RESEARCH FACILITIES AND PROGRAMS

200-BeV machine—design study

The Atomic Energy Commission has published a preliminary design study for the proposed 200-billion-electron-volt proton accelerator. Although the study was done at the Lawrence Radiation Laboratory, the designers had no specific site in mind, and their determinations are billed as applicable to any location.

The accelerator would be a strong-focusing proton synchrotron providing 3×10^{13} protons per pulse at a maximum rate of 30 cycles a minute. It would be 0.86 miles in diameter, lie under 25 ft or more of earth shielding, and have along its circumference several areas for external-beam and internal-target experiments.

The protons would begin their journey in a Cockcroft-Walton preinjector, which would bring them to an energy of 750 keV. They would then go on to an Alvarez-type linear accelerator and be raised to 200 MeV. The last injection stage would be an 8-BeV rapid-cycling synchrotron, which would be inside the main circle. At 8-BeV seven successive pulses would be transferred to the main synchrotron in 1/3 sec and stored in orbits around its circumference. When the main ring was filled, all the protons would be accelerated to maximum energy.

The main ring would have twelve long straight sections, two of which would provide opportunities for beam extraction and the use of external targets. One straight section would be for internal targets. According to the authors of the study, planning for extracted beams before construction is a new departure; at other accelerators they have been developed after operation has begun.

Because of the high beam intensity special precautions against radioactivity are planned. Radiation-resistant materials are called for, and, whenever possible, components would be located outside the high-radiation areas of the accelerator.

Total cost of construction is estimated at $347 960 000. The accelerator is expected to be completed six and a half years after authorization. The total staff when the machine is operating will be the equivalent of 2472 full-time workers; the annual budget is estimated at $58.7 million.

The full study is two volumes at $10; a 25-page summary is available for $2. Both can be ordered from the Clearinghouse for Federal Scientific and Technical Information, NBS, Springfield, Va.

In another development, the AEC referred 85 site proposals to the National Academy of Sciences for evaluation. Originally 126 locations in 46 states were proposed. Sites in 43 states are still under consideration; North Dakota, South Dakota, and Wyoming have been eliminated. Alaska, Hawaii, Montana, and Vermont did not submit proposals. In view of the large number of sites still in the running, the AEC now feels that it may not be possible to make a final decision by the end of the year as it originally hoped to do.

Organics from chondrites

Organic compounds that come from outer space in meteorites are probably relics of a primordial gas phase, conclude Martin Studier (Argonne National Laboratory), Ryoichi Hayatsu, and Edward Anders (both of the University of Chicago). Moreover the gas phase was probably the solar nebula, and during planetary evolution the organics were probably formed under conditions of thermodynamic equilibrium. Thus the idea that such substances indicate extraterrestrial biology, already abandoned by most scientists, is further discredited.

With experiments reported in a recent issue of *Science* [**149**, 1455 (1965)] Studier and his collaborators examined the distribution of compounds in samples of three carbonaceous chondrites, which, like all meteorites, probably come from asteriods. Their technique was to put samples into a liquid-nitrogen-cooled tube, pump away the gases around them, and then, with time-of-flight mass spectrometry, study the evolution of gases trapped inside the samples. Uncondensed gases were examined and pumped away. Afterward the temperature was allowed to rise so that condensed vapors could be drawn off and examined in turn.

The distribution that they find convinces them that the origin was a primordial gas phase, and, by eliminating other possibilities for that phase, they conclude that it was the solar nebula. Just what the course of development was is not obvious, but Studier, Hayatsu, and Anders draw a tentative picture: at some early stage some unknown, mass-dependent fractionation took away hydrogen and helium; remaining carbon, hydrogen, and oxygen, which were in an asphalt ratio, were heated and then cooled to form a broad spectrum of organics; these were caught in dust grains that crystallized and grew into asteroids, comets, and planets. Meanwhile solar radiation broke up some of the original organic molecules to make smaller ones.

The hypothesis accounts for all organics identified so far; further calculations will show whether it can account for all organics in all meteorites. If it will not, one may have to turn once again to the postulate of biological activity.

Canadian radiotelescope

The Canadian National Research Council is constructing a 150-ft paraboloid radiotelescope at the Algonquin Radio Observatory in Lake Traverse, Ont. The instrument is expected to be complete by February 1966. The observatory, which is equipped with interferometers and smaller dishes, is located in Algonquin Park, a large provincial reserve about 150 miles northwest of Ottawa.

The new reflector will be faced in solid steel plate over the inner 120 ft of its diameter; the remainder will be wire mesh. It is designed for both