PHYSICS

Computer Studies Atoms

Functioning as a part of nuclear experiments, the computer is now being used to scan atomic debris that results when nuclear particles collide in an accelerator—By Ann Ewing

➤ A NEW "WEAPON" in the arsenal of science, the computer, is being used to learn what goes on inside atomic cores.

The computer is used not merely as a calculating machine, but is actually part of the experiment. It will become an even more essential part in the future.

This was the consensus of experts testifying in Washington, D.C., before the Joint Congressional Committee on Atomic Energy, whose members want to find out what the U. S. program should be in the field of high energy physics, which deals with the basic structure of all matter in the universe.

Dr. Leon M. Lederman of Columbia University, New York, reported that a recent experiment using the Columbia atom smasher, with the devices for detecting atomic reactions linked to a computer, gave an answer considerably more accurate than physicists earning Ph.D. degrees during the last 20 years had been able to achieve.

Dr. Lederman said that "in the old-fashioned days of last year," the scientist observed the nuclear smash-ups of interest, giving the word to photograph the event. Now the computer is used to scan the atomic debris resulting when nuclear particles collide in an accelerator.

The computer is so speedy in processing information that it can automatically modify the exposure conditions to obtain improved photographs. It can also use the time between the nuclear collisions, which occur in pulses of a few hundred each second, to analyze the results of the previous burst.

Moreover, Dr. Lederman said, one computer can handle several experiments at one time.

Dr. Lederman led the group of physicists who discovered the anti-deuteron, the first known anti-nucleus made up of two fundamental building blocks of anti-matter—the anti-proton and the anti-neutron. The anti-deuteron is the anti-nucleus of the heavy hydrogen atom.

Dr. John R. Pasta of the University of Illinois noted that the computer known as SMP, for Scanning and Measuring Projector, communicates with the operator through a typewriter. It can report doubtful measurements and ask questions about the need for further measurements—a dialogue between human and computer.

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TECHNOLOGY

New Distillation Unit Supplies Drinking Water

➤ A NEW SEAWATER distillation unit soon will be in use by the U.S. Army. Built of aluminum, the unit produces 150 gallons of drinking water an hour from seawater or brackish water. It can also filter out radioactive contamination. The unit was developed by the U.S. Army Research and Development Laboratories, Fort Belvoir.

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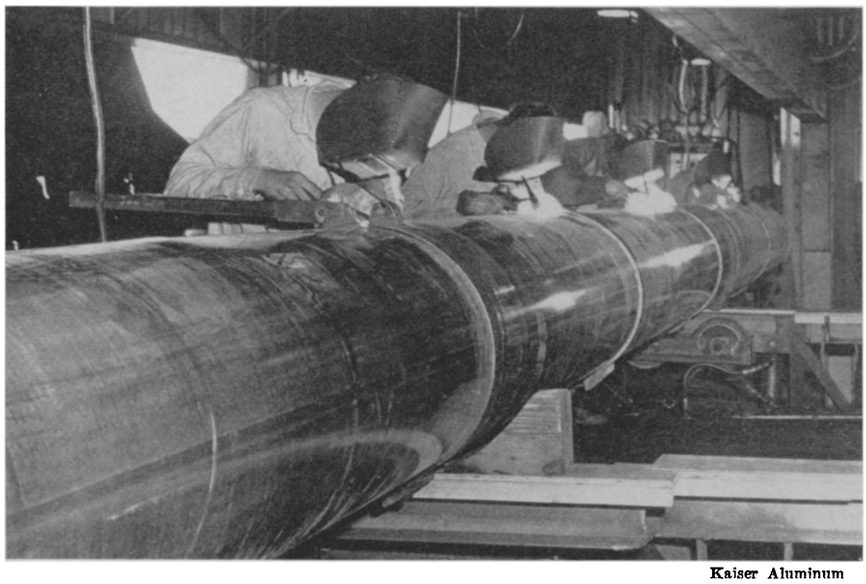

Kaiser Aluminum

ACCELERATOR'S PATH—Being tack welded is an O-shaped aluminum pipe which will provide a rigid girder for the 10,000-foot linear accelerator, the world's longest, to be built at Stanford University, Stanford, Calif.

GEOPHYSICS

Satellites Locate Bumps On Pear-Shaped Earth

➤ THE CONTOURS of the somewhat pear-shaped earth will be further defined by satellite watchers isolated in the dark icy winter of Antarctica.

With a special tracking unit array of antennas resembling a collection of umbrellas stripped of their covering, scientists are prepared to gather precise orbital data from satellites passing over the polar regions. By observing the shapes of the satellite orbits and the way they change, the scientists can determine variations in the strength of the earth's gravity field, which in turn reflect variations in the shape of the earth.

The scientists, located at McMurdo Station, are doing research as a part of the U.S. Antarctic Research Program, sponsored by the National Science Foundation.

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ENGINEERING

Way Found to Compute Space Probe's Path

➤ A NEW WAY to compute the speed and direction that must be given a space probe to make it land at any desired spot on the moon or a planet has been developed.

The method takes the "guesswork" out of calculating how to send man-made vehicles from one place to another within the solar system. It was devised by Dr. Murray Wachman of General Electric Company's Valley Forge Space Technology Center, Philadelphia.

Using his formula, the result of any change of velocity can be calculated to as accurate a final position as necessary. In the system now in use, scientists make very precise "guesses" to determine the effects of velocity changes.

Both methods require the high-speed calculating ability of a giant computer. Dr. Wachman's report to the Society for Industrial and Applied Mathematics in Philadelphia is "on the two point boundary value problem, with application to celestial mechanics."

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PHYSICS

Two-Mile Accelerator Is World's Largest

➤ A TWO-MILE aluminum pipe with a two-mile copper pipe inside it forms the path for what will be the world's largest instrument for nuclear research.

The instrument is a 20 billion electron volt linear accelerator, used for observing the behavior of atomic particles traveling at fantastically high speeds. It is being installed at Stanford University, Stanford, Calif.

In order to provide the truest possible path, the accelerator tube was made not to deviate from a straight line more than 0.04 inches throughout its length.

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