Spin-Up in the Vela Pulsar: Microscopic Description. GORDON BAYM, DAVID PINES, AND CHRISTOPHER PETHICK, *Department of Physics, University of Illinois, Urbana, Ill.*, AND MALVIN RUDERMAN, *Department of Physics, Columbia University, New York, N. Y.*—We discuss the microscopic basis of the model described in the previous paper. The coupling between the rotation of crust and that of the interior charged particles takes place through the strong magnetic field present in the star, and is characterized by a time on the order of minutes. Distortions of the magnetic field lines, due to relative motion of the crust and interior charges, give rise to Alfvén oscillations, which are in principle observable as periodic modulations of the pulse frequency; the periods are ~ 10–10^3 sec for internal fields between 10^{12} and 10^{10} gauss. The fact that τ_e, the relaxation time describing the mutual friction between the charged particles and neutrons, is on the order of years suggests that the interior of the neutron star is, at least in part, superfluid. If both the interior protons and neutrons are superfluid, the scattering of electrons against the cores of the rotational vortices in the neutron superfluid provides the most important microscopic damping process. Our calculations for this process yield a τ_e on the order of a year, furnishing strong evidence for the superfluidity of both the neutron and proton liquids in the interior. If only the neutrons are superfluid, τ_e is a factor 10^6 smaller.

The Flow Pattern within Solar Granules. JACQUES M. BECKERS, *High Altitude Observatory, Boulder, Colo.*, AND ROGER A. MORRISON, *Air Force Institute of Technology, Dayton, Ohio.*—Narrow-band filtergrams ($\frac{1}{4}$ Å) taken at the Sacramento Peak Observatory simultaneously in the blue and red wings of the Fe I 6569.2 Å line have been examined for systematic horizontal and vertical motions inside the granules. Doppler-shift determinations resulting from the measurement of the intensity differences between the two filtergrams gave the following results:

(a) The vertical, upward, motions are dominant amounting to ~ 0.38 km/sec at the granule center.

(b) The horizontal, outward, motion equals ~ 0.24 km/sec. This is the first time that such a motion has been established. Its existence confirms the concept of a granule as a convection cell.

(c) The vortex motion (rotation of the granule) is below the detection limit of 20 m/sec.

Occultation Observations of the Pleiades. RICHARD A. BERG, *Leander McCormick Observatory, Charlottesville, Va.*—A pulse-counting dual-channel photoelectric photometer was used to record the March 1969 occultations of the Pleiades from McCormick Observatory's 32-inch reflector at the Fan Mountain Station. The observed occultation curves were restored to strip-intensity curves by Scheuer's deconvolution technique. The results of six of these observations are reported here. All stars were studied by Abt *et al.* (1965, *Astrophys. J.* **142**, 1604) for spectroscopic variations, and those below marked with asterisks were shown or confirmed by them to be binary systems. Upper-limit values quoted below for diameters essentially represent mean errors of observation.

BD+23°505 (HD 23288, 5.23, B7 IV) is a double star with separation $0''.0062 \pm 0''.0002$ in scan position angle 247°, $\Delta m = 2.0 \pm 0.2$. The diameter of the primary is $\leqslant 0''.0016$. BD+23°507* (HD 23302, 3.59, B6 III) has an observed diameter of $0''.0030 \pm 0''.0018$ (m.e.), but this value is affected by the presence of the secondary component which is $\leqslant 0''.0025$ distant in scan position angle 108°. The duplicity of BD+24°547* (HD 23338, 4.19, B6 V) is not confirmed by this observation. The separation in position angle 22° must be $\leqslant 0''.0015$; thus the true position angle of the secondary is within 10° of 292°. The near-grazing condition of this occultation permits the lunar slope at the point of disappearance of this star to be found as 4°. BD+23°540* (HD 23642, 6.61, A0 V) likewise is not observed as a double, having an observed diameter of $\leqslant 0''.0021$. BD+23°536 (HD 23629, 6.19, A0 V) has an observed diameter of $0''.0104 \pm 0''.0017$, fully 40 times larger than the blackbody diameter. Deconvolutions do not disclose a distinct secondary component, but do show evidence of peculiar circumstances for this star. For BD +23°541 (HD 23630, 2.77, B7 III) the observed diameter is $\leqslant 0''.0018$, and no evidence of duplicity is seen.

Theoretical Intensities of Fe XIV in the Solar EUV Spectrum. M. BLAHA, *Goddard Space Flight Center, Greenbelt, Md.*—Improved observations of the solar EUV spectrum allow more detailed interpretation of coronal line intensities in terms of temperature and electron density of the emitting region. For this purpose it is necessary to know the behavior of coronal lines in different physical conditions. The coronal emission spectrum is still not well understood partly due to the lack of reliable atomic data. The primary objective of the present study was to find the dependence of line ratios of Fe XIV on electron concentration and temperature by solving the equations of statistical equilibrium for this ion. The following excited configurations have been considered: $3s3p^2$, $3s^23d$, $3p^3$, $3s3p3d$, $3s^24s$, $3s^24p$, $3s^24d$. $3s^24f$. Configuration interaction