Recent observations of globular clusters in M31 by Kron and Mayall and the revision of the absolute magnitudes of RR Lyrae stars by Eggen, Hoyle, and Sandage suggest that Sandage's distance moduli for members of the local group are possibly too large. If this is the case then the Hubble constant is probably slightly larger than 100 km/sec/Mpc.

Transition Probabilities and Collisional Cross Sections for Ultraviolet Lines. CARLOS M. VARSANSKY, *Department of Physics, University of Colorado*.—With the advent of rocket-borne and satellite-borne spectrographs it is becoming possible to study celestial objects in the hitherto inaccessible ultraviolet. The spectroscopic analysis will require the knowledge of the basic atomic parameters of the lines observed. To satisfy this need, a program for the computation of these parameters has been started at the University of Colorado. The nuclear-charge expansion method of Layzer and Varsavsky has been applied to the computation of the electric dipole matrix elements for many lines of interest. The method is particularly suitable for the treatment of a particular transition along an isoelectronic sequence. In a forthcoming publication we shall present the numerical results obtained for typical allowed transitions in the isoelectronic sequences from helium through chlorine (except neon), together with a detailed account of the mechanics of the method that will enable other investigators to calculate the matrix elements for any other transition of interest. The matrix elements for electric dipole transitions are easily related to optical transition probabilities and total excitation cross sections by electronic impact. In the first case we must make some assumptions about the coupling of the angular momenta. Our tables are based on the L-S coupling scheme. In the case of total cross sections, a simple relationship is obtained if we can make use of the Born approximation, and if the transition is optically allowed; these restrictions reduce, of course, the scope of the tables but allow the treatment of many transitions of interest in the solar corona. An attempt is made to evaluate our method by comparison with the available experimental and theoretical data. In the few cases where such data exist the agreement is satisfactory.

The Variable K Line of 73 Draconis. WILLIAM H. WEHLAU, *University of Western Ontario*.—Six spectrograms from the Dominion Astrophysical Observatory at 4.5 Å/mm are being used to study the variable spectrum of 73 Draconis. The *Eu*II, *Sr*II, and *Ti*II lines vary in phase. At *Eu*II minimum, the *Ca* II line at 3933Å is sharp and weak (equivalent width about 0.2Å) for the spectral type, A2p. At *Eu* II maximum a broad, shallow *Ca* II line is present. It is about 5 Å wide at half-intensity, with a central depth of about 0.3. This broad line appears to vary in phase with the other variable lines mentioned; all of them show a longer minimum than maximum intensity. If a correction for a depression of the continuum by the broad K line is applied, the equivalent width of the sharp component remains constant during the period of spectrum variability.

An Infrared Survey of the Magellanic Clouds. I. Four Regions in the Large Cloud. B. WESTERLUND, *Uppsala Southern Station, Mt. Stromlo Observatory*.—Infrared magnitudes and red minus infrared color indices have been measured for 303 stars in four regions of the Large Magellanic Cloud. The regions are: A, the surroundings of 30 Doradus; B, the Bar; C, the region between 30 Doradus and Shapley's Constellation III; and D, Constellation III. Two hundred and twenty-five stars have been classified as MO or later in the Case system; 9 stars appear to have an intensity distribution similar to that of carbon stars. Thirty red variables have been found. The infrared absolute magnitudes are found to be -8.2 mag for supergiants of class M1 and -8.6 mag for those of class M2 using a distance modulus of 19.0 mag for the Large Cloud. The corresponding intrinsic colors are $(R-I)_0 = +1.13$ mag and $+1.33$ mag, respectively. The infrared absolute magni-

tudes of the giants of classes M4–M6.5 in the Bar appear to be somewhat brighter than -6 mag. The standard deviations of the individual values are ± 0.5 mag for the absolute magnitudes of the supergiants and ± 0.13 mag for their colors. The M supergiants are most numerous in the region of 30 Doradus but exist in all four areas. They are often situated in or near groups of blue stars but they avoid the regions richest in gas. Interstellar dust has been found in parts of the 30 Doradus region, Constellation III, and the Bar. The maximum absorption measured amounts to $A_V \sim 1$ mag. The luminosity of the late M stars in the Bar appears to place these stars among the red giants of population II. Eight of the nine possible carbon stars have been found in the Bar. Their mean infrared absolute magnitude is -5.7 mag. Confirmation of the classes of these stars is most desirable. The survey is being carried out on plates taken with the 20/26-in. Schmidt telescope at Uppsala Southern Station.

Theoretical Study of the Solar Lyman-Alpha Profile. K. G. WIDING AND D. C. MORTON, *U. S. Naval Research Laboratory, Washington, D.C.*—An attempt is made to find a theoretical profile of the solar Lyman-alpha line to account for the one observed with a rocket-borne spectrograph by J. D. Purcell and R. Tousey on July 21, 1959. The emission line and the shallow central reversal are assumed to be formed in the chromosphere, while the deep central absorption is supposed to be formed outside the sun. The analysis is based on the chromospheric theories of Jeffries and Thomas which combine solutions of the statistical equilibrium equation and the transfer equation, without requiring thermodynamic equilibrium. It is assumed that the absorption coefficient has a Doppler profile and that the line is formed by completely noncoherent scattering. As a first approximation, the region of line formation is taken to be isothermal. The depth of the central reversal and the width between the maxima are reproduced by an electron temperature of 1.3×10^6 K and a total number of ground-state hydrogen atoms of 3×10^{14} cm $^{-2}$. However the predicted wings drop much more steeply than the observed ones. For an electron density of 10^{10} cm $^{-3}$ the predicted central intensity is 4.4×10^{-8} erg sec $^{-1}$ cm $^{-2}$ sr $^{-1}$ cps $^{-1}$ which agrees with the value of 3×10^{-8} deduced from the observed profile and measurements of the total Lyman-alpha intensity made during the flight. For a second approximation we represent the Planck function by

$$B_\nu(T_e) = S_1(1 + Ae^{-c\tau_0}),$$

where τ_0 is the optical depth at the center of the line. We neglect the radiative-excitation term relative to the collisional-excitation term. A profile with a central reversal similar to the observed one is obtained for a c of 0.15 and any A between 10^4 and 10^{10} . The profile differs little from the one given by the isothermal model, and again the predicted wings drop far too steeply. The central intensity, for an electron density of 10^{10} cm $^{-3}$, is 2.1×10^{-7} erg sec $^{-1}$ cm $^{-2}$ sr $^{-1}$ cps $^{-1}$, too large by an order of magnitude. Lowering the electron density to 10^9 cm $^{-3}$ will give agreement with the observations.

On the Evolution of Close Binary Systems. FRANK BRADSHAW WOOD, *Flower and Cook Observatory, University of Pennsylvania*.—Three problems in the study of close binaries are large ranges in mass ratios, many departures from the mass-luminosity relation, and the fact that when one component fills the Jacobian limiting surface, this is usually the less massive component. Efforts to explain these by large scale mass transfer have not shown how this can be done without disturbing the equilibrium. A protostar with two condensation centers will become a binary. Recent work on the evolution of single stars suggests that the contraction centers probably have a higher initial condensation of dust to gas than the medium from which they are condensing, and later will attract the gas which comprises most of the star. In the case of a close binary, these centers will compete for the gas (chiefly hydrogen) in the medium from which the stars form. If one center