

RESEARCH FACILITIES AND PROGRAMS

Meson factories

Among the recommendations made last year by the Ramsey Panel to study needs in high-energy physics was an endorsement of MURA's proposal to build a high-intensity 12.5 BeV machine. Because it was expected that the energy range of the MURA accelerator would overlap that of the so-called "meson factories", the Ramsey report advised against authorizing the latter type of accelerator for the time being. Meson factories are medium-energy accelerators (300-1000 MeV), capable of producing proton beams of much greater intensity than other types of existing machines. The report stated that for research in particle physics, the MURA accelerator and the meson factory would be roughly comparable. It was noted, however, that a meson factory might also serve as a powerful tool for investigating nuclear structure, and the panel recommended that studies be continued on the possible use of meson factories for this purpose.

Last December, a panel was appointed by the White House Office of Science and Technology for the specific purpose of considering the usefulness of meson factories in studies of nuclear structure. In January of this year, the Atomic Energy Commission announced its decision not to build the MURA accelerator. This announcement offered the panel on meson factories a strong reason for recommending the early construction of a high-intensity machine, since the arguments which the Ramsey Report had given for building the MURA accelerator could now be advanced in favor of the meson factory. The latter, according to the panel, would be much less expensive (about \$50 million instead of some \$150 million for the MURA machine) and could also carry out some of the important high-energy experiments originally proposed for MURA.

The report, in recommending that a meson factory be built, stated that such an accelerator is needed for accurate determination of the nuclear force, as an intensive source of slow pi and mu mesons, and for a variety

of high-energy nuclear structure experiments.

To be useful for studies in nuclear structure, a meson factory must have relatively high energy, good energy resolution, and intense currents. Many planned experiments require intense secondary beams of muons and pions; therefore, a suitable accelerator should provide proton beams of hundreds of microamperes at energies of 500 MeV or greater.

In the past, electrostatic accelerators have been used for detailed investigation of low-energy nuclear states. While they give the over-all properties of these states, they cannot give high-energy information. Scattering of electrons at energies up to 1 BeV would supply the required energy and momentum for some experiments proposed for the factories, but by no means all. High-energy synchrotrons cover the same energy range as would a meson factory. However, the maximum deflected beam available from existing synchrocyclotrons, even if proposed improvements are made, is no more than 0.05 μ A. On the other hand, meson factories would have deflected beams of 100 to 1000 μ A.

In its report, the panel recommended that a meson factory be constructed, that the energy be variable, and that the maximum value be 500 to 800 MeV.

The panel members were: Hans A. Bethe, chairman, Herman Feshbach, Harry Gove, W. W. Havens, Jr., Robert Christy, Gerald Phillips and Robert R. Wilson.

Yerkes telescope

A 24-inch reflecting telescope designed to map the magnetic field surrounding the Milky Way was recently installed at the University of Chicago's Yerkes Observatory, in Williams Bay, Wis.

The telescope, which was constructed to observe extremely small amounts of polarization with high precision, is equipped with a 7-foot-long tube and a diaphragm which nar-

rows its field of vision. Starlight beams are collected through the telescope's mirror and passed through a prism which splits them into horizontal and vertical components. These components are then focused on separate light-sensitive photoelectric cells.

William A. Hiltner, director of Yerkes and designer of the new telescope, took part in the discovery 14 years ago that the light from some stars in the Milky Way was polarized. It was later concluded that polarization measurements on nearby stars (not more than about 300 light years away) would show the orientation of dust particles in the galactic magnetic field, and that the field could thus be charted.

The 24-inch telescope, financed by an \$80 000 grant from the National Science Foundation, replaces an outmoded 16-inch instrument at Yerkes. Three other major telescopes are in use at the Observatory, including the original Yerkes 24-inch reflector and a 40-inch refracting telescope which is the largest of its type.

Astrometric reflector

The US Naval Observatory at Flagstaff, Ariz., has acquired a new telescope for determining the distances of very faint stars by measuring their heliocentric parallax. The new \$2.3 million, 61-inch Astrometric Reflector is the first large reflecting telescope designed specifically for this purpose, and is capable of detecting the apparent motion of stars as distant as 100 light years and of a magnitude as faint as 18.5. Of particular interest are the red dwarfs, white dwarfs, and subdwarfs—all stars of unusual properties whose energies cannot be evaluated until their distances are known.

In addition to the determination of stellar distances, the telescope will be used for the study of stellar systems, including the perturbation of stars by "dark companions", and photoelectric and spectroscopic studies of very faint objects.

The optics of the telescope include a 61-inch paraboloidal primary mir-