Coronal Electrodynamics. MARVIN L. WHITE AND NOEL STONE, *CRZIP, L. G. Hanscom Field.*—The startling difference of the solar corona between sunspot minimum and sunspot maximum can be accounted for by the tremendous changes in the thermal and electrical conductivities of the coronal material caused by the variability of the general solar magnetic field, small as this field may be. The Babcocks of Mount Wilson Observatory are responsible for the observational discovery that the dipole field of the sun dies down and reverses polarity, completing the whole cycle in 23 yr. The solar winds will, of course, distort this dipole field. Theoretical calculations indicate that these dipole lines of force will be distorted into circles of force all tangent to the magnetic axis of the sun at its center in the limiting case of infinite particle emission from the sun.

Intermediate cases are described in terms of the confluent hypergeometric function. But for the limiting case, the magnetic field will fall off with the same dependence on distance as the plasma density, which is not reliably known quantity. Hence, a model of the plasma density dependence is invoked. Using the above theory for the magnetic lines of force and the model for the magnetic intensity the above-mentioned conductivities as well as the fluid viscosity of the solar coronal plasma are computed. The correction due to the presence of even a very small magnetic field is so great that it can easily explain the variations in appearance of the solar corona over the 23-yr cycle.

The rotation of the solar corona caused by fluid viscosity coupled with its computed conductivity and the presence of the general dipole field produces interplanetary current systems, as well as permanent ring current systems. There is a competition between the "frozen-in" effects of hydromagnetics and dynamo effects, the latter depending on a relative motion between the conducting plasma and the lines of force. The three-dimensional dynamo currents have been computed; they indicate that a disk-like coronal electrojet in the solar equatorial plane should exist during sunspot minimum, and this can be observed (in cross section) on all coronal photographs we have seen.

Stellar Photometry from B8 to M7 in the 8–14 μ Window. ROBERT L. WILDEY AND BRUCE C. MURRAY, *California Institute of Technology.*—A photometer employing a liquid-hydrogen-cooled mercury-doped germanium photoconductor whose spectral response is limited to the 8–14 μ region by a low-pass interference filter and a BaF₂ window coupled with the cell's threshold wavelength has been placed

at the east arm Cassegrain focus of the 200-inch Hale telescope.

Twenty-five stars have been measured. The earliest star for which two measurements have been obtained is the B8Ia star β Orionis. The latest star is the M7e star χ Cygni. The brightest star, 1.37×10^{-14} W/cm², is α Orionis. The carbon star DS Peg was also measured. In a two-color diagram formed with B and V there is an intrinsic increase in dispersion going to later type stars and a systematic trend away from the blackbody relation. This may be due to increasing and variable amounts of interstellar reddening as one goes to later type stars, *only* if the interstellar absorption at 10 μ is not negligible compared to that in the visual. It can also be due to intrinsic departures from homogeneity in the group with respect to age, as one goes to later types, whose influence is caused by increasing departures from blackbody conditions. The ratios of the stellar fluxes to those expected from blackbodies of the published stellar effective-temperatures and angular diameters are not far from 1. A systematic trend exhibited may not be real because of the assumptions involved in interferometric diameter determinations. DS Peg does not appear peculiar in the two-color plots, but χ Cygni falls on the opposite side of the blackbody curve ("blue excess") compared with most of the late-type stars.

Acceleration of Interplanetary Grains. STANLEY P. WYATT, JR., *University of Illinois Observatory.*—As is well known, the repulsive force of solar radiation pressure and the gravitational attractive force are significantly competitive for small interplanetary particles. For a homogeneous sphere of radius s and density ρ the ratio of the accelerations, radiation pressure to gravitation, is $5.7 \times 10^{-5}/\rho s$. An additional repulsive force that can achieve importance is that of the solar wind. Let the outbound solar plasma at any moment be characterized by a number density n of protons and electrons each, a kinetic temperature T , and a radial velocity v . For v of order 300 km/sec and T in the range 10^5 to 10^6 °K, the momentum of the electrons is largely thermal and that of the protons comes chiefly from the wind velocity. Because of their higher mobility the electrons impact more frequently and the grain rapidly acquires an equilibrium negative charge. Thereafter the capture cross section of the grain is much reduced for solar electrons and increased by a small factor for solar protons. The solar wind interacts with the grain in two ways. First, the direct bombardment of the grain by solar protons has a strength compared with solar radiation pressure that is approximately twice the ratio of the mo-