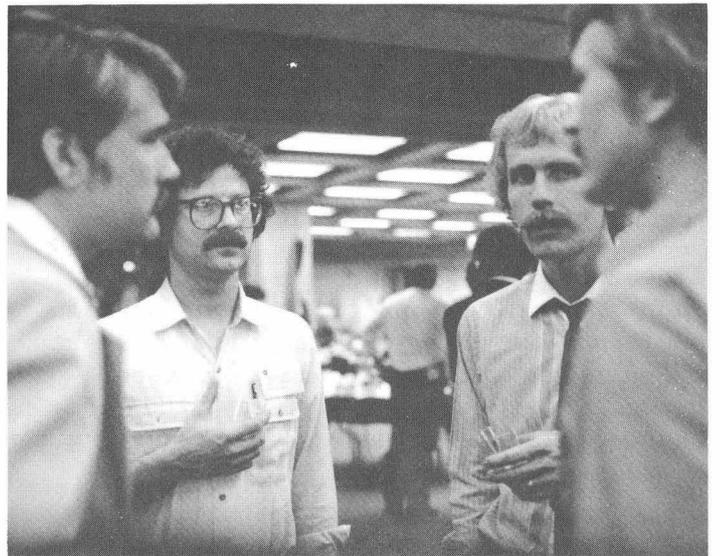
Terry P. Walker, Fermilab Theory Department; Walt Schearer, Glenbard North High School; JoAnn Johnson, Wheaton North High School; and Ward Haselhorst, Proviso East High School, make up a working group of physicists and "master teachers" editing conference materials.



Physics professors from Mexico and Brazil who were among the ten Latin Americans participating in the conference are (l. to r.) Prof. Gilbert Kuipers, Prof. Piotr Trzesniak, Dr. Vaime Klapp, Prof. Saul Tellez and Prof. Eugenio Ley-Koo.



Stanka Jovanovic, President of Friends of Fermilab, with three physics master teachers who edited conference materials and assisted in leading group sessions. From left is William Conway, Lake Forest High School; Stanka Jovanovic, Friends of Fermilab Association; Walt Schearer, Glenbard North High School; and JoAnn Johnson, Wheaton North High School.



Conference participants (from left) are Chris Hill, Fermilab Theory Department; Larry Weathers, Bromfield School, Harvard, Mass.; Clifford Will, Washington University, St. Louis; and John Sherfinski, Kingswood-Oxford School, West Hartford, Conn.

Correction

The correct date for the Jazz Showcase is Saturday, July 12, 1986. The date printed in the last edition of *FermiNews* was incorrect.

The Jazz Showcase is a part of the Fermilab Arts Series Summer Showcase schedule for 1986.

Editor: R. Fenner; Assoc. editor: S. Winchester
Photography: Fermilab Photo Unit

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New Housing Project for Visitors Moves Closer to Reality

A major hurdle was passed last month when the Universities Research Association (URA) received approval from the Illinois Educational Facilities Authority (IEFA) to apply for a loan from the Cultural Pooled Financing Program, which is sponsored by the IEFA. The next step will be a credit assessment by the First National Bank of Chicago. If the credit assessment is positive, it will clear the way for a low-interest loan of up to \$4.5 million over a three-year period. The money will be used to construct new housing units in the Fermilab Village (see map).

Obtaining a loan from this program was made possible last October when Governor James Thompson signed House Bill 2472. That legislation permits Illinois "cultural institutions" to borrow through the IEFA on a tax-exempt basis. URA qualifies as a not-for-profit institution which provides cultural, intellectual, scientific, and educational enrichment to the people of the state of Illinois.

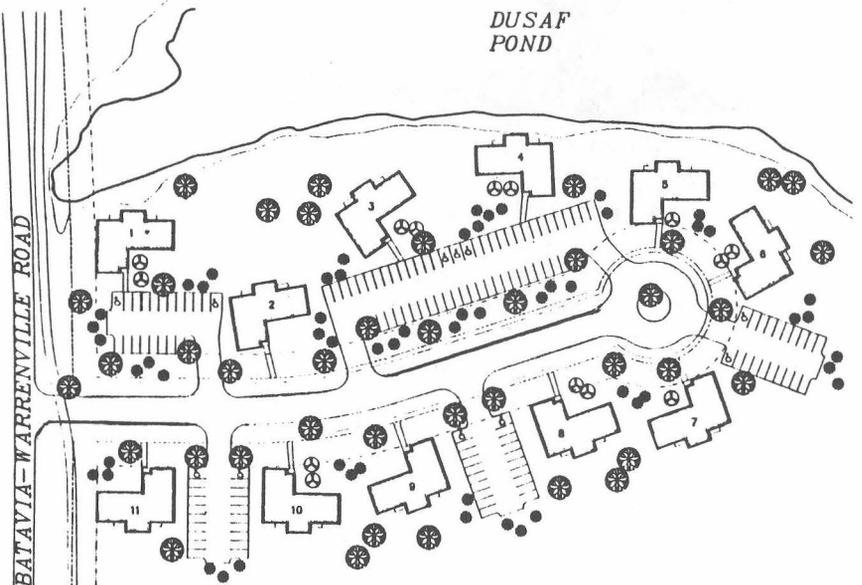
Last summer, Fermilab Director Leon Lederman put top priority on obtaining additional housing. There was a shortage of 78 units and many would-be visitors were being turned away. Clearly the housing shortage was becoming critical, hurting the overall physics program.

When the situation was presented to the URA Board of Trustees, Fermilab was given the go-ahead to seek financing through IEFA. Such financing is viewed as the most promising, if not only, solution to the increasing shortage of on-site housing for visitors. Before the Board of Trustees will consider final approval to proceed with the project, two more requirements have to be met: 1) favorable credit assessment and terms of financing by the First National Bank of Chicago and; 2) a leasing agreement with the Department of Energy (DOE) - currently under negotiation.



The project contemplates building 24 furnished apartments this year and a similar number in each of the following two years. Whether the full three-year plan is carried out will depend upon a continuing demand for more housing.

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The first cluster of housing will be located in the Village on the west side of DUSAF Pond. A future cluster would go on the east side of the pond.

John Paulk is the manager of the project. He is assisted by a Housing Task Group comprised of Maris Abolins, Arthur Garfinkel, Sharon Hagopian, Ken Heller, Bob McCarthy, Alice McLerran, Avril Quarrie, and Cynthia Sazama. These participants have provided input on the layout and contents of housing that would best meet the Laboratory's needs. They have recommended two-story multiple-unit structures very similar to coach houses found in nearby commercial developments. The units would feature a modern kitchen, bath with tub/shower combination, living-dining room area, one or two bedrooms, individual furnace, hot water heater, central air conditioning, generous closet storage, patio or second floor wooden deck. The group is recommending exterior treatment in the colonial or Victorian style.

URA, as the borrowing institution, will be responsible for financing and construction. Income from rent will be used to retire the loan.

- John Paulk

Bridge Club Begins Play

The Fermilab Bridge Club had their first games on May 1, 1986, and reports are that it was a whopping success.

Mark Fischler, of the Research Division, gave a brief history of duplicate bridge and explained the mechanics of the game to the ten players who attended the meeting. After playing a team match, the scores were compared and Mark discussed the boards that were played, the bidding at each table, and perhaps how the bidding might have gone. Mark did an admirable job with plenty of good humor.

If you would like to become a better bridge player, or if you just want to keep in practice, please join us on the 1st and 3rd Thursdays of each month. The next game will be held on May 15, at 7:00 p.m., in the Music Room of the Users Center.

Come alone or bring a partner, there is no limit on the number of players. For more information call Alma, ext. 3387.

- Alma Karas

Benefits Notes . . .

Cref Retirement Incomes Up 35.5% on May 1

Variable annuity incomes being paid by College Retirement Equities Fund (CREF) to its 95,000 retired participants will increase by 35.5% for the twelve months beginning May 1, 1986. Yearly changes in CREF retirement income reflect the investment experience of CREF's common stock portfolio for the preceding year ending March 31.

It's important to remember that stock prices go down as well as up. Since CREF began in 1952, yearly May 1 changes in CREF retirement incomes have ranged from decreases of as much as 17% to increases of as much as 39%. Before selecting a CREF variable annuity at retirement, you should decide if you are financially able to handle the ups and downs of the stock market.

Alert - Parents of 1986 College Graduates

College graduation is around the corner for some of our employees' dependents. If they are enrolled in the Life, Medical (HMO included), and Dental plans, their coverage terminates on graduation day, unless they will continue as full time students and are not 23 years old. If they do not have group coverage elsewhere, they can convert to an individual policy. They have 31 days from termination of their group coverage to convert to an individual policy. Connecticut General conversion forms are available from the Employee Benefits Office at ext. 3395 or 4361. HMO members can contact their HMO direct for the conversion forms.

- Paula Cashin

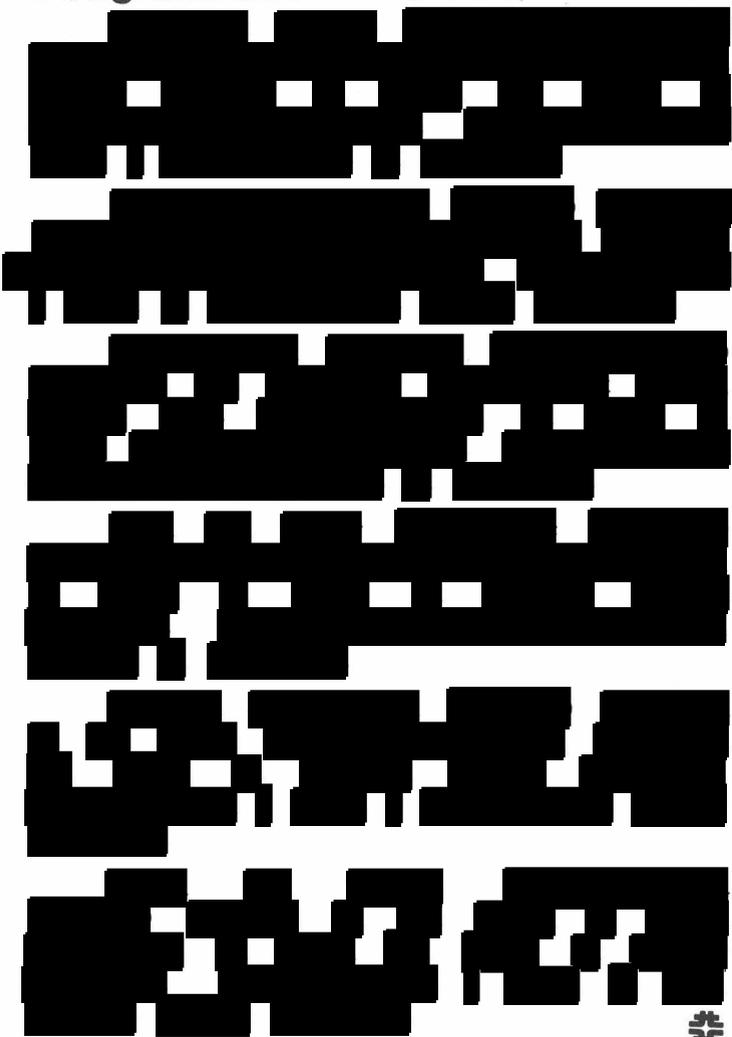
Classified Ad Schedule

The Classified Ads are distributed with *FermiNews* in the first issue of each month. The deadline dates for submission of ads are as follows:

June 12, 1986
July 10, 1986
August 7, 1986

An ad form must be filled out to place an ad. The forms are available from the Publications Office, WH3SE, MS #107, or by calling ext. 3278.

Congratulations To . . .



Along with this issue of *FermiNews*, you will find the most recent map of Fermilab which shows every road and building on site. This map is shown courtesy of Construction Engineering Services.

Science Week Poster Contest

National Science Week was first launched by the National Science Foundation in 1985 to increase public awareness and understanding of science and technology. This year's National Science Week (May 11 to May 17) is being recognized once again at Fermilab by a poster contest sponsored by the Friends of Fermilab Association.

The theme of the poster contest is "Discovery and Invention." Entrants are asked to create a poster depicting the invention or discovery for which they would most like to be famous in the year 2010. The contest is open to all third to sixth grade students in Kane and DuPage counties. Participating schools are holding school-wide contests and submitting their winning posters for the Fermilab competition. This year's entries range from the elusive discovery of the cure for the common cold, and dog collar translators (to convert barks into English), through such sci-fi-inspired ideas as instant people transporters, (as in "Beam me up, Scotty").

Cash prizes will be awarded in two categories, third and fourth grade, fifth and sixth grade, during the contest awards ceremony scheduled for Saturday, May 17. All entrants will receive a certificate for participation and the winning schools will receive a plaque. The awards ceremony will again feature a science magic show for the participants, their families, and their teachers. The posters will be on display outside Curia II during National Science Week.

Friends of Fermilab gratefully acknowledges Sandra Cox, Chuck Brown, Mary Kay Brown, Angela Gonzales, Dick Carrigan, and Bill West for their assistance with the 1986 Poster Contest.

- Barbara Grannis

The Finagle Factor is characterized by changing the universe to fit the equation.

The Bouguerre Factor changes the equation to fit the universe.

Film Society Presents . . .

On Friday, May 23, 1986, at 8:00 p.m., the Fermilab International Film Society will present *Pather Panchali* (directed by Satyajit Ray) in Ramsey Auditorium.

"The first film in Ray's epic trilogy on Indian life. It focuses on young Apu, a boy from a Bengali village, struggling to survive."

Tickets are \$2 for adults, and children 12 and under get in for 50¢. Tickets are available at the door.

In the Library

The following article of current interest and relevance can be found in the Fermilab Library, WH 3E:

"The case for the super collider," by James W. Cronin, appears in the May 1986 edition of the *Bulletin of the Atomic Scientists*.

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"an important time," during which the SSC design report undergoes review at the cabinet level. It was Knapp's stated opinion that there is "a good chance" the Secretary of Energy will recommend to President Reagan that SSC be "a major thrust of the current administration...[however] without a general increase of funds for all science, SSC has problems."

Following status reports by Roger Dixon (experimental schedule), Rich Orr (Accelerator), John Peoples (TeV I), and Ray Stefanski (the fixed-target program), John McTague, Acting Presidential Science Advisor, brought word from the nation's capital that while "It is universally appreciated in Washington that science is good for us," it is difficult to create a sense of urgency for science in D.C. Most basic research, said McTague, is done through universities, and dollars invested in university research will turn out students who have an immediate impact on the nation's sciences. Fermilab, according to McTague, has immediate impact by training scientists and technicians who enter the private sector, taking with them knowledge gained at Fermilab.

Stating that Japan, "for utterly practical reasons," is moving from a post-war economy patterned after a U.S. model to one where basic research receives primary emphasis, McTague said, "The connection between economic strength and science is stronger than ever. We will rely more in the future on R&D for societal advance. Being ahead in basic research is becoming more and more important." Government's investment in basic research, he said, is "a national trust."

In a video-taped address prepared especially for the Users Meeting, Senator Pete V. Domenici (R.-N.Mex.) began by outlining Gramm-Rudman-Hollings' potential impact on science. "If the automatic [budget] cuts do take place, civilian research and development programs would be cut from the \$19.1 billion in the [Senate] budget committee's proposal to \$16.9 billion...These cuts are clearly unacceptable. In meeting the deficit targets, R&D will have to take its fair share of the upcoming cuts, but it should be a fair share...I will be making it clear on the Senate floor that we have the flexibility to provide the Department of Energy with... funds for your areas of research as we go

through the appropriations process. Congress recognizes the need for R&D, but in a time of fiscal restraint, a high priority for R&D is hard to maintain... Nevertheless, even with Gramm-Rudman-Hollings and the current drive for deficit reduction, both the President's budget and the Senate's budget proposals provide increases for R&D...R&D funding has grown by 26 percent in real terms since 1981. The debate about where R&D dollars should go will continue...Congress continually needs to be reminded of the critical role that R&D plays in maintaining not only our defense structure but also the technological competitiveness of our society in world trade, and the general standard of living of our citizens. The R&D community should take the opportunity, whenever it can, to remind Congress of just what they are getting for the money they spend in this area. This is vital if we are to 'sell' projects such as the SSC or the upgrades which are necessary for our existing facilities. This nation's long-term economic health depends upon investing in our intellectual resources."

The panel discussion "How Do We Sustain Good Science?" began with a statement by URA President Knapp in which he said that "The decline in science funding began with Viet Nam...We are left with a system which pits universities against each other for funds," with antique equipment, and too much funding-related paperwork.

R. Stephen Berry, Professor of Chemistry at the University of Chicago, outlined four points to consider when addressing the topic at hand: 1) Science must find a mechanism with which to maintain R&D continuity and damp out "fads" which divert funds from more stable projects; 2) A return of the science/government relationship to a pattern of delegation and trust rather than the current "excess of accountability"; 3) The need to address the problem of "scientific illiteracy" which exists outside the scientific community; and 4) Development of the type of research support that looks at performance of individuals.

Bertrand I. Halperin of Harvard University noted that his field, condensed matter physics, progresses on many fronts, with research being done by small groups. In his view, the most urgent need faced by science is increased support for these small research groups, support which has dropped off in the last 10 years.

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Riccardo Giacconi, Director of the Space Telescope Science Institute, called this "a great time to be an astronomer" as many important cosmological questions have been answered in the last 10 years. He called for an effort to make the best possible use of funds in the post-Gramm-Rudman-Hollings era, citing increased efficiency and education as two ways of achieving this goal.

High-energy physicist James L. Cronin of the University of Chicago said he "Can't recall a time when opportunities were better...We must approach science with a better sense of unity...No gain is to be had from pushing one field above another... All sciences must have a unified approach."

Atomic physicist Daniel Kleppner, MIT, observed that Robert Wilson's "one world of physics" is splintering into "nations with special interests." He brought word of concern in other areas of physics about the effect of "large physics" and called on high-energy physics practitioners "to be sensitive to the needs of other disciplines. The case [for science] is stronger if science presents a unified front...All disciplines are inter-dependent."

Saturday's session brought a report from Irwin Gaines on the Advanced Computer Program, a VAX-based, Fermilab-developed system "designed to meet the Lab's future computing needs," and a system which is already generating great cross-over enthusiasm from the private sector.

Jeffrey Appel of the Computing Department gave the users a viewgraph tour of the new 3-story Central Computing Facility (CCF), an "ambitious project" to say the least. A 3-year, \$24 million undertaking, the CCF design emphasizes expandability in order to accommodate growth in the face of Fermilab's future computer needs. Construction on the CCF is scheduled to begin in June of this year, with interior opening projected in December of '87.

Michael Turner of the Theoretical Astrophysics Group (substituting for Rocky Kolb, who was "on a field trip somewhere near the Andromeda galaxy") reported on "the State of the Universe." The Universe, declared Turner, "is in order." Turner

outlined the group's investigations into the "six Cosmic 'whys' [of the Universe]: why so smooth, why so flat, why so old, why so few monopoles, and 'whyre' did homogeneity come from?" The inflationary Universe concept proposed by Alan Guth occupies a central role in the Astrophysics Group's investigations, Turner said, because while "there is still no compelling model, [the inflationary Universe is] still the best hope to answer the Cosmic 'whys'."

Stanley Wojcicki, of the SSC Central Design Group, covered three items in his talk: a review of the SSC R&D done in the last three years, the SSC today, and future prospects. While SSC funding has maintained a flat-line \$20 million for the last three years, effort on R&D is ongoing on a national scale, involving universities, national labs, and industry. Several major SSC milestones have been met, the "most important" of which, the Conceptual Design Report, was undergoing DOE review as Wojcicki spoke.

Wojcicki projected this year's Snowmass Conference as being significant in that an assembled high-energy physics community will, for the first time, be able to react to a completed conceptual design report.

In regards to SSC's future, "If [the Secretary of Energy's] report is positive, then SSC would, hopefully, be in the Presidential budget message in January." Assuming SSC is in the Presidential budget in FY87, Wojcicki's "most optimistic scenario, a non-DOE-sanctioned scenario, but realistic," would call for an 18-month-long DOE site search to commence shortly after adoption of the President's budget, with another six months elapsing from site selection until groundbreaking. "According to the present game plan, construction would be complete in 1994, and first physics experiments would begin in 1995."

The final address of the 1986 Users Meeting, a special talk on jet spectroscopy given by Rick Field of the University of Florida, Gainesville, brought the proceedings back into the realm of present physics with a discussion of "a dream...to look at jets and reconstruct the invariant masses of the objects that decay into those jets."