physical sciences notes

PULSARS

Interstellar magnetic field

Among the things that pulsars (SN: 4/27, p. 400) can do for astronomers is give a direct measurement of the interstellar magnetic field, according to Dr. Richard M. Goldstein of the Jet Propulsion Laboratory at California Institute of Technology.

Pulsar signals are slowed up when they come through a region that has free electrons in it, as the interstellar volume does. The slowing depends in part on whatever magnetic field may be in the region and the amount differs according to whether left-hand or right-hand circularly polarized waves are observed.

By switching back and forth between the two polarizations and watching the change in time of arrival, the field strength can be determined. Dr. Goldstein reports in SCIENCE for July 5 that measurements so far indicate it can not be greater than 0.62×10^{-3} gauss. The earth's field is about half a gauss.

PLANETARY ASTRONOMY

Red spot and the sun

For generations astronomers have puzzled about the nature of Jupiter's great red spot—a conspicuous feature that appears in the planet's northern hemisphere. Optical and radio observations have concentrated on it trying to determine whether it is some huge persistent cyclone in the Jovian atmosphere, a mountain breaking through the clouds, or they know not what.

Records show that the great spot varies in optical brightness in a more or less cyclic manner. Drs. E. R. Graf, C. E. Smith and F. R. McDevitt of Auburn University in Auburn, Ala., have compared these cycles as observed between 1892 and 1947 with the variations of solar ultraviolet radiation. They report in the June 1 NATURE that there is a significant correspondence between the two cycles. This could mean that solar ultraviolet triggers or regulates whatever mechanism causes the red spot.

The ultraviolet is highly ionizing radiation. It regulates the amount of ionization in the earth's ionosphere, and it could do similar things for Jupiter.

RADIO ASTRONOMY

Radio from X-ray stars

Since the discovery a few years ago of concentrated astronomical sources of X-rays—the so-called X-ray stars—astronomers have been trying to discover whether they radiate also in other parts of the electromagnetic spectrum. Optical identifications have been determined for a few out of about 30, and now, from the Algonquin Radio Observatory in Algonquin Park, Ontario, comes a report of radio observation.

Drs. B. H. Andrew and C. R. Purton report in NATURE for June 1 that the X-ray source Sco X-1—which has also been optically identified—radiates at 4.6 centimeters wavelength with a brightness of 0.021 ± 0.007 flux units. (One flux unit is 10^{-26} watts per square meter per hertz.)

The Canadian astronomers find Sco X-1's spectrum incompatible with emission due simply to thermal motion of charged particles, and point out that synchrotron radiation may be the mechanism.

Synchrotron radiation is produced by charged particles in strong magnetic fields. Presence or absence of such fields is an important factor in theoretical attempts to explain the nature of the X-ray stars.

ASTRONOMY

New Columbia observatory

Columbia University is constructing a new astronomical observatory at Harriman, N.Y.

The facility, which houses a 24-inch reflecting telescope, is expected to be finished by October. It will give the Columbia department of astronomy a teaching and research tool to replace the 12-inch telescope in the university's Rutherfurd Observatory.

Rutherfurd Observatory is located on top of the Pupin Physics Laboratories on the university's Morningside Heights campus. It has become unusable because of the illuminated haze over Manhattan.

SOLID STATE

New magnetic materials

Scientists at Bell Telephone Laboratories have reported the discovery of new permanent magnet materials that contain rare-earth elements. Writing in the June 1 APPLIED PHYSICS LETTERS, Drs. E. A. Nesbitt, R. H. Willens, R. C. Sherwood and J. H. Wernick relate that the materials are based on hexagonal crystal compounds involving five cobalt atoms and one of a rare-earth element.

Replacing a few cobalt atoms with copper in some of these compounds results in materials with substantial permanent magnet properties. Forces as high as 28,700 oersteds—about a hundred times as strong as a toy magnet—have been obtained in such crystals containing cobalt, copper and samarium.

BIOCHEMISTRY

Possible meteoritic source of life chemicals

A possible non-terrestrial source of the life chemicals essential to making RNA and DNA, the key compounds through which hereditary traits are passed on to the next generation, may have been found by three scientists from the University of Chicago and nearby Argonne National Laboratory.

Dr. Martin H. Studier of Argonne, with Drs. Edward Anders and Ryoichi Hayatsu of Chicago, report they have been able to synthesize organic compounds using such common chemicals as carbon monoxide, hydrogen and ammonia mixed with matter from the Orgueil and Murray carbonaceous chondritic meteorites.

They believe catalytic reactions of the type they made in the laboratory could have occurred in the early history of the solar system. The organic molecules they report synthesized in their laboratory are adenine and guanine, with a tentative identification of cytosine.

The original meteorite fell in sourthern France in May of 1864.