Around

At the Vatican on 9 May, Pope John Paul II greeted participants in an international symposium on 'Galilean Science Today', including (front row, left to right) Gösta Ekspong of Sweden and CERN Director General Herwig Schopper. The symposium marked the 350th anniversary of the publication of Galileo's famous 'Dialogues' — a major milestone in science. After the misunderstandings of the past have now been dispelled, the way is now clear for a fruitful concord between science and faith.

(Photo Osservatore Romano)

scientists from all over the world assembled under Swiss guard in the Sala Regia of the Vatican to be greeted by Pope John Paul II. He reiterated his hope that the dispelling of past misunderstandings and mistrust will lead to fruitful concord between science and faith. Scientists enjoyed great moral influence which should be used in the defence of man and his dignity. The task of scientists was gigantic and noble, and the world expected from them a service worthy of their intellectual capabilities and ethical responsibilities.

The symposium on Galilean Science Today rightly took place in the Barberini Palace in the very room where Galileo often visited his friend who later as Pope Urban VII and Head of the Church came into conflict with him. The very charged sessions provided a wide panorama of modern science where true to Galileo's principles the search for truth was carried out in intellectual humility.

In concluding the symposium, Nino Zichichi called for optimism because, after all, human intellectual power is enormous. Our striving towards a fuller understanding of Nature should lead to a better life in peace and human dignity. More means are needed for research and not for arms because, as should be made known widely, scientists' work is of the greatest value to mankind. These stimulating days of talks and meetings of eminent scientists in the public eye certainly assisted these aims and were a worthy memorial to two great men of science.

(Report by Simon Newman.)

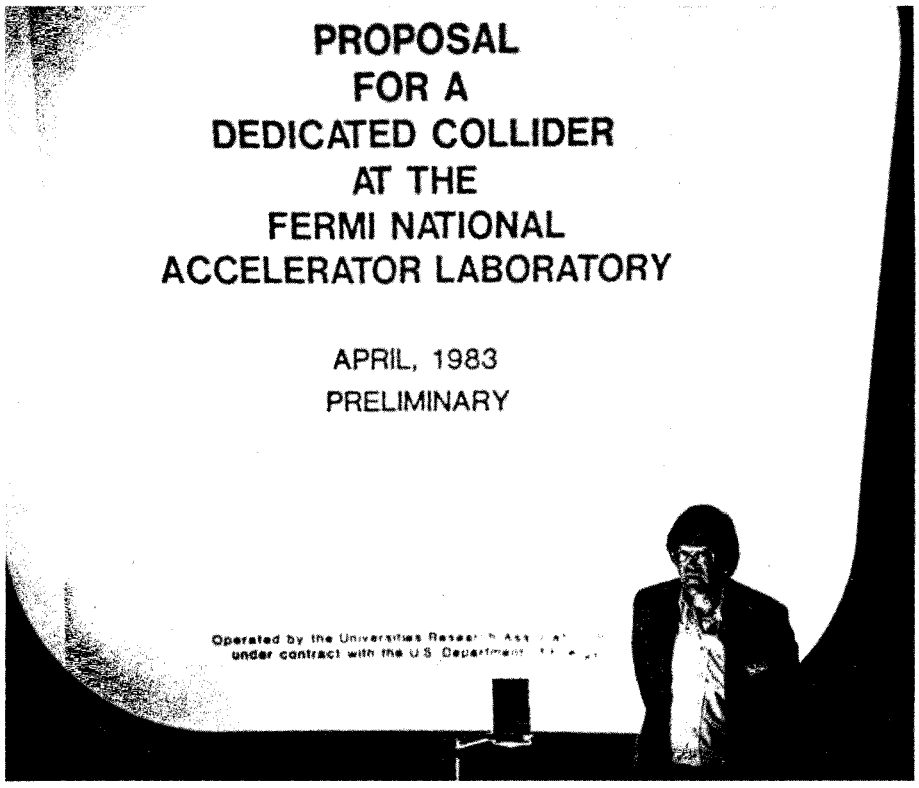
FERMILAB Annual Users' Meeting

In an atmosphere full of promise a record 370 users met at Fermilab in April for the 15th annual Users' Meeting. The gathering took place in the midst of activities to bring beam through one-third of the Energy Saver (see June issue, page 181)*. Laboratory Director Leon Lederman and his staff reported that the ring was nearing completion and that circulating beam could follow soon. The ebullience of the moment was further

At the recent Fermilab annual Users Meeting, Peter Limon describes progress on the one-third ring beam test for the Fermilab Energy Doubler. As he spoke, beam monitors showed that beam had travelled several hundred feet, but later that day beam was happily passing through the third of the ring to a temporary beam dump.

the Laboratories

James D. Bjorken presents Fermilab's new proposal for a dedicated proton-antiproton collider, reaching collision energies of 4 or 5 TeV. It would fit gracefully into the Fermilab site and use the Tevatron as injector.



**** First full turn of beam around the new Fermilab superconducting Doubler Ring occurred on 2 June, with the ring operating at 100 GeV.***

stimulated by an awareness of the momentous successes in Europe and by the realization that pivotal decisions would have to be made for the United States to regain a leading position in the field.

The two-day programme included talks by Leon Lederman, Universities Research Association president Guy Stever and the Director for Energy Research at the US Department of Energy, Alvin Trivelpiece. Of particular interest to users were presentations by Fermilab personnel on the status of laboratory facilities for the upcoming fixed target programme. Particularly lively discussion ensued after presentations by Ken Stanfield on the experimental areas and by Taiji Yamanouchi about the schedule. Users were characteristically concerned with seeming delays in schedules that prevented their resumption of an active experimental programme as early as possible.

The situation with TeV I, the proton-antiproton collider programme at Fermilab, was aired in talks by John Peoples who described the design and projected construction schedules for the antiproton source, by Alvin Tollestrup who presented a status report on the collider flagship detector for TeV I, and by Dave Johnson who outlined the possibilities for the other interaction region in D0. The inevitable comparisons with the CERN programme had to be made. Reasons for optimism emerged based on higher energy (2 TeV compared with 0.54 TeV) and higher anticipated luminosity, permitting the exploration with higher statistics of 'known' phenomena such as Z^0s and Ws and perhaps opening thresholds to new and unexpected physics.

Al Brenner reported on the Computing Facility at Fermilab and described the present saturated state of the BCyber system. He outlined the schedule for the acquisition of an upgraded system which calls for at least a factor of two more computer power to be installed by Christmas. This new system will take care of the computer needs for only the next two to three years. Brenner emphasized that a new architecture is really needed to accommodate the long-term computing requirements at Fermilab.

A highlight of the meeting was a Friday afternoon session devoted to a discussion of Fermilab options presented to the High Energy Physics Advisory Panel subcommittee on New Facilities (Woods Hole Panel). In a brilliant introductory statement panel chairman Stanley Wojcicki outlined the panel's objective, the method by which it hoped to arrive at its recommendations, and the good news and bad news confronting US particle physics. J.D. Bjorken gave a short summary of the new Fermilab proposal for a 2 TeV on 2 TeV Dedicated Collider (DC) and Maury Tigner summarized the results of a Cornell workshop on a 20 TeV on 20 TeV proton-proton collider, the so-called 'Deserton'. A lively 'Town Meeting' discussion followed.

In his talk on Saturday regarding the Department of Energy's Fiscal Year 1984 Science Budget, Alvin Trivelpiece said nothing to dispel mounting optimism by pointing out that the climate for basic research in Washington is good, both major parties would identify themselves as friends of basic research and the administration is open to suggestions for major new initiatives in science.

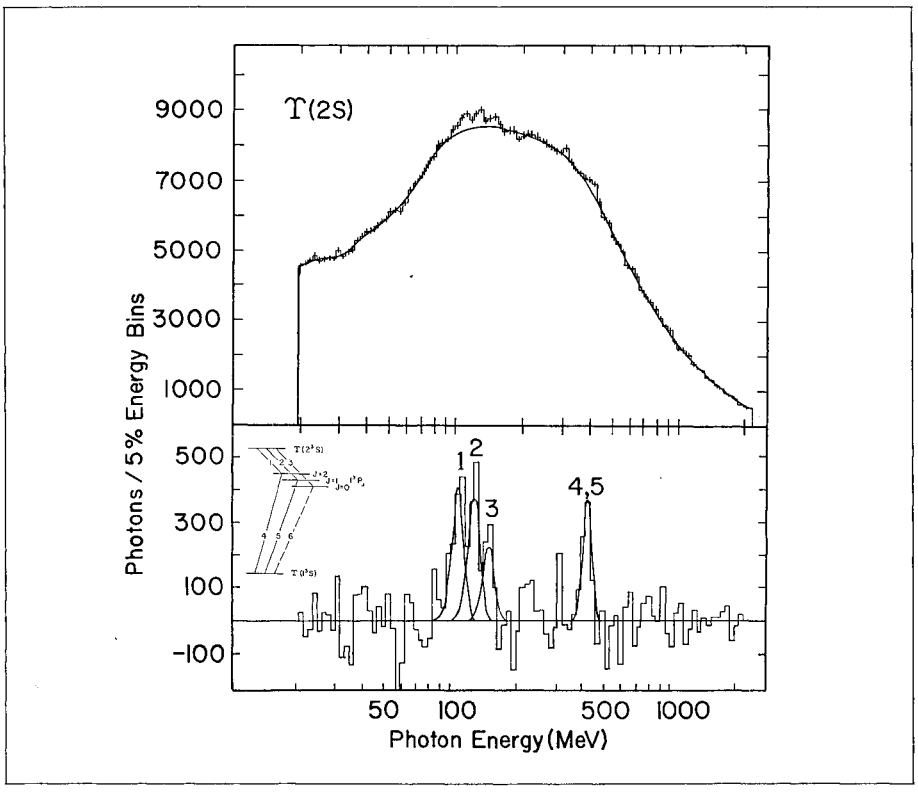
Some of the new physics that may be studied with the new machines was summarized by Martin Perl of SLAC who gave a talk entitled 'The Status of Lepton Searches', a speciality of his for which he received the 1982 Wolf prize for physics, an hon-

our he shared with Fermilab Director Leon Lederman. The conference ended with an interesting discourse on computing and its ramifications by 1982 Nobel laureate Ken Wilson of Cornell. He argued persuasively that we must look to the revolution in microprocessors to provide the basis of an industrial recovery. Moreover, he presented a scenario whereby the funding of the 'Desertron' could be effectively obtained from computer and electronics companies without having to look to the US federal government. On this euphoric note attendees dispersed to continue their preparations for the imminent Tevatron era.

CORNELL
More upsilons

The CUSB group working at the CESR electron-positron collider has added three new particles to the upsilon family. The upsilons are understood as beauty quark-antiquark bound states with parallel quark spins (triplet states, carrying also orbital angular momentum. So-called P states carry one unit of orbital angular momentum, while S states have none. The CUSB group has now observed the ground state P upsilons in radiative decays of the first excited S upsilon.

The four lowest lying S upsilons are relatively easy to observe since they carry the same quantum numbers as the photon and are directly produced in electron-positron annihilations. Many other bound states are expected to exist but they must be produced indirectly. In fact, the upsilon spectrum is far richer in bound states than the analogous charmonium system, although the search is more difficult due to higher multiplicities and lower production rates. The first excited P upsilons (2P) were observed at CESR with the CUSB sodium iodide and lead glass calorimeter last year in radiative decays of the second excited S upsilon (3S) — see September 1982 issue, page 274.



Evidence for three new upsilon states from the CUSB detector at Cornell's CESR electron-positron ring. Top, single photons from radiative decays of 2S upsilons show an excess over the background. Below, the background-subtracted spectrum, showing how well it is fitted by three photon lines at 149, 128 and 108 MeV, corresponding to the three states of the 1P upsilon. The 427 MeV signal is due to the (merged) 1P to 1S decays.

The CUSB group has also studied upsilon 2S radiative decays to search for the lowest lying P upsilon (1P). This task was expected to be more difficult, despite the higher production rate of 2S particles, because the rates for electric dipole transitions were expected to be significantly smaller than the 3S to 2P transitions. During a run from December 1982 to March 1983, 30 inverse picobarns of integrated luminosity were collected and 150 000 2S upsilon events were detected. The 2S events were analysed with the same two techniques that were successfully employed for the 3S events.

The first technique involves an analysis of the inclusive (single) photon spectrum from upsilon 2S decays. A broad prominent excess over background is visible in the region from 90 to 160 MeV. Another smaller, yet statistically significant, narrow peak is observed at 427 MeV. The interpretation of the lower energy signal as being due to radiative transitions from the 2S to the 1P upsilons is supported by a number of observations. The excess from 90 to 160 MeV is much wider than the detector resolution and has been fitted by three photon lines at 149, 128, and 108 MeV, corresponding to the three states of the 1P. These three lines are produced in the ratio expected for electric dipole transitions from 2S to 1P states. Both the centre of gravity of 9 900 MeV for the 1P mass, and the measured branching ratio of 16 per cent agree with predictions. The expected lines for decay of the 1P to the ground state (1S) are observed (merged together) at 427 MeV which