

WASHINGTON REPORTS

Built on Schedule and Budget, CEBAF is Dedicated and Renamed the Thomas Jefferson National Lab

On I-64 near Newport News, Virginia, highway signs directing motorists to CEBAF were removed last month and replaced with signs reading Jefferson Lab. The name change was announced on 24 May at a rousing dedication ceremony for the Continuous Electron Beam Accelerator Facility. The event attracted some 1800 physicists, government officials and other guests. Under a huge white tent and to the accompaniment of a ten-man brass band, Energy Secretary Hazel O'Leary officially retitled CEBAF the Thomas Jefferson National Accelerator Facility, after Virginia's canonical citizen and the most ardent advocate of scientific research and "useful knowledge" in his time. In the first hours after O'Leary's announcement, the historic resonance of the new name seemed to be ignored as cut-ups among the guests tried to pronounce the acronym for the lab, pouncing on the letters TJNAF as a not so subtle variation on T. J. Maxx, the discount clothing chain.

The Jefferson Lab should not be discounted, however, as a serious addition to the world's trove of physics research centers. Though dedicated just before the Memorial Day weekend,

the accelerator was actually completed almost a year ago on schedule and, to the relief of many, within its budget of \$600 million. Following a commissioning period, experiments have been carried out since last November, when the accelerator began delivering a continuous stream of electrons recirculated five times around the 7/8-mile race-track-shaped beam lines, boosting their energy to the specified 4 GeV and smashing them into a stationary target in one of three detector halls. "The accelerator ran better than any new accelerator I've ever seen, and better than most mature accelerators I've seen," declared Don Geesaman of Argonne National Laboratory, who led the first experiment, studying the probability that a proton dislodged from a large nucleus will actually pass through it and escape.

The Energy Department built the lab for coincidence experiments that are critical to electron-nucleus scattering. To do this requires both high energy and a continuous beam, which the Jefferson Lab now provides. "Until now, we haven't had a sound scientific basis for understanding the nucleus," says Nathan Isgur, who heads the laboratory's theory division. Nearly 560 scientists

from 116 institutions in 25 countries have lined up to use the accelerator's continuous wave electron beam this year, and experiments have already been approved for the next three years.

Such experiments will enable researchers to study the structure of the nucleus and improve their understanding of the little-understood forces between quarks. The Jefferson Lab's accelerator was designed to probe the short-range behavior of quarks in nuclei with surgical precision, to map the internal structure of the simplest atomic nuclei—namely, deuterium, tritium, helium-3 and helium-4—and to help understand the consequences of the theory of quantum chromodynamics, which defines the strong force that binds the quarks and ultimately nuclei together, in a manner analogous to that in which atomic physicists in the 1930s used experiments to verify the consequences of the newly discovered quantum theory for atoms and molecules.

Accordingly, the Jefferson Lab promises to open up a whole class of nuclear physics that is not accessible with other accelerators. Other electron accelerators, such as the one at the Stanford Linear Accelerator Center, deliver short pulses of electrons, enabling physicists to study a few events at a time. By contrast, the supercon-



Founding fathers of the Jefferson Lab: At the dedication ceremony (from left) Senator John Warner, who commanded the political forces, D. Allan Bromley, who led the scientific panel that selected the design from among four other concepts, and Hermann Gruner, who engineered the construction and operation of the electron accelerator with superconducting RF cavities that is expected to map the largely unexplored transition region between the nucleon-meson and quark-gluon regimes.



ducting CW beam at Jefferson will allow the statistical examination of hundreds of thousands of collisions every second. Isgur offers an analogy for the quantity of new data that will be available: The 300 terabytes of data that will be produced each year at Jefferson is equivalent to a compilation of detailed biographical histories of every human on Earth.

The ceremony under the big top was in effect a tribute to Hermann Grunder, Jefferson's director, who was coaxed from the Lawrence Berkeley Laboratory in 1985 to run the project. Grunder radically altered the design that had been picked two years earlier by a subpanel of the Department of Energy's Nuclear Science Advisory Committee after a fierce political and technical competition among five proposers (see *PHYSICS TODAY*, February 1986, page 51).

During the acrimonious battle that raged in Washington, the project was dubbed the "Warnatron" in honor of Republican Senator John Warner, who was the most vigorous supporter of building the accelerator in his state, Virginia. In a stirring speech at the dedication, Grunder hailed Warner as the project's unyielding patron. Dennis Barnes, president of the Southeastern University Research Association, an organization of 41 universities in 13 states and the District of Columbia that manages the Jefferson Lab, reminded the audience that credit should also go to many others, including Democratic Senator Charles Robb, who was Virginia's governor in the early 1980s, and the state's general assem-

bly, which provided critical financial aid to SURA until Federal funds arrived. Grunder told his audience that "the times were too easy" when the project got started. "Let me assure you that they're going to get tougher," he said. "We must do a better job of thanking our friends—and instructing our enemies."

The day's principal speaker was D. Allan Bromley of Yale University, who, as chairman of the panel that chose the SURA design in 1983, provided some insight to the process. "The commitment of the Southeastern universities to add 35 new positions in nuclear physics to their faculties had weighed heavily in the selection," he said. "I was delighted to learn recently that, in fact, the SURA universities added not 35 but rather 127 such positions since 1982." Bromley praised Grunder for his "characteristic bold leadership" in altering the entire design of the proposed accelerator by using superconducting RF cavities and technology developed by accelerator scientists at Cornell University. "The change took very real courage and was vitally important—and entirely correct," Bromley declared. The scientific potential of Grunder's redesign, Bromley added, laid to rest any qualms some panel members had about the project.

A cautionary note

Bromley asked the audience that he be "forgiven for injecting a cautionary note" to the celebration. "When I was in the White House [as science adviser to President Bush], I spent much more time defending scientific projects from

other scientists who were convinced that the funding would be better spent on their projects . . . than I did from anyone outside the scientific community. Far too few realized that when funding is removed from one scientific program it never is transferred to any other . . . but ends up in sewer systems, harbor dredging or garage construction—in satisfaction of immediate consumer demands," Bromley stated.

"Beyond this, nuclear scientists share another problem," Bromley said. "They very rarely express either enthusiasm or effective support for the activities of their colleagues in other subfields. This is remarkably consistent and very damaging. I am beginning to sense that the current major sub-areas of nuclear physics are becoming increasingly competitive and nonsupportive under funding pressures. The subcommunities interested in electromagnetic physics, in relativistic heavy-ion physics, in physics with radioactive beams and in nuclear astrophysics are beginning to make disparaging remarks about one another. I cannot emphasize too strongly that negative remarks by a reputable nuclear physicist about any part of nuclear physics are always used with great effect by those who have no interest in supporting any part of our field."

After the ceremony at the Jefferson Lab, Bromley told a reporter he thought it was fitting that the laboratory be named in memory of the only US president ever to declare that "politics is my duty, but science is my passion."

IRWIN GOODWIN

Office of Naval Research Observes its 50th Year Sponsoring Research, as Galvin Panel Calls for Wider Tack

Drift is the word most used to characterize the US Navy these days. Some of its weapons systems, such as the F-18E fighter-bomber and the Sea-wolf nuclear submarine, don't quite jibe with the Navy's strategy since the collapse of the Soviet Union. Then there are the charges of cheating at the Naval Academy, of ignoring whistle-blowers in the ranks and condoning sexist and prurient behavior by seamen and officers toward women in the fleet.

The Office of Naval Research, however, is rarely if ever off course. With its headquarters atop an office building in Arlington, Virginia, five regional offices and the Naval Research Laboratory, located across the Potomac River from Washington National Airport, ONR is a trim organization that operates on an annual budget of about \$1.3

billion today in much the same way it did when Congress created it in 1946. ONR's mission remains unchanged: "to plan, foster and encourage scientific research in recognition of its paramount importance as related to the maintenance of future naval power and the preservation of national security." Fifty years ago, ONR and the Agriculture Department were the only Federal agencies sponsoring basic research in academic, government and industrial laboratories. ONR devised the system used by many government agencies to fund this kind of research. When the National Science Foundation was established in 1950, it seemed only natural to model it after ONR. In fact, NSF's first director, Alan Waterman, was brought in from ONR with President Truman's approval.

To mark its 50th anniversary, ONR gathered about 350 old-timers, young researchers, Pentagon brass and other guests on 22 May at the National Academy of Sciences for a day-long tribute. The atmosphere was like that of a class reunion, with much time spent retelling research yarns and renewing old acquaintances.

In his keynote address, President Clinton's science adviser, John H. Gibbons, observed: "One of the powerful ideas that emerged from World War II is that fundamental research at the scientific frontier is an investment that has richly repaid its investors, the taxpayers. Indeed, the rate of return looking back over the past 40 to 50 years is on the order of 30% to 50% per year, accounting for perhaps half of our productivity gains since the end of World War II."