physical sciences

MOLECULAR ASTRONOMY

Hydrogen cyanide

Astronomers continue to add to the list of molecules found in the interstellar dust clouds. A recent, important one is molecular hydrogen (SN: 6/20, p. 595). Another is hydrogen cyanide. Evidence for it appeared in observations made during the first week in June with the 36-foot radio telescope of the National Radio Astronomy Observatory at Kitt Peak, Ariz., by Drs. David Buhl of NRAO and Lewis E. Snyder of the University of Virginia.

They reported their finding to the meeting of the American Astronomical Society at Boulder, Colo., last week.

Hydrogen cyanide, like a number of other interstellar compounds, signaled its presence by emission of a characteristic pattern of radio frequencies. In laboratory reactions it can play an important role in the formation of amino acids, and therefore it adds one more to the number of compounds of biochemical interest found in interstellar space. There are so many of these that some scientists are beginning to speculate that primitive forms of life may live in the shadow of the interstellar dust.

PARTICLES

Unsuccessful quark hunt

A search for quarks in cosmic rays has been made at Aachen, West Germany by Drs. Helmut Faissner, M. Holder, K. Krisor, Grant Mason (now at the University of Utah), Z. Sawaf and H. Umbach of the Third Physical Institute of the Technical University of Aachen. They report in the June 15 PHYSICAL REVIEW LETTERS that it was unsuccessful.

This is in contrast to a claim made in September 1969 by Dr. Brian McCusker of the University of Sydney in Australia that he had found quarks in cosmic rays (SN: 9/13, p. 198). Dr. McCusker claimed to have seen quarks with an electric charge two-thirds that of an electron; the Aachen search was for quarks with one-third the electronic charge.

The Aachen observers used an array of wire proportional counters capable of measuring the locations and specific ionizations of several particles arriving simultaneously. They saw no definite quarks and from their data they say there could be no more than one quark arriving every half-billion seconds from a 57-degree square of sky on any square centimeter of the detector.

SOLAR PHYSICS

New lines in the corona

Infrared observations of the solar corona taken during the total eclipse of March 7 show strong emission lines at wave lengths never before detected, Drs. Kenneth H. Olsen and Charles R. Anderson of Los Alamos Scientific Laboratory told the meeting of the American Astronomical Society in Boulder, Colo., last week.

The strongest emissions were at 2.744 microns, 1.523 microns and 1.266 microns. The data also seem to show evidence of other new lines, but they are fainter, and Drs. Olsen and Anderson are not willing to claim them yet. They believe the 1.266-micron line comes from sulfur atoms ionized eight times; they have not yet determined what elements produce the others.

ACCELERATORS

First beam at Los Alamos

The first beam of accelerated particles in the Los Alamos Meson Physics Facility was achieved on June 10. The beam reached an energy of 5 million electron volts (MeV) and was a test of the injecting preaccelerator and the first section of the main accelerator. The Los Alamos management expects to run a 100-MeV test within a year. The target date for the machine's full 800-MeV energy is July 4, 1972. When LAMPF is complete, its accelerated protons will be used to make beams of mesons for nuclear physics, and biological and medical research.

PLANETARY ASTRONOMY

Pigeonite in Vesta

The surface composition of the asteroid Vesta is similar to that of the class of meteorites known as basaltic achondrites. So report Drs. Thomas B. McCord and Torrence V. Johnson of the Massachusetts Institute of Technology and John B. Adams of the College of the Virgin Islands in the June 19 SCIENCE.

They made the determination by comparing spectra of sunlight reflected by Vesta with laboratory spectra taken from various terrestrial minerals. It turned out that the spectrum of Vesta best matches that of an iron-calcium-magnesium mixture called pigeonite; certain achondritic meteorites are also rich in this mineral.

The investigators take the finding as evidence that at least some of the meteorites that fall to earth come from the belt of asteroids between Mars and Jupiter.

PARTICLES

No heavy vector mesons

A search for members of the class of particles called vector mesons having masses greater than 1,200 MeV ended unsuccessfully, report Drs. Stanley P. Hayes, Richard L. Imlay, Peter M. Joseph, Alan S. Keizer, James R. Knowles and Peter C. Stein of the Laboratory of Nuclear Studies at Cornell University in PHYSICAL REVIEW LETTERS for June 15.

The existence of heavy vector mesons is predicted by a theory called vector meson dominance, which attempts to link phenomena governed by electromagnetic forces with those governed by the strong nuclear force that holds nuclei together. The theory arose in explanation of what happens when a photon, the particle that carries electromagnetic forces from place to place, collides with a particle whose activity is mainly controlled by the strong force. It proposes that the photon and the vector mesons, which are strong force particles, can change into each other.

One of the theory's predictions is that vector mesons heavier than the three now known (the rho, omega and phi) should exist, but the present experiment is the latest of several unsuccessful attempts to find them.