Energy Physics. Actual work on the site began in 1960.

Like all Soviet accelerators, the Serpukhov machine was designed in Leningrad, at the Research Institute for Electrophysical Equipment. Pieces of the accelerator are built by industry and then put together under the supervision of a large engineering firm. The minor modifications and repair usually needed during assembly are done at Serpukhov, where there are some limited workshop facilities.

A. A. Logunov is director of the laboratory, R. M. Sulaiev is vice-director and Y. D. Prokoshkin is director of research.

Argonne supermagnet

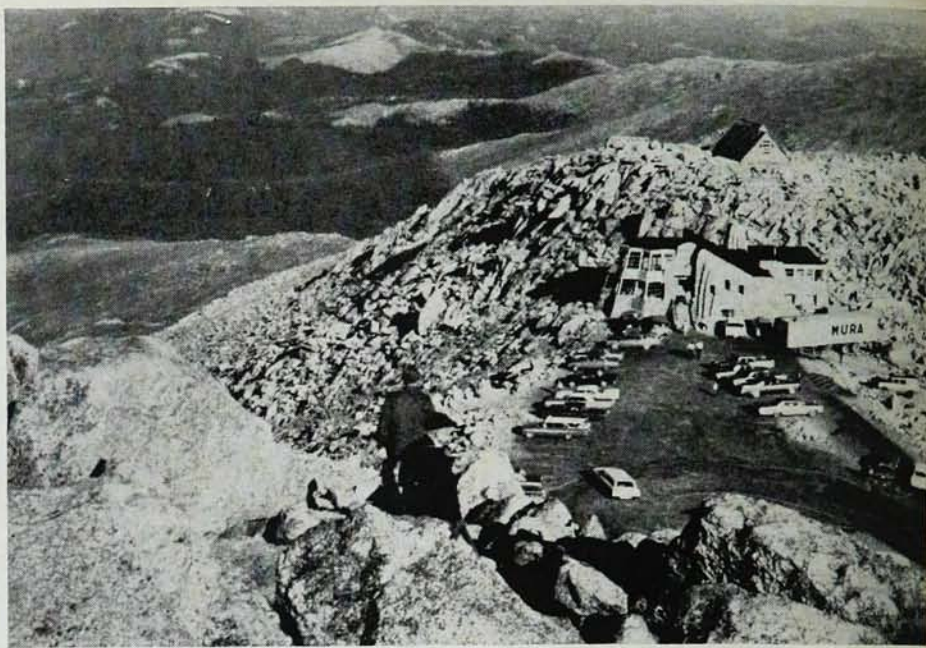
A superconducting magnet is being used for the first time in a high-energy experiment. Charles Laverick and Thomas H. Fields performed the magnet work at Argonne National Laboratory in collaboration with the staffs of Argonne and Carnegie Tech. The supermagnet provides the Argonne-Carnegie Tech 25-cm bubble chamber with a 44 000-gauss field for investigating hyperfragments that result from K^- capture by helium.

While development work is proceeding on a 100 000-gauss superconducting magnet for this chamber, tests are being conducted to determine the feasibility of using a supermagnet for a planned 3.6-meter bubble chamber. With their advantages of small size and economy, which results from very low power consumption, large supermagnets became feasible only after the development at Argonne of superconducting cables that could sustain the severe thermal and mechanical stresses to which they would be subjected.

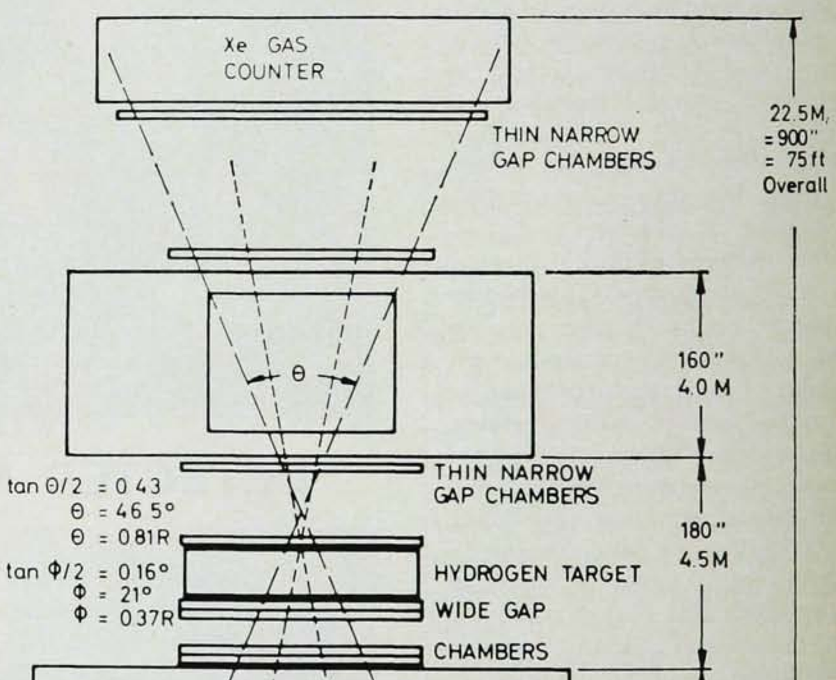
Cosmic rays for high energy

The National Science Foundation has granted funds to investigate the feasibility of using cosmic rays to study particle interactions in the range between 100 and 1000 BeV. The project was proposed by Lawrence W. Jones of the University of Michigan and will be done under the auspices of the Midwest Universities Research Association. NSF gave $279 800.

The idea of using cosmic rays was



SUMMIT OF MT EVANS in Colorado, proposed site of installation to study high-energy interactions with cosmic rays. Elevation is about 4200 meters.



COUNTER AND TARGET arrangement for high-energy experiments with cosmic rays. Equipment will identify incoming particles, let them interact with a hydrogen target and measure products of the interactions.

proposed because of the probable time lag in the construction of the next generation of accelerators. It will be at least a decade before accelerators of more than 100 BeV are ready for research. Meanwhile, the cosmic rays are there, and an installation of the financial status of a large bubble chamber could learn much from them. No one proposes that cosmic-ray studies could substitute for accelerators. They are urged as an interim and auxiliary activity.

In the past, much of the new knowledge in high-energy physics came from cosmic rays, but as soon as really energetic accelerators became available, their experimental versatility carried the field, and cosmic rays were neglected. Increases in accelerator energy came along quickly enough to satisfy the curiosity of those who were interested in experimenting at ever higher energies. Now, with a long time in prospect till the present highest-energy machines are surpassed, cosmic rays may become interesting again, simply as a source of high-energy particles.

In the feasibility study, Jones is associated with Fred Mills of MURA; P. V. Ramana Murthy and A. Subramian (both on leave from Tata Institute, Bombay); R. March, D. Hartung and K. R. Simon of the University of Wisconsin; B. Dayton of Los Angeles State College; and G. Del Castillo of MURA. They propose erecting a large array of detecting equipment on the summit of Mt. Evans in Colorado at about 4200 meters above sea level and present figures to demonstrate that the counting rate of interesting interactions at that height would make the project useful. The site is accessible by automobile road and is about two hours from Denver. The University of Denver already has a cosmic-ray station there.

The detector they would like to build would be a tall (22.5-meter) vertical array designed (1) to identify incoming particles, (2) to allow them to interact with a hydrogen target, and (3) to identify and measure the interaction products. In the center of the array there would be the liquid-hydrogen target with dimensions 1 $\times$ 2 $\times$ 5 meters. Above it, the "beam" defining portion would consist of spark chambers, thin scintillation counters, a matrix of gas proportional counters and a large magnet. The magnet would provide 16 kG over a volume of $2 \times 3 \times 4$ meters. Below the target, a similar magnet ($2 \times 2 \times 5$ meters) and spark-chamber array would analyze the products. The last element in the system would be an ionization calorimeter, an array of alternate layers of iron, ionization detectors and spark chambers. Such a calorimeter is capable of determining particle energy at 100 BeV and higher within $\pm 20\%$. The proposers estimate that the installation could be brought into operation in four years at a cost of about $15 million.

Automated oceanography

The Coast and Geodetic Survey recently took delivery of the largest vessel ever built in the United States for oceanographic research. The 3400-metric-ton ship, named *Oceanographer*, is the fourteenth member of the CGS oceanographic fleet.

The new vessel is remarkable for an automated system that both controls and monitors the ship's operation and collects and sorts data from its scientific recording equipment. *Oceanographer's* equipment measures and records ambient light, ship's course and speed, magnetic field intensity, gravity, surface current and temperature, temperature at depth, and ocean depth. Subbottom profiles, showing the structure of the ocean floor beneath the sediment, are taken while the ship is underway. On station, the ship takes water samples at depth and can obtain 30-meter core samples from the deep ocean floor. Sounding balloons gather meteorological data.

Orbiting Observatory

A power supply failure shortly after launching has permanently ended the usefulness of the first orbiting astronomical observatory. The craft, which carried experiments to make observations in the low-wavelength end of the electromagnetic spectrum, was sent up from Cape Kennedy on 8 April. There are no plans for a back-up craft carrying the same experiments as the one that failed, but there are plans for future OAO's, (two in 1967 and one in 1968), which will carry other experiments.

Experiments on the dead vehicle included the following: photometer and spectrophotometers to study near-ultraviolet (100 to 420 millimicrons) emissions of stars and nebulae, a "sandwich" crystal scintillator to record high-energy gammas, a gas proportional counter to study soft x rays, and an anticoincidence shaded detector for low-energy gammas (2 to 180 keV).

Experiments aboard future OAO's will include an instrument of moderate resolution to do absolute spectrophotometry in the ultraviolet, the ultraviolet sky-survey "Celescope" instrument of the Smithsonian Astrophysical Observatory, a high-resolution ultraviolet instrument developed by Princeton University and a stellar and nebular instrument developed jointly by University College, London, and the University of Leicester.

Charged-particle satellite

A satellite to study angular distribution of charged particles in the earth's magnetic field was put into polar orbit from Vandenberg AFB on 22 April. The orbit is highly elliptical, having an apogee of about 6000 km and a perigee of about 400 km. The satellite was put up by the Air Force, and the experiments belong to the Air Force Cambridge Research Laboratories.

The vehicle, designated OV3-1, carries a spherical electrostatic analyzer to measure low-energy ionospheric charged particles and two curved-plate electrostatic analyzers to measure high-energy radiation-belt electrons and protons up to 100 keV. To obtain energy spectra of particles up to a few MeV, an electron spectrometer and a proton spectrometer are carried. A Geiger counter will measure radiation intensity. All instruments are directional except the spherical electrostatic analyzer and the Geiger counter. Magnetometers are aboard to determine orientation of the directional instruments with respect to the magnetic field. □