

# Physical Sciences Notes

## ASTROPHYSICS

### Interpreting Solar Rotation

If the interior of the sun actually rotated as fast—every 1.8 days—as Dr. Robert H. Dicke of Princeton University has recently interpreted his measurements to mean, the sun would be unstable. The rate of turbulent diffusion in the unstable regions of such a star as the sun, with an inner part rotating much faster than the outer, precludes a fast-spinning interior.

This conclusion was reported in the May 26 *SCIENCE* by Drs. Peter Goldreich of California Institute of Technology and Gerald Schubert of the University of California, Los Angeles.

Dr. Dicke has reported that flattening of the solar poles (SN : 2/11), resulting from a strongly rotating core deep within the sun, causes eight percent of the measured 43-second shift in the orbit of Mercury, one of the three variables experimentally supporting Einstein's theory of general relativity.

## COMETARY ASTRONOMY

### 1963 Comet Found Four Years Later

Four years after it appeared in the heavens, Mrs. Jean H. Anderson of the University of Minnesota reports that she has discovered the ninth comet of 1963.

Mrs. Anderson found the comet on four photographic plates made by Dr. W. J. Luyten, also of the University of Minnesota, on consecutive nights in November 1963. The comet, known only by its number, was about magnitude 16, too faint to be seen except through a large telescope. It had a wide and relatively long tail.

The comet could well have a short period, returning to the sun's vicinity within 5.5 years, or about two years from now, Mrs. Anderson reported to the Smithsonian Astrophysical Observatory in Cambridge, Mass., world clearing house for astronomical observations.

## SOLAR SYSTEM ASTRONOMY

### Zodiacal Dust and Deep-Sea Sediments

The recent detection of radioactive aluminum 26 in marine sediments has led to the conclusion that it is brought into the earth's atmosphere by micrometeorites that have been exposed to high energy solar protons in interplanetary space.

"The presence of aluminum 26 is consistent with the zodiacal dust model with particles, of some tens of microns, rather than with submicron particles," Dr. S. Fred Singer, now at the U.S. Department of the Interior, reports in the May 26 *SCIENCE*.

From this model, he has calculated that the mass accretion on earth is about 1,250 tons a day, with an upper limit of 2,500 and lower limit of 250.

The presence of aluminum 26, Dr. Singer notes, also supports the idea that an important fraction of the dust is stony in composition and density, rather than being made up entirely of carbon grains or other minerals suggested in several exotic models.

Dr. Singer further concludes that the accreted dust

particles have been in the solar system and exposed to protons from solar high energy particles for a time interval greater than a significant fraction of the half-life of aluminum 26, which is 7.4 million years.

## ASTRONOMY

### Space Mirror Shelved

A strong stand against placing a huge mirror into an earth orbit, a concept considered last year by the Department of Defense under the name Project Able, has been taken by a group of scientists from the National Academy of Sciences' Space Science Board.

The study group found "no scientific merit for such a satellite commensurate with its costs to the public and its nuisance to science." If such a satellite should be considered in the future, ability to destroy it by signal from the ground should be an inherent part of the design.

Dr. Donald F. Hornig, the President's Science Adviser, said that the Government no longer has plans to orbit a huge mirror to illuminate portions of the earth. One speculative use would be to light up Vietnamese jungles at night.

The scientists also recommend that in the event any future plans are contemplated for the development of such a reflector system, detailed studies of the scientific hazards possibly affecting ecology, biology or astronomy be made and disseminated to the public.

Dr. John W. Findlay of the National Radio Astronomy Observatory is chairman of the Committee on Potential Contamination and Interference from Space Experiments, which made the NAS report after consulting with astronomers, biologists and ecologists.

## RADIOGRAPHY

### Neutron Detection System

The United Kingdom Atomic Energy Authority has developed a new type of neutron detection system for use in neutron radiography. It will give a permanent visual image of the shadows cast when neutrons are passed through a solid object—a useful method of examining materials and components.

The system consists of two parallel aluminum plates, one coated with lithium and the other with selenium, separated by a narrow air gap. A uniform electrostatic charge is created on the selenium layer, while the other is grounded. When a stream of neutrons strikes the lithium layer, charged particles are emitted, producing a pattern of charge on the selenium layer that corresponds to the pattern of the neutrons passing through the object being radiographed.

Particles of pigment carrying an opposite charge from that on the selenium layer are dusted onto that layer, where they adhere only to the pattern produced by the neutrons. The pigment is transferred to some base material and made into a permanent record by heat.

The new technique will detect neutrons of any energy, but the UKAEA suggests that it will be particularly useful in slow neutron radiography, newly being adapted for the inspection of thick iron or steel objects.