In three of these are attachments for the pumping system that maintains an almost perfect vacuum in the chamber through which the electrons travel. In the fourth straight section is a radio-frequency cavity. Electrons, shot into the synchrotron by an external electron gun driven by a high voltage pulse transformer, pass through an accelerating tube immersed in oil and are injected into the vacuum chamber with an energy of about one million volts. Their velocity then is roughly 175,000 miles a second, or about 94 percent that of light. The electrons move clockwise around the synchrotron. Each time they reach the radio frequency cavity they get a 250-volt boost in energy. In one-fourth of a second they will have traveled some 46,000 miles—almost twice around the earth—to reach an energy of one-half billion volts.

At these speeds a powerful magnetic field which increases as their speed increases must be used to keep the electrons from flying out of their orbit. Power for the electromagnet which does this job is supplied by a 7,500 kilowatt motor-generator. As each burst of electrons is shot into the synchrotron the magnetic field is produced by a current which rises steadily from zero to 3,000 amperes in one-quarter second, then decays again to zero as the current flows back through mercury arc rectifiers. These convert electrical energy to mechanical energy which is stored in a large motor-driven flywheel until the process is repeated—at the rate of about 70 times a minute. When the radio frequency cavity is turned off at peak magnetic field the electrons leave their orbit and strike the target.

Construction of the machine was speeded up by the fact that Caltech secured the vacuum pumping system and iron for the magnet from the University of California. They had been used for a pilot model of the six-billion volt protron accelerator now under construction at Berkeley.

Aeronautical Structures

New Laboratory Established at Columbia

An Aeronautical Structures Laboratory will be established at Columbia University during the next academic year, according to John R. Dunning, dean of Columbia's School of Engineering. Designed primarily as a clearing house for information on high-speed rockets and aircraft research, the laboratory will be under the supervision of the department of civil engineering and will be directed by J. M. Garrelts, professor and head of that department. In its research the laboratory will be able to make use of the facilities of the university's physics, mathematics, and other departments as well as such installations as the cyclotron laboratory at Irvington-on-Hudson and the Materials Testing Laboratory.

New Hopkins Astrophysics Lab

Modern APL Building Also Planned

A new laboratory of astrophysics and physical meteorology has been established at The Johns Hopkins University under the direction of John D. Strong, professor of experimental physics. A study of the spectra of planetary atmospheres is currently under way, according to Dr. Strong, and it is hoped that astrophysical measurements can be extended from the visible region of the electromagnetic spectrum to the longer wavelengths including the far infrared. Other aspects of the laboratory's research program will include investigations of the behavior of atmospheric pressure and certain optical studies of interest in astrophysical work, with special emphasis to be placed on lens and mirror coatings. The laboratory will also train graduate students working toward the doctor's degree in astrophysics.

At the same time, the university has announced that a firm of New York City architects has been assigned to proceed with final plans for construction of the new Applied Physics Laboratory, which will be located on a newly purchased 205-acre tract about fifteen miles from the present APL site at Silver Spring. According to APL Director R. E. Gibson, construction of the entirely air-conditioned laboratory building is expected to begin early next year.

High Altitude Research

The Mauna Loa Observatory, Hawaii

According to a recent communication from R. H. Simpson of the U. S. Department of Commerce Weather Bureau in Washington, D. C., another high altitude laboratory should be added to the list of such stations given in the May 1952 issue of *Physics Today* (p. 28). A new geophysical observatory, he points out, has been established at the summit of Mauna Loa (altitude 13,453 ft) on the island of Hawaii. Equipped at present as a weather observatory, it is attended by U. S. Weather Bureau personnel stationed at Hilo, Hawaii.

Meteorological instruments are of the recording type and are capable of operating as long as three months without attention. Continuous records of wind direction and speed, sunshine, rain and snowfall, temperature, humidity, and pressure are now recorded at the observatory and it is planned to install additional equipment including a Dobson ozone recorder and a water vapor absorption spectrometer. It is also hoped that a two-way radio system can be installed which will be suitable for collecting meteorological data from the observatory at Hilo through a push button relay process.

The single structure at the observatory site includes accommodations for two or three observers to remain overnight. The observatory is connected to Hilo, the principal city on the island of Hawaii, by a fifty-nine mile stretch of road which runs from sea level through the dense rain forest of Kulani, above the timberline, and across endless fields of lava formations. The last fifteen miles of the journey must be made by a four-wheel drive vehicle but plans call for the completion of a passenger sedan road within the next seven months.

The Mauna Loa Observatory, one of the highest elevation weather stations in the world, is well exposed to prevailing winds and is perhaps the only spot on

earth where one can travel from sea level to such heights over an area in which the climate is determined by a fully marine tropical air mass free from the distortions of continental effects. For this reason, the observatory affords an unusual opportunity for many types of geophysical research.

White Mountain Joint Support Program

The White Mountain Research Station on Mount Barcroft in California's White Mountain range is to receive combined support totaling $36,000 per year for a three-year period from the National Science Foundation, the Office of Naval Research, and the Rockefeller Foundation, according to a recent NSF announcement. The laboratory, located within the limits of the Inyo National Forest, was acquired by ONR from the Naval Ordnance Test Station in 1950 and has been operated as a year-round high-altitude research facility by the University of California, with funds provided under an ONR contract. The University will continue to maintain the station under the direction of Professors Nello Pace and S. F. Cook, who are assisted by an interdepartmental committee composed of staff members of the University representing various divisions of the physical, medical, and biological sciences. It is intended under the new program that the committee be broadened to include scientists from all geographical regions of the United States and from the various fields of science which require high altitude research facilities. Two laboratories, one at the 10,500-foot level and another at 12,500 feet, are now available to scientists. In addition, limited experimentation may be carried on at heights up to 14,256 feet.

Radiation Research

A New Society is Organized

The Radiation Research Society, which held its first meeting in New York City last April 15th, has been organized in recognition of the present need for better integration of the various scientific disciplines involved in the study of radiation effects. The council of the new society includes two representatives for each of the fields of physics, chemistry, biology, and medicine, and two additional members elected to represent science in general. The initial membership of the organization is over 250. Officers for 1952–53 are: Raymond E. Zirkle, president; Alexander Hollaender, vice president; Abraham Edelmann, secretary; and Harvey Patt, treasurer.

Miscellany

International

Visiting professorships in physics are currently open for qualified applicants at the University of Karachi and the University of the Punjab, Pakistan, and the University of Malaya, Singapore, according to the State Department. Inquiries or applications should be addressed to Mr. Gilbert Anderson, Chief, American Grantees Section, Professional Activities Branch, Educational Exchange Service, U. S. Department of State, Washington 25, D. C.

The Italian Society of Geophysics and Meteorology, organized in May of this year, has announced plans to begin publication of a Bulletin within the next few months. The society was formed to serve the interests of those persons who are concerned with climatology, seismology, volcanology, oceanography, hydrology, geodesy, and other subjects which might fall under the general categories of geophysics and meteorology. The secretary is Professor M. Bossolasco of the Geophysical Institute, University of Genoa.

Israel and Unesco have signed an agreement providing that five scientists will be sent to that country and that five Israeli scientists will receive fellowships for study abroad. Unesco plans to provide teachers in experimental physics, optics, geology, and biochemistry, as well as a scientist to work with the National Physical Research Laboratory.

Israel has also formed an Atomic Energy Commission, according to reports from Tel Aviv. The move was made by Prime Minister David Ben-Gurion following a survey of the country's natural resources which indicated the presence of radioactive minerals.

Government

Statistical and fiscal information on the programs of federal agencies for the last two years in supporting scientific research and development by educational and other nonprofit institutions has been requested by the National Science Foundation. NSF is compiling such data on a continuing basis at the request of the Bureau of the Budget, which has gathered similar information on federal research and development programs in previous years.

Expansion of the research programs of the Army, the Navy, and the Air Force has been insured by a bill which President Truman signed in mid-July. The legislation also provides for part-time consultants and specialists to serve on advisory committees and for the employment of alien scientists.

Reactor-produced radioactive polonium 210 may now be purchased at Oak Ridge for use in research. The first alpha-particle emitter to be sold by the AEC's Isotopes Division, polonium can also be used as a source of high-energy neutrons, and it has been announced that polonium-beryllium neutron sources, enclosed in nickel cylinders, will be assembled at Oak Ridge for distribution to licensed purchasers.

Uranium 235, the fissionable isotope of uranium, will be produced at a new gaseous diffusion plant to be located in Pike County, Ohio, according to an announcement made August 12th by the AEC. The plant, costing an estimated $1.2 billion, will be constructed in connection with the AEC's recently disclosed atomic weapons expansion program. Completion of the project is expected to take about four years, although some units of the plant may be in operation by 1954.