News and views

FOR AN INFORMED PUBLIC

HOW SHOULD OUR NUCLEAR WEALTH BE SPENT?

Perhaps the most specific and forceful plea for the public release of certain atomic secrets yet to be made by any highly placed scientist has been advanced by former Atomic Energy Commissioner Robert F. Bacher, now of the California Institute of Technology. In a talk given before the National Parent Teachers' Congress at Long Beach, California on May 24, Bacher declared that the American citizen should have access to some vital information dealing with the possibilities of atomic energy and with the present state of its development in order to judge intelligently whether his government is doing a good job. Essential but still secret information that should be made available for this purpose, Bacher holds, concerns what our present atomic bombs will do, roughly how many we have, and what use might be made of fissionable material if it were not intended for bombs.

At the moment, said Bacher, the technical development of nuclear reactors does not warrant any great use of fissionable material except for reactor development; yet the time is coming when we must decide how best to use fissionable material in the interests of the nation. "It may be necessary," he continued, "even with world tension no less than it is today, to decide whether it is wise to earmark all of our fissionable material for atomic bombs. It may be wiser, in order to assure our long-range industrial development, to put part of our fissionable material into nuclear reactors. . . . We must take great care that the allocation of fissionable material is decided in such a way that our citizens know what decision is being made and what it means to the future of the country. Short-sighted use of all fissionable material for weapons may in the future lead to a national catastrophe. Our fissionable material is a more vital national asset than all the gold in Fort Knox."

With particular reference to the hydrogen bomb question, Bacher emphasized the need for an accurate understanding of what its development might mean to the national security. If this promised to add materially to our military strength, even at great cost and effort and even though it required the conversion of some appreciable amount of our stock of fissionable material into the non-negotiable and decaying form of tritium (which has a half-life of only twelve years), then one might perhaps argue for an H bomb development, he said, but added that it promises nothing of the sort. It would be most helpful to the public in judging whether such a development can be expected to add much to our military effectiveness, Bacher concluded, to know approximately how many atomic bombs we have now.

Four days after Bacher's talk, Gordon Dean, a present member of the Atomic Energy Commission, spoke before a group of Ohio newspaper editors in Columbus on the subject of releasing secret atomic information. "The Russian atomic explosion," he said, "together with several other events, suggests that in the interest of national security it may be wise to declassify rather broadly certain scientific and technical information which the Russians must have possessed in order to achieve an explosion."

ACCELERATING

MORE BIG MACHINES

With 300 Mev synchrotons and synchrocyclotrons budding at scattered points over the Northeast and as energetic a betatron reported in Illinois, there can be little doubt that the springtime of Big Physics has arrived. Other large accelerators have been sighted as far north as Ontario and as far south as Oak Ridge, and from the far west come rumors of still greater wonders to come.

Columbia University's new synchrocyclotron was formally dedicated on May 2 by the University's president, General of the Army Dwight D. Eisenhower, at a brief ceremony held at the Nevis estate, Irvington-on-Hudson, where the big proton accelerator has been installed. John R. Dunning, professor of physics at Columbia, has stated that an energy level of 385 Mev has been reached in operating the instrument. The cyclotron was built with support from the Office of Naval Research. Eugene T. Booth of Columbia was in charge of the three-year construction job, and according to Dr. Dunning, who spoke at the dedication ceremonies, was largely responsible for the successful operation of the instrument. President Eisenhower pointed out that the Nevis estate, formerly owned by the family of Alexander Hamilton, had been donated to the University in 1933 by Mrs. T. Coleman du Pont.

A week or so earlier, the General Electric Company announced the successful operation in its first phase of the GE Research Laboratory's new 300 Mev "nonferromagnetic" synchroton. The electron and x-ray accelerator differs from the Berkeley 300 Mev synchrotron and other similar instruments in that its design eliminates the usual iron-core electromagnet and instead produces the necessary magnetic fields by means of specially designed coils of wire. The Berkeley machine, by contrast, has an electromagnet weighing 130 tons. The GE synchrotron, built under the joint sponsorship of the ONR and the GE Research Laboratory, has been operated thus far up to about a million volts and probably will be working at much higher energies before the end of the year, according to C. G. Suits, vice president and director of research for GE. First erected in one of the old buildings of the Laboratory in downtown Schenectady, the instrument is now being installed in its own building at the new Knolls site in Niskayuna. James L. Lawson, E. B. Gaerttner, W. B. Jones, H. R. Kratz, G. L. Ragan, H. G. Voorhies, and M. L. Yeater were in charge of design and construction.

The first public demonstration of the University of Illinois' new 300 Mev betatron was made at Champaign last February 28 by Donald W. Kerst, the originator of the betatron, who designed and completed the first

such instrument in 1940. Like the synchrotrons, the present betatron produces high energy beams of x-rays and electrons. It had been under construction for fifteen months and was built with an appropriation of $1,500,000 authorized by the Illinois General Assembly in 1945. It is anticipated that both the Atomic Energy Commission and the Office of Naval Research will submit research problems for investigation.

In Cambridge, a 300 Mev synchrotron is in operation at the Laboratory for Nuclear Science and Engineering of the Massachusetts Institute of Technology. Construction on the MIT accelerator was begun in 1946 and in January of this year it was announced that the machine had passed its first operating tests. Construction was supported in part by the ONR, and the instrument was designed and built under the direction of Ivan A. Getting, professor of electrical engineering. This brings the total of MIT accelerators of over a million volts to seven and, according to J. R. Zacharias, director of the laboratory, work is now in progress on the eighth and ninth MIT accelerators.

Another GE-built synchrotron, a 70 Mev version, was built recently in the Schenectady Laboratory and shipped to Queens University at Kingston, Ontario, where its dedication ceremonies were held in late January. The instrument is the most powerful of its kind ever to leave the United States.

Accelerators still in the building stage include the Oak Ridge National Laboratory's eighty-six-inch cyclotron, the first such instrument in the Southeast, which the AEC expects to have in operation within a few months. The cyclotron, a 20 Mev proton accelerator, is being assembled at the electromagnet plant and will upon completion considerably augment research facilities at Oak Ridge.

As announced late last year, the 80 Mev synchrotron at the Iowa State College Institute for Atomic Research at Ames has undergone certain preliminary tests and should be in full-scale operation at an early date. Another GE product, the Ames synchrotron was built in Schenectady and assembled in Iowa by the physics department staff.

Brookhaven National Laboratory has two accelerators in progress. The first is a 20 Mev cyclotron purchased from the Collins Radio Company that at present is remarkable chiefly because it is so handsomely designed, but which is also expected upon completion to be extremely useful as a research instrument. The second Brookhaven machine is the giant proton-synchrotron (the "cosmotron"), which, it is predicted, will reach energies as high as 2.5 or 3 billion volts. Both accelerators are well on their way to being finished, although no estimates have been made as to when they will be placed in operation.

At the California Institute of Technology a one and one-quarter million dollar contract with the AEC has been signed to design, construct, and operate (for three years) a one billion volt synchrotron. The project is being supervised by Robert F. Bacher, head of the division of physics, mathematics, and astronomy at Caltech. At the same time the AEC announced that a contract had been awarded to the University of Florida for completion of a one million volt electrostatic generator that is now under construction there.

From Stanford University has come word that tests of the fifteen foot prototype model of a projected billion volt electron linear accelerator have given encouraging results. A voltage output of 25 Mev has been reached, which is claimed to be the highest energy obtained to date anywhere with an electron linear accelerator. When completed, the instrument will have an over-all length of one hundred and sixty feet. According to statements from Stanford it is expected that some eighty feet of the accelerator will be in operation by August, giving a possible energy level of 320 Mev.

V'S AND DOGS' HIND LEGS

TWO NEW PARTICLES

Most of the exciting events in physics are those that occur during the rare moments when previously unverified observations are duplicated in independent experiments. One recent example is a patient piece of detective work carried out at the California Institute of Technology by a team of physicists headed by Nobel Prize winner Carl D. Anderson and reported at the Washington meeting of the American Physical Society in April. Using a specially rigged Wilson cloud chamber, the group took in the neighborhood of eleven thousand photographs of cosmic ray events to obtain thirty-four pictures giving evidence of two new elementary particles that first had tentatively been reported in England three years ago. The particles, one carrying a charge and the other neutral, were first observed by G. D. Rochester and C. C. Butler of the University of Manchester in 1947. The British scientists had obtained two photographs suggesting the presence of the particles, but despite repeated efforts, neither they nor others were able to find further such evidence.

Last year, Anderson, together with R. B. Leighton, E. W. Cowan, A. J. Seriff, and C. Hsiao, began getting cloud chamber photographs of a neutral particle that occasionally revealed itself by decaying into two charged particles, at least one of which appears to be a meson of a type already known. Since the original particle carried no charge, it could not be seen in the cloud chamber, which registers only the passage of ionizing particles. The evidence, then, consists of photographs showing an inverted V with its apex marking the point of disintegration of the original particle. Thirty such pictures eventually were obtained. Calculations of the mass and energy of the two secondary particles suggest that the new particle has a mass at least twice and possibly seven times that of any known cosmic ray particle.

The second new particle, of which only four traces were found, also disintegrates into at least two secondary particles, but in this case only one is charged, the other (or others) being neutral. The observed track is one that appears not as a V, but in the words of a Caltech announcement looks "like a dog's hind leg"—a track that comes down in a straight line and then turns off at a new angle. The upper part of the track is explained as being that of the charged particle itself. The track shooting off