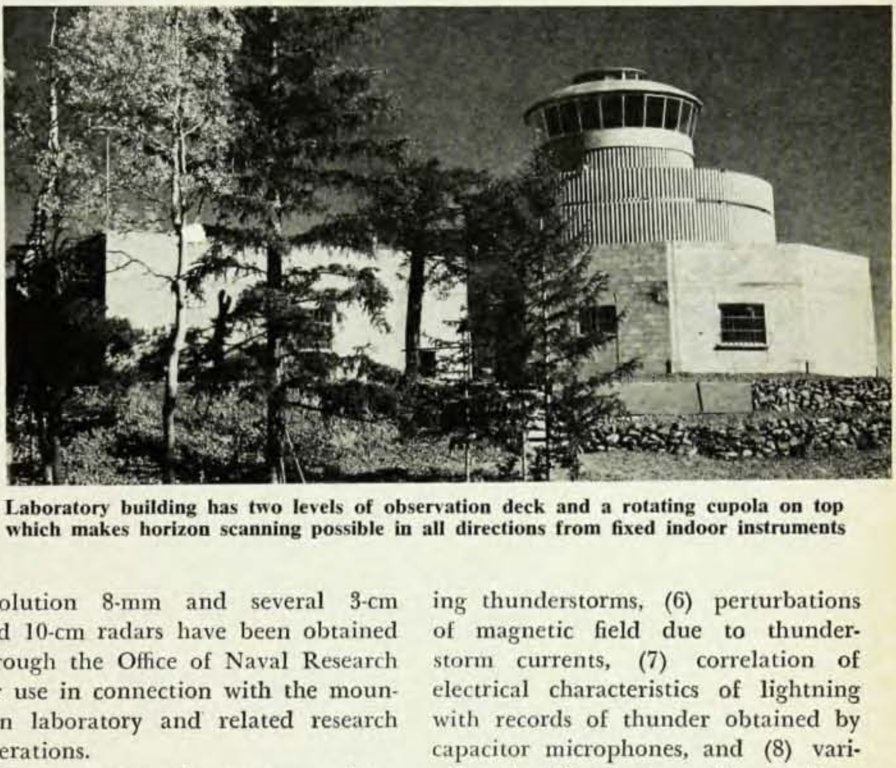
of New Mexico. Several square miles of open ridges and meadows at the site offer ample space for locating equipment for radar, electric-field, and precipitation studies calling for observations at elevations above ten thousand feet. Some 20 000 square miles of adjacent territory can be viewed from the site, which is a favorable feature for the evaluation of weather-modification programs involving radar, photographic, and visual surveillance. Total precipitation at the Langmuir Laboratory during 1963 was 18.15 inches, while the average rainfall at Socorro is only 8.74 inches. Most of the Laboratory's precipitation came during the summer thunderstorms of July, August, and September, when conditions were favorable for almost daily build-up of cumulonimbus clouds over the mountains. The bases of these clouds are typically only two or three thousand feet above the mountain top. During the winter months, precipitating clouds often envelop the Laboratory. Temperatures in 1963 ranged from 80°F to 10° below zero.

Instrumentation and recorders for all standard weather and atmospheric electricity elements have been installed, and information from this system is available to all research groups using the laboratory. The sensors include channels for temperature, dew point, solar radiation, precipitation, wind speed and direction, electric field, positive and negative electrical conductivity, and barometric pressure. Output signals from these sensors are recorded on strip-chart recorders in an "instrument room" on the first floor. A digital voltmeter with paper-tape printer is being installed and will be programmed to sample all basic weather and atmospheric electricity variables on an appropriate time scale.

Special instrumentation includes a Hewlett-Packard precision time standard and clock with a quartz oscillator having a stability of 5 parts in 10^{10} per week. A digital clock driven by the time standard will provide for timing marks and the programming of measurements. The magnetic field is monitored by a Varian rubidium-vapor station magnetometer having a sensitivity of 0.02 gamma. One high-resolution 8-mm and several 3-cm and 10-cm radars have been obtained through the Office of Naval Research for use in connection with the mountain laboratory and related research operations.

Arrow indicates site of Irving Langmuir Laboratory for Atmospheric Physics Research located on a summit of the Magdelena Mountains in central New Mexico



Laboratory building has two levels of observation deck and a rotating cupola on top which makes horizon scanning possible in all directions from fixed indoor instruments

Current research programs (supported by the National Science Foundation, the Office of Naval Research, and the State of New Mexico) include the following: (1) a comparison of the conductivity and small-ion concentration at the mountain elevation with values measured in the valley at Socorro, (2) condensation nuclei variations under fair-weather and thunderstorm conditions, (3) pressure variation associated with the development and movement of storms over the mountain top, (4) effect of the release of anhydrous ammonia on the electrification produced in a thunderstorm, (5) earth currents and corona point discharge on the mountain during thunderstorms, (6) perturbations of magnetic field due to thunderstorm currents, (7) correlation of electrical characteristics of lightning with records of thunder obtained by capacitor microphones, and (8) variation of tritium content of water from different stages of a thunderstorm. Institute scientists involved in these studies include E. J. Workman, M. H. Wilkening, M. Brook, and C. R. Holmes.

MIT research fund

A $15 million fund, intended for basic research in the physical sciences, has been established at the Massachusetts Institute of Technology. Money for the fund, which will be known as "The Alfred P. Sloan Fund for Basic Research in the Physical Sciences", comes from a personal gift of $5 million from Mr. Sloan, which will

be matched in equal amounts by a Sloan Foundation gift and another earlier Foundation grant to MIT. Considered one of the largest private gifts to research in recent years, the fund will approximately double the amount of money available at MIT for basic research. The object of the fund will be to help correct the imbalance existing between the resources of applied and basic research and, in general, to support research in those areas of the physical sciences that are not otherwise heavily subsidized.

Though generally only those proposals made by MIT scientists will be considered for grants, work at other institutions that is directly related to MIT work will also be eligible for support, as well as work done by MIT scientists while visiting at other institutions. Named to head the new fund are James R. Killian, Jr., Julius A. Stratton, and Charles H. Townes, who are chairman of the corporation, president, and provost of MIT, respectively.

Bubble chamber

The largest bubble chamber in Europe, the 150-cm-long British National Hydrogen Bubble Chamber, is now operating at CERN. The device is being used at the CERN 28-BeV proton synchrotron this year and will then be moved to England where it will be used with Nimrod, the 7-BeV proton synchrotron at Harwell.

Construction of the chamber began in 1959 as a cooperative project carried out by Birmingham and Liverpool Universities and Imperial College, London, together with the National Institute for Research in Nuclear Science (NIRNS). Funds for its design, construction, and its operation at CERN were provided by the British Department of Scientific and Industrial Research, in the amount of £ 1 million. The chamber's 300-ton magnet was sent to Geneva late in 1961. The chamber itself was assembled at the NIRNS Rutherford High Energy Laboratory, where it was successfully tested in January 1963, and then shipped to CERN. Its initial trial runs began last November.

The first experiments with the 150-cm chamber have involved the interaction of negative K particles with the hydrogen in the chamber, the search for more omega particles (so far, only the two found at Brookhaven in January are known), and detailed studies of various resonance states.

According to information released by CERN on July 16, the techniques of beam transport for the bubble-chamber experiments have been refined to a point unmatched elsewhere. Large numbers of quadrupole magnets focus the beam, which is directed by several horizontal and vertical bending magnets along a 180-meter path from the synchrotron to the bubble chamber. Remote-controlled adjustable collimators maintain the beam dimensions, and unwanted particles are deflected in three electrostatic separators, each 30 ft long. The remaining particles are counted and then enter the chamber.

British electron synchrotron

A 5.3-BeV electron accelerator, christened NINA, is being built at the recently established Daresbury Nuclear Physics Laboratory in England. The Daresbury Laboratory is the second national laboratory established by the British National Institute for Research in Nuclear Science. The first was the Rutherford High Energy Laboratory.

The synchrotron will be a strong-focusing machine in which the beam is confined to a small region by strong magnetic forces. While only small currents will be accelerated to the maximum design energy, it is planned that large currents, of the order of several microamperes, will be available at 4 BeV.

The electrons will be injected from a 40-MeV linear accelerator. Then they will be steered in a 70.2-meter-diameter circle by forty magnets. Between the gaps there will be very large field-free sections. This feature should make the machine particularly accessible for experiments. A study is also being made of the possibility of injecting and accelerating positrons in the machine as well.

The Daresbury site was chosen because of its good geological properties, and because it is midway between the Universities of Liverpool and Manchester. Both institutions, together with Glasgow University, have taken a keen interest in the new laboratory. Permanent buildings are well under way, and the first was occupied in May. Installation of the machine components is expected to begin early next year, while the target date for actual acceleration of electrons is September 1966. A. W. Merrison, on leave of absence from Liverpool, is director of the new facility.

German machine reaches 6 BeV

DESY (otherwise Deutsches Elektronen-Synchrotron), a 6-BeV strong-focusing electron synchrotron, started operating in Hamburg at the end of February. The German machine takes 40-MeV electrons from a linear accelerator and sends them through a ring tunnel, 100 meters in diameter. Inside the tunnel there are 24 radially focusing magnets and 24 radially defocusing magnets, with 16 straight accelerating sections between. DESY produces between 1 and 3×10^{10} electrons/pulse or from 5 to 15×10^{11} electrons/second. So far, 4.8 BeV is the maximum particle energy available for continuous operation, although bursts of 6-BeV electrons have been achieved without major trouble.

DESY has been used to produce bremsstrahlung pulses lasting 1.6 msec, by inserting a target inside the tunnel. The bremsstrahlung intensity was approximately 3×10^{8} effective quanta/10^{10} electrons.

Measurements are being made to determine the radiation background to be encountered during experiments. The first experiments with the new synchrotron have included an investigation of electron-proton scattering with the internal electron beam and a study of meson photoproduction.

The machine, building, and experimental areas cost about $27.5 million, with most of the money ($20.75 million) provided by the Federal Republic of Germany. Funds were also given by the Free City of Hamburg ($4.25 million) and the Volkswagen Foundation ($2.5 million). Physicists at German universities will be encouraged to collaborate with DESY scientists in joint experiments.