University of California

BEVATRON REJUVENATED—The bevatron, giant nuclear accelerator in the University of California Lawrence Radiation Laboratory, Berkeley, has returned to operation with major modifications made at a cost of $9.6 million. The machine is completely shielded in 17,000 tons of concrete.

PHYSICS

Atom Smasher Revived

The historic 10,000-ton atom smasher, bevatron, has returned to action again with higher output of particles and other improvements after a seven-month shutdown.

➤ A NEW LEASE on life has been given the giant atom-smasher that played a big part in revolutionizing knowledge of nuclear particles in the last eight years.

The University of California Lawrence Radiation Laboratory's bevatron—on the nuclear firing line almost constantly since early in 1954 and long since outdated by the rapid march of accelerator technology—has received a radical electronic and magnetic face-lifting.

The big machine has returned to operation, after a seven-month shutdown, with new research capabilities under the direction of Dr. Edwin M. McMillan, Nobel Laureate and director of the Lawrence Radiation Laboratory.

The Atomic Energy Commission financed the $9.6 million modification, comparable to the original cost of the machine. The number of particles the revised machine produces, 800 billion per pulse, is already four times greater than before. Ultimately this output may rise to 25 times the old rate. The maximum energy of 6.2 billion electron volts (Bev) is not raised.

The higher output of particles, plus other improvements, will keep the 10,000-ton atom smasher on a favorably competitive basis with the world's other two productive giant accelerators—one at Brookhaven and the other at CERN, near Geneva, Switzerland—in explorations over a wide range of the known phenomena of high-energy physics.

The bevatron's historic career really got under way with the discovery of the antiproton in 1955 and the antineutron in 1956, and with subsequent exploration of the new mirror image of the ordinary world of matter.

The big machine made possible the first systematic studies of the "strange particles," the super-heavy hyperons and the "K" particles, many of which were originally discovered in cosmic rays. Two new hyperons, the antilambda and the neutral cascade, were discovered.

Recently the bevatron has given birth to most of the growing family of new particles called "resonances"—of 16 resonances 11 have been identified with bevatron data and two others were found simultaneously with other laboratories.

The exploitation of bubble chambers and computers in gathering and analyzing huge quantities of particle information, increasing the power of nuclear exploration, was pioneered largely with the bevatron.

A world center of particle physics research, the bevatron has been used by scientists from 25 universities in the United States and from 36 foreign countries.

Modifications to the machine include a big new, high intensity, 19.5 Mev proton linear accelerator as an injector; rewinding the magnet pole faces; modern, sophisticated electronic controls; apparatus for piping the proton beam directly out of the machine (deflected beam); 5,000 square feet of new research space; and a roof of concrete that will completely enclose the instrument in a total of 17,000 tons of shielding.

The bigger output of protons and their deflection out of the machine will permit a larger number of experiments simultaneously—and a faster pace of research. Nuclear reactions once so rare they could not be studied will now become commonplace, opening new research prospects.

Production of larger numbers of events also means that it will be profitable to study secondary particles at higher energies than formerly. And greater precision and sophistication of experiment will be possible.

The bigger machines at Brookhaven and CERN outclass the bevatron in systematic studies of antiparticles and neutrinos, and they have a greater potential for discovering new phenomena.

In the still-rich field of strange particle research, the bevatron can now hold its own.

• Science News Letter, 83:181 March 23, 1963

PHYSICS

First Nuclear Reactor Fuel in Smithsonian

➤ A ONE-INCH CUBE of uranium that was part of the fuel of the world's first nuclear reactor has been presented to the Smithsonian Institution where it will be a part of a future display on nuclear energy.

The presentation was made by Chairman Glenn T. Seaborg of the U.S. Atomic Energy Commission. The nuclear fuel, enclosed in a plastic model of the reactor in which scientists, led by the late Enrico Fermi, achieved the first sustained nuclear chain reaction, was accepted by Dr. Leonard Carmichael, Secretary of the Smithsonian Institution.

President Kennedy had suggested, when he saw it last November, that the historic cube be placed in the Smithsonian. The occasion was the White House visit of surviving members of the group that were with Fermi on Dec. 2, 1942, when the scientific breakthrough was achieved.

"We hope that this model with its historic bit of uranium will make a useful addition to the Smithsonian's world famous collections," said Chairman Seaborg. "It is a symbol of the successful harnessing of this new source of energy—nuclear energy—which is one of the milestones in the evolution of our new scientific society."

In accepting the gift, Dr. Carmichael said: "We are planning a section of the Fermi reactor—almost full scale—that will be a feature of the exhibits in the Hall of Nuclear Energy in our new building. We are using some of the graphite blocks from the Fermi reactor but it is not practical to use any of the original fuel elements. We are particularly happy to have this uranium as a representation of the original fuel."

Fuel from the 1942 reactor was used in two other early reactors and then sent to the Commission's Oak Ridge (Tenn.) National Laboratory for reprocessing. Since not all of the fuel was reprocessed, it was possible to cut the cube as a souvenir.

The model was made at the Oak Ridge Laboratory especially for the 20th anniversary observance. The inscription reads: "Fuel from World's First Nuclear Reactor, Dec. 2, 1942, Stagg Field Stadium, Chicago, Ill."

• Science News Letter, 83:181 March 23, 1963