Fermilab

High-energy physics in a suitcase

Batavia, Illinois

PHYSICISTS at Fermi National Accelerator Laboratory (Fermilab) are not the only ones disappointed that the main accelerator beam was shut down for repairs after last fall's successful engineering run that produced the highest energy

Most visiting scientists, called "users" by the resident staff, stay at the Fermilab village, once the town of Weston, Illinois. Collaborators on Fermilab projects who still have teaching responsibilities at their home institutions face an itinerant lifestyle. "I have my bags

proton-antiproton collisions ever. A flock of Canada geese typically spends the cold Illinois winter on one of the cooling ponds for main ring magnets. With the ring's magnets turned off, the ponds are now mostly ice, so that this winter the large flock has had to fight for space in the small area melted by heat from Fermilab's computers.

Fermilab sits on 6,800 acres about 30 miles from downtown Chicago. Despite its relative proximity to one of the largest cities in the United States, a herd of 75 buffalo grazing just beyond the Collider Detection Facility (CDF) serves as a reminder that the city is not that close. Indeed, a conscious effort has been made to minimize the environmental impact of Fermilab's facilities. A project begun nearly a decade ago by Fermilab employees and area residents has now replanted all 800 acres inside the ring, restoring much of the original prairie vegetation.

Fermilab was dedicated in 1974. Today, there are about 2,200 employees, although that number will be allowed to slip to 2,000 under budgetary pressures. There are 400 physicists resident at Fermilab, but there is also a steady stream of visiting physicists from the 325 institutions in the United States and abroad involved in collaborative projects.

Fermilab budget (\$ million)

	FY85	FY86	FY87 (estimate)
Operations	122.3	118.8	135.9
Capital equipment	27.5	31.6	30.5
Construction	41.6	19.3	23.7

packed all the time", says Phil Kesten, a postdoctoral fellow at Brandeis University working on software for CDF. Kesten leaves his home in Boston once every 2 to 3 weeks for four-day visits to Fermilab. Some pay even more frequent visits.

While the trip to Chicago takes about an hour by car, many are reluctant to spend the extra travel time. The neighbouring towns of Batavia, Aurora and St Charles are hardly famous for their cultural appeal. "One likes to go out to a nice restaurant once in a while", says Kesten. "After a few trips, you've tried them all".

One bonus from living at Fermilab is the opportunity to visit Chez Leon, a restaurant run by Tita Jensen, wife of physicist Hans Jensen. Chez Leon is open only for lunch on Wednesdays and dinners on Thursdays, but visitors have been known to adjust their schedules to coincide with those times.

Users are not alone in being faced with heavy travel schedules. During this period of tight federal budgets, Fermilab project directors constantly find themselves travelling to Washington to defend their fiscal needs. Two weeks ago, Peter Koehler and Paul Grannis, co-leaders of a new colliding beam detector known as D-Zero, made the pilgrimage to urge Department of Energy officials to release an additional \$1 million to support research and development efforts by the 125 collaborating institutions. While Koehler and Grannis are satisfied with the \$7.1 million allocation in the 1986 budget for D-Zero, they are concerned

that without additional money for their collaborators, work will fall behind schedule. But prospects for this extra money are not good. The Department of Energy has already used up most of its discretionary funds for this fiscal year.

Fermilab director Leon Lederman was also in Washington recently, testifying before a House subcommittee on high-energy physics. Reagan administration budgets have treated Fermilab fairly generously. With the commissioning of the Polarized Proton Beam and Target System, expected within five months, Fermilab will finish a \$25 million upgrade to the fixed beam experiments.

The completion of the major Tevatron construction projects brought Fermilab's budget down to \$169.7 million in 1986 from \$191.4 million in 1985. The government has proposed a 1987 budget of \$190.1 million that will allow improvements to the antiproton Debuncher and Accumulator rings, as well as completion of CDF and continued work at D-Zero.

But Lederman believes that science in general is "trembling at the edge of a decline" like that of 1968. Lederman is especially concerned about the effects of the automatic cuts that may be required by the Gramm-Rudman deficit reduction act. "It will kill American science", says Lederman. He argues that most scientific efforts operate on a pattern of growth, and to apply the brakes suddenly can wreak havoc. Moreover, in a large facility such as Fermilab, many capital

Leon Lederman

costs are fixed, and a 15 per cent cut in the overall budget can mean a 40 per cent cut in funds available for research.

For the time being, Lederman believes that Fermilab is "sitting pretty". Until the Superconducting Supercollider is built, and Lederman believes it will be, Fermilab will provide the highest energy window into the particle physics world.

Department of Energy officials concede it will be difficult to obtain the funds budgeted for Fermilab in 1987. But the prospect of losing funds for research is extremely frustrating for high-energy physicists who feel their subject is "incredibly juicy" right now. "It's like being in an attic full of treasures", says Lederman, "and we've opened only one box".

Joseph Palca