physical sciences

SELENOGRAPHY

Colored spots

From time to time in recent years some observers have reported seeing colored spots on the surface of the moon. Others have not seen them in spite of systematic surveillance (SN: 11/23, p. 521). One interpretation of these phenomena, if they exist, is that they are leakages of gas that come through the lunar surface from some reservoir in the moon's interior.

Dr. N. A. Kozyrev of the Pulkhovo Observatory in the Soviet Union reports that he observed and studied the spectrum of such a spot in the crater Aristarchus on April 1 and following days.

The spectrum, which was obtained with the 50-inch reflecting telescope of the Crimean Astrophysical Observatory, can be identified, says Dr. Kozyrev, with the molecular spectra of cyanogen and molecular nitrogen, which could indicate their presence.

PARTICLE PHYSICS

New resonance

Resonances are unstable particles with extremely short lifetimes. In the last decade or so several dozen have been discovered. Many of these are so-called baryon resonances, which are related to neutrons and protons and act as if they were heavy, energetically excited versions of them.

Confirmation of a new baryon resonance is reported in the May 5 PHYSICAL REVIEW LETTERS by Drs. Alberto Benvenuti and Erwin Marquit of the University of Minnesota and Frank Oppenheimer of the University of Colorado. A European group had reported the possibility of a resonance with a mass of about 1,650 million electron volts divided by the speed of light (MeV/c), the unit of mass that particle physicists like to use. Study of bubble chamber pictures from Lawrence Radiation Laboratory convinces Drs. Benvenuti, Marquit and Oppenheimer that such a particle does indeed exist and that its mass is actually 1,640 MeV/c, close to the European result.

COSMOLOGY

More from both sides

For some years now controversy has simmered over the meaning of the cosmic background radio signals that have been discovered at a wide range of wavelengths from one meter to a few tenths of a centimeter (SN: 6/15, p. 575).

The question is whether it represents a cosmic blackbody and therefore supports a big-bang cosmology, or whether it has some other origin and leaves an opening for rival steady-state theories.

In the latest contributions Drs. A. M. Wolfe and G. R. Burbidge of the University of California, San Diego, argue the steady-state side and Dr. A. D. Payne of the University of Tasmania in Australia argues the big-bang side.

Drs. Wolfe and Burbidge set out to see whether the background signal could be the sum of a large number of discrete sources rather than a universal blackbody. They report in the April ASTROPHYSICAL JOURNAL that calculation shows this is indeed possible for a number of current models of the universe, including both steady state and big bang. Furthermore, they say, only observations in the hundredth-centimeter range, which could need airborne equipment, are likely to distinguish among the models.

Dr. Payne reports, in the AUSTRALIAN JOURNAL OF PHYSICS for February, that his calculations rule out a steady-state theory and that only an expanding universe filled with blackbody radiation will do.

GALACTIC ASTRONOMY

Magnetic field

In recent months there have been several attempts to measure the magnetic field that appears to permeate the Milky Way galaxy, and some success has been reported (SN: 9/21, p. 282).

The latest contribution comes from the Owens Valley Radio Observatory of California Institute of Technology. The measurement was done by Drs. R. D. Ekers, A. T. Moffet and G. A. Seielstad of Owens Valley and Dr. James Lequeux, a visitor from the Observatoire de Meudon in France.

They determined the magnetic field strength from its effect on the polarization of radio signals from the pulsar PSR 0833—45, and they report, in the April ASTROPHYSICAL JOURNAL LETTERS, a strength of 0.73 microgauss for the longitudinal field along the inner face of the Orion arm, one of the galaxy's spiral arms. Earth's field is about 500,000 microgauss.

The only previous direct measurement gave figures between 10 and 20 microgauss, but the Owens Valley astronomers feel their results "probably better represent the typical interstellar field. . . ." The previous work depended on processes taking place in dense hydrogen clouds, where conditions may not represent the interstellar average, they say.

PARTICLE PHYSICS

Double storage ring in Germany

Preparations have begun for construction of an electron-positron double storage ring at the Deutsches Elektronen-Synchrontron (DESY) near Hamburg. Ground breaking is expected in the fall, and construction will take about four years.

Storage rings circulate beams of accelerated particles and then clash them together. In this way much more of the energy supplied by the accelerator can be put into interactions of interest to physicists than can be done by colliding moving beams with stationary targets (SN: 7/13, p. 42).

The German rings will take particles accelerated by DESY to three billion electron volts energy. When these are collided the effect will be the same as striking a stationary target with a beam at 36,000 billion electron volts.

The DESY installation will be unique in having separate rings for electrons and positrons. In other existing or planned facilities of the sort, the two types of particle are stored one above the other in a single ring.