following conditions are found near the orbit of earth; $w \approx 200\text{--}600$ km/sec, and $N_e \approx 0.1\text{--}1/\text{cm}^3$. We obtain no direct information concerning the temperature. A transition region is found near 2 a.u., where the velocities undergo an order of magnitude decrease to velocities ~ 10 km/sec outside.

The transition region occurs where the dynamical pressure of the wind (inside) becomes comparable to the pressure in the interstellar medium (taken as due to a magnetic field of 3γ). Thus, this transition region seems to be the shock transition which enables a supersonic solution to flow smoothly into the interstellar medium. The model is consistent with the simple interpretation of the storage of solar cosmic rays by a disordered magnetic field from $1\frac{1}{2}$ to 5 a.u. The model is also consistent with other facts concerning comets and the night sky Lyman- α observations.

The mean free path for protons found on this model near the orbit of earth (with an assumed temperature of $50\,000^\circ\text{K}$) is about 1 a.u. Hence, one questions the validity of the assumption of isotropy and the use of fluid equations in constructing models of the interplanetary medium. A plasma probe experiment suitable for detecting an anisotropy in the velocity distribution would be most valuable.

NGC 1365. E. M. BURBIDGE, G. R. BURBIDGE, AND K. H. PRENDERGAST, *Yerkes Observatory*.—A number of spectra of the nuclear region of the barred spiral galaxy NGC 1365 (SBb) have been obtained with the nebular spectrograph at McDonald Observatory with the slit set in several different position angles. Except in the outer parts of the nuclear region, in each case the plot of velocity against distance from the center is strictly linear and the slopes were determined by least squares. An earlier study, based on spectra in two orientations only, had suggested that the nuclear region is rotating very fast. Analysis of the slopes of all the spectra shows that motions other than circular rotation alone must be present. A velocity field such that the true velocity vector in the galaxy is an arbitrary linear function of distance from the center will not satisfy the observations.

Collapse Phase of Early Solar Evolution. A. G. W. CAMERON, *Institute for Space Studies, New York*.—When the early protosun has a radius of several hundred astronomical units, the gas atoms should be fully associated in molecular form or condensed on interstellar grains. Normally, during the contraction of the protosun, half the gravitational potential energy released will be radiated from the surface. However, when the temperature becomes

high enough to induce molecular dissociation or atomic ionization, the required energy is obtained at the expense of that which would otherwise be radiated. The dissociation of hydrogen molecules and ionization of hydrogen and helium atoms in the protosun require so much energy that the protosun becomes dynamically unstable against collapse. The instability commences when the protosun has a radius of the order of 100 a.u., and ceases only after the protosun has a radius of the order of that of the orbit of Mercury. The conservation of angular momentum in contraction from an interstellar cloud requires the protosun to become rotationally unstable at the equator when its radius shrinks to about 100 a.u. Hence material must be shed to form a solar nebula during the collapse phase of the contraction. Some details of mass distributions in the resulting nebula corresponding to various auxiliary assumptions will be presented.

Synchrotron Radiation as the Source of the Polarized Decimeter Radiation from Jupiter.

DAVID B. J. CHANG, *California Institute of Technology, Pasadena, California, and Plasma Physics Laboratory, Boeing Scientific Research Laboratories, Seattle, Wash. (present address: University of California at San Diego, La Jolla, California)* AND LEVERETT, DAVIS, JR., *California Institute of Technology, Pasadena, California*.—A detailed study of the synchrotron radiation from a shell of relativistic electrons trapped in a dipole field confirms an earlier suggestion (Davis, L., Jr., and Chang, D. B. J., *J. Geophys. Research* **66**, 2524, 1961) that the degree of polarization observed for the 31 cm radiation from Jupiter (Radhakrishnan, V., and Roberts, J. A., *Phys. Rev. Letters* **4**, 493–494, 1960) can be obtained from such shells provided a large portion of the electrons are in relatively flat helices near the equatorial plane. The over-all polarization and spatial extent of the source do not depend very strongly on the frequency or on the energy distribution of the electrons as long as the electrons radiate efficiently at the frequency of interest. Magnetic containment of relativistic electrons which radiate efficiently at decimeter wavelengths requires magnetic fields of the order of 0.1 to 1 gauss in the emitting region and about 60 times as much at the poles, with electrons of energies in the 5 to 75 Mev range and densities of the order of 10^{-3} to 10^{-2} cm^{-3} . The corresponding time scales compare favorably with those suggested by the observations (Field, G. B., *J. Geophys. Research* **66**, 1395–1405, 1961). The synchrotron model is consistent with the recent observations of Morris (Morris, D., private communication 1961) at 21 cm, which show the source region to have an equatorial dimension somewhat larger than the polar dimension