astronomy

PLANETARY ASTRONOMY

Jupiter's spot and the sun

Jupiter's Red Spot is more likely to be connected with solar wind particles than with ultraviolet radiation from the sun, as had been suggested (SN: 7/20, p. 59).

So says, Dr. T. Scott Smith of Goddard Space Flight Center in Greenbelt, Md., in NATURE for July 27. He points out that the brightness variation of the Red Spot has two maxima for every single maximum of the sunspot count. Solar proton flares likewise have two maxima per sunspot maximum. Since it is already known that solar proton flares have important terrestrial effects, Dr. Smith reasons that they "may be a more relevant aspect of solar activity to associate with Jupiter's spot than the ultraviolet radiation. . . ."

SOLAR SYSTEM

Meteoroids near the moon

The density of meteoroids near the moon is about half that near the earth, according to lunar orbiter data.

Over the last 17 months five satellites have collected data on the rate of penetration of 0.025-millimeter beryllium-copper sheets by meteoroids. Each experiment carried 20 detectors.

The spacecraft were in both polar and equatorial orbits with respect to the moon. Altitudes—from the moon—ranged between 30 and 6,200 kilometers.

The data indicate that the rate of penetration near the moon is half that near the earth, report Drs. C. A. Gurtler and Gary W. Grew of the space agency's Langley Research Center in Hampton, Va., in the Aug. 2 SCIENCE —0.16 punctures per square meter per day at the moon to 0.33 near earth.

SPECTRAL PHYSICS

Hydroxyl spectrum

The clouds of hydroxyl radicals, hydrogen-oxygen molecules, that were discovered in interstellar space in 1963 (see p. 167) have been a puzzle to astrophysicists because the radiation they put out is unlikely without an outside energy source.

Both maser action, and energy supplied by the chemical process of combining the atoms into the molecules, have been suggested as sources. If either of these is true, the hydroxyl clouds should radiate weakly at several radio wavelengths in addition to those that have been detected.

Precise wavelengths of these faint radiation lines and their brightness relative to the strong ones can be determined in the laboratory. On the basis of work done in the past, the 140-foot radiotelescope at Green Bank, W.Va., was used to search for two of the lines. A negative result led to a conclusion that their brightness was less than one or two percent those of the bright lines.

Now Dr. R. L. Poynter of the Jet Propulsion Laboratory, California Institute of Technology, and Dr. R. A. Beaudet of the University of Southern California, report in the July 29 PHYSICAL REVIEW LETTERS new and more accurate determinations of the weak lines, indicating that the lines should be brighter than the Green Bank limit.

INSTRUMENTATION

Soviet orbiting observatory

Data taken by a Soviet satellite that carried optical telescopes into orbit are now being analyzed, according to a report translated from the June 9 issue of PRAVDA.

The satellite, called Kosmos 215, was fired on April 19 into a 91.1-minute orbit with an apogee of 426 kilometers and a perigee of 261 km.

It carried eight small telescopes with reflex mirrors 70 millimeters in diameter designed to observe hot star radiation in the visible and ultraviolet parts of the spectrum, an X-ray telescope for the region between 0.5 and 5 angstroms wavelength, and two photometers to record solar radiation dispersed in the upper atmosphere.

The first United States attempt to put optical telescopes into orbit suffered a battery failure. The next is scheduled for sometime this fall.

COSMIC RAYS

High energy puzzle

Analysis of a cosmic ray shower from a primary proton of 5×10^{19} electron volts energy and comparison with other events in this energy range has led a group of observers at Leeds University in England to suggest that there may be more protons in this energy range than theory would like to have.

Drs. A. C. Evans, R. J. O. Reid, R. M. Tennent, A. A. Watson and J. G. Wilson report in the July 27 NATURE that the three such events seen by them and another group of observers over the last few years are 10 times what theory predicts for the area of their detectors in the time they have been looking.

Protons of this energy are linked by theory to the supposed cosmic blackbody radiation (SN: 6/15, p.575). The radiation should react with high energy protons to produce pi mesons and thus reduce their numbers drastically compared with protons of lower energy.

If the number of high energy protons is truly so great and if the radio background is really blackbody, then the source of the protons has to be much closer to the earth than has been believed—less than 10^{20} kilometers according to one calculation.

GALACTIC STRUCTURE

Interstellar magnetic field

While researchers at California Institute of Technology's Jet Propulsion Laboratory are trying to use pulsar signals to measure directly the strength of the interstellar magnetic field (SN: 7/20, p. 59), colleagues at Jodrell Bank in England are using a related, indirect method.

The method used at Jodrell Bank measures the rotation of plane polarized waves caused by magnetically influenced electrons in the interstellar space and in the ionosphere. The contribution of the ionosphere, whose electron density and magnetic field strength are known, is subtracted, and interstellar electron density is estimated. This leads to a value for the interstellar field. The upper limit on this value stands at 2×10^{-7} gauss, in spite of suggestions that it ought to be higher, says Dr. F. G. Smith in the July 27 NATURE.