The Microwave Spectrum of Jupiter. John R. Dickel, Joseph J. Degioanni, and Gary C. Goodman, University of Illinois Observatory, Urbana Ill.—Observations of Jupiter at 2 and 4.5 cm are combined with other published measurements to determine the microwave spectrum of the planet. All of the available data have been normalized to a consistent scale by comparison of the flux densities adopted for the various calibration sources by each worker.

The emission from Jupiter in this part of the spectrum consists of two components: thermal emission from the atmosphere of the planet and synchrotron emission from the Jovian radiation belts. Since the latter is polarized while the former is not, we have separated the two contributions by analyzing the change with wavelength of the degree of polarization of the total radiation. Some published interferometric results have also been used to aid in this separation process.

The results indicate that the synchrotron component decreases with frequency above about 1400 MHz with a spectral index of about $-0.28$. The polarized radiation has a spectral index of $-0.23$, so that the actual degree of polarization of the synchrotron radiation decreases with frequency. This implies that the distribution of particles in the Jovian radiation belts is dependent upon the initial energy. The thermal emission shows a dip near the center of the ammonia band at 24 GHz and then increases toward lower frequencies.

This research was supported in part by the National Science Foundation.

Ne I in the Sun and in RS Ophiuchi. R. D. Dietz and F. Q. Orrall, Institute for Astronomy, University of Hawaii, Honolulu.—A faint emission line at $\lambda 6402$ occasionally appears in bright events in the inner solar corona. Joy (Astrophys. J. 133, 493, 1961) reports an unidentified line at about the same wavelength in the 1958 outburst of RS Ophiuchi. Loop prominences associated with coronal condensations and the nova outburst both show relatively low-excitation “prominence” spectra of H I, He I, Ca II, etc., and high-excitation forbidden “coronal” spectra such as [Fe x], [Fe xiv], and [Ca xv]. The line might thus be either a “prominence” or “coronal” line, but a study of the Sacramento Peak routine coronal spectra suggests that it behaves as a “prominence” line. If it is, it is most probably Ne I $\lambda 6402.246$. A difficulty with this identification is that this would be the only neutral neon line observed in the sun. Qualitatively this is not unreasonable; $\lambda 6402$ is ordinarily the brightest Ne I line observed in early-type stars. If only one line of Ne I were to be present it would be this line, and in our spectrogram the line is near the limit of detectability.

To verify this identification quantitatively, we measured the continuum, $\lambda 6402$ and He I $\lambda 6678$ produced by a discrete feature in a bright loop prominence. An analysis of these intensities based on non-LTE calculations of helium excitation shows that the observed ratio $I(\lambda 6678)/I(\lambda 6402) = 100$ is consistent with the neon identification. The line is thus almost certainly due to Ne I in the sun and probably also in the nova.

This work was supported by the National Aeronautics and Space Administration under grant HGR 12-001-011.

The Drive System for the McDonald Observatory 107-inch Telescope. D. M. Edison, Westinghouse Electric Corporation, Research Laboratories, Pittsburgh, and E. J. Rhodes, Westinghouse Electric Corporation, Sunnyvale.—The drive to be described was designed to meet a very exacting performance specification, and as such possesses several unusual electrical and mechanical features. Advantage is taken of very stiff mechanical arrangement to produce an extremely precise servomechanism having a fast response without a great amount of overshoot.

Factors leading to effective deployment of the system in an automated mode, including computer controlled acquisition and automatic guiding, are discussed in the context of their effect on drive design.

The multiloop control system design and specification was aided by a computer simulation of the drive and mount and performance predictions are compared with experimental results.

Development potential for this type of system is covered, particularly its application to much larger telescopes.

A Theoretical Model for the Interstellar Medium. G. B. Field, D. W. Goldsmith, and H. J. Habing, Astronomy Department, University of California, Berkeley.—Following Pikel’ner (1967) and Spitzer and Tomasko (1968), we studied the thermal properties of the interstellar gas, if this is heated by cosmic rays with kinetic energies less than 100 MeV. In general the gas appears to have two thermally stable phases: one at $T = 1.2 \times 10^6 K$ and one at $T < 300^6 K$. Based on this fundamental property we propose a static model for the interstellar medium. Most of interstellar space is occupied by the hot gas. Due to gravitation in the Z direction, the pressure at $Z = 0$ is larger than the hot gas can accomodate, and about 75% of the gas is condensed into the cool, dense phase to form

© American Astronomical Society • Provided by the NASA Astrophysics Data System