forty cathode ray tubes, based on an invention of F. C. Williams in Manchester, England.

The Institute's machine was created under the direction of John von Neumann, who with Herman H. Goldstine worked out the mathematical and logical design. Julian Bigelow was responsible for the engineering design. Initial sponsorship came from the Research and Development Service of the Ordnance Corps, U. S. Army. The project has continued under the joint sponsorship of that agency, together with the Office of Naval Research, the Navy, the Air Force, and the AEC.

The Los Alamos computer, which has been under construction for the past three years, was designed and built by a small group headed by Nicholas Metropolis with James H. Richardson as senior engineer. The Los Alamos Laboratory is operated by the University of California for the Atomic Energy Commission.

Brookhaven Breaks a Record

Cosmotron Passes Two Billion Volt Mark

On June 10th Brookhaven National Laboratory's recently completed synchrotron made history by producing a proton beam with an energy of 2.25 billion electron volts, or roughly five times greater than that of the previous record-holder, the 170-inch synchrocyclotron at the University of Chicago's Institute for Nuclear Studies (see the article by D. E. Nagle, *Physics Today*, June 1952).

The farthest advanced of several particle accelerators of the bevatron class now in varying stages of completion here and abroad, the Brookhaven instrument has been under construction since 1949. Its 2200-ton iron magnet was installed early last year, and for the past several months the Brookhaven staff has been occupied with exhaustive testing of the accelerator components. The process of tuning up the assembled machine began last March when protons were first fed into the vacuum chamber by a 3-Mev Van de Graaff generator provided for that purpose. The big machine, termed the "cosmotron" because it accelerates protons to velocities comparable to those found in the cosmic radiation, is undergoing further tests and evaluation at the Atomic Energy Commission's Upton, Long Island, laboratory, and it is expected that the instrument will not be in final operation until sometime this fall.

Designed to accelerate protons to energies approaching three billion electron volts, the cosmotron will be used to study proton-nucleon interactions and is expected to provide an important source of mesons of varying kinds. Among the first investigations to be conducted when a beam of protons of the intended energy is available for research purposes, it has been reported, will be a search for events indicating the presence of artificially-produced V-particles. These particles, which have been discovered only rarely in cloud chamber photographs of cosmic-ray events, carry no charge and are evidently several times heavier than any other known cosmic-ray particles.

Other proton synchrotrons designed to operate in the energy range above one billion volts are under construction at the University of California at Berkeley and the University of Birmingham in England.

The Oak Ridge Swimming Pool

Low Power, Low Cost Research Reactor

Development of a relatively inexpensive, low power nuclear reactor, unique in that it is submerged in water to protect operators from radiation, was announced on May 19th by the Oak Ridge Operations Office of the U. S. Atomic Energy Commission. The reactor, pioneered and developed by scientists at Oak Ridge National Laboratory, is the central feature of a bulk shield testing facility which is used for experiments to aid development of improved reactor shields. Popularly known as the "swimming pool", according to the AEC, the reactor is submerged in a pool of water 20 feet deep, 20 feet wide, and 40 feet long, in which it can be moved about. The reactor became "critical" on December 17, 1950, and was placed in operation soon afterward. The entire facility was constructed for less than \$250,000, exclusive of fuel. Of this amount, the reactor core itself cost only \$58,400, the rest of the cost being for concrete work, the building, and auxiliary equipment. The reactor uses fuel elements that had already been designed for the materials testing reactor in Idaho. The swimming pool reactor has a continuous, full load power rating of 10 kilowatts, at which it produces a maximum flux of approximately 10^{11} thermal neutrons per square centimeter per second.

The reactor is an assembly of movable fuel elements placed on end in an aluminum grid. It is suspended by an aluminum framework from what is called the reactor bridge, which spans the pool. The bridge rests on wheels fitted to rails along either side of the pool, so that the reactor can be moved along a center line the length of the pool. Similarly, an instrument bridge spans the pool and operates on the rails. A steel framework attached to the movable mechanism of this bridge extends nearly to the bottom of the pool. Using a carriage that slides up and down on the framework, operators can place test instruments at any point in the pool.

A useful feature is an aluminum gate, 12 feet high and 21 feet long, 10 feet from the south end of the 130,000 gallon pool. When the reactor is moved to this end of the pool, the gate can be lowered and the greater area of the pool can be blocked off and pumped dry. Thus, some repairs and adjustments are facilitated, and instruments and shielding samples can be placed easily in desired spots, with personnel meanwhile protected from radiation. Shielding measurements on samples can be made also in the open air, with samples placed near the dry side of the gate and the reactor moved close to the other side of the gate. Centered on the bottom surface of the pool is a well, 14 feet square and 5 feet deep, filled with removable blocks of high-density concrete, giving part of the pool an adjustable floor level for more flexibility in the placement of shielding samples and instruments.