Astronomical Surface Photometry by Numerical Mapping Techniques. WILLIAM B. JONES, D. L. OBITS, R. M. GALLET, AND G. DE VAUCOULEURS, *Institute of Telecommunication Sciences and Aeronomy (ESSA), Boulder and The University of Texas*.—The numerical mapping techniques of Jones and Gallet (*ITU Telecomm.* **27**, 260, 1960; **29**, 129, 1962; **32**, 18, 1965) have been adapted to the solution of astronomical problems involving photographic surface photometry. An application was made to the mapping of luminosity distribution in galaxies by means of the "GALAXY 2" program developed by Obits. Other possible applications to optical (and radio) astronomy include mapping of specific intensity (flux density), color (spectral index), polarization, magnetic and velocity fields, star (source) counts, contrast enhancement and noise reduction.

A detailed description of the mathematical methods of analysis and data reduction, and of the computer program will appear shortly in *Publications of the Department of Astronomy of the University of Texas*, Ser. II, No. 8.

An automatic, digitized, two-coordinate microdensitometer specially designed to provide the input for the mapping program will be placed in operation in Austin in the near future.

Chemical Identification of Interstellar Dust. F. M. JOHNSON, *Electro-Optical Systems, Inc., Pasadena*.—Experimental results are presented correlating the observed diffuse interstellar bands with low-temperature laboratory spectra. The bands can be identified with electronic-vibronic transitions. The diffuse lines arise from absorption *within* the interstellar grains. A good fit can be obtained both as to intensity and wavelength for the strongest of the interstellar lines. Two groups of hydrocarbons are considered candidates for the dust particles: (1) the carotenoids and (2) the porphyrins. In the former the absorption is associated with the conjugated system of ethylenic linkages, a typical member of the group being carotene. In the latter, an extensive search has revealed a number of porphyrins a typical one being chlorophyll whose absorption bands lie close to the diffuse lines.

Energy levels can now be constructed and the lines assigned to (a) vibronic transitions, (b) small chemical variations of the basic compounds. Cosmological implications relating to the chemical identification of the interstellar dust are discussed, as well as the chemistry, physics, and associated phenomena of the identified complex hydrocarbon dust compounds.

This work was supported in part by NASA under contract No. NASW-1450.

Central Star Temperatures of Planetary Nebulae by Stoy's Method. JAMES B. KALER, *University of Illinois Observatory*.—Temperatures of the exciting stars of nine planetary nebulae and the Orion Nebula have been calculated by incorporating the effects of helium absorption and fine structure cooling into Stoy's method (Aller, *Gaseous Nebulae*, p. 221). This method uses the ratio of the total energy radiated in the forbidden lines to the number of hydrogen Balmer photons to arrive at ultraviolet blackbody temperatures for the exciting stars.

The major problem of the method is that one must add into the observed sum of the forbidden line intensities the energy radiated as a result of the excitation of the fine structure levels of the ground term of various ions, particularly O^{2+} , O^{3+} , Ne^+ , Ne^{2+} and Ne^{4+} , whose lines lie in the far infrared. For this purpose the cooling rates calculated by Burbidge, Gould, and Pottasch (*Astrophys. J.* **138**, 945, 1963), as modified by the collision cross sections and collisional deexcitation rates of Osterbrock (*Astrophys. J.* **142**, 1423, 1965) are used. The correction is small for low excitation planetaries (4% for IC 418), but quite high for high excitation nebulae (130% for NGC 7027). Nevertheless, the resultant temperatures are in good agreement with those of Harman and Seaton (*Monthly Notices Roy. Astron. Soc.* **132**, 15, 1966), who used the Zanstra method. For example, for NGC 7662 and NGC 6572 the modified Stoy method gives 104 000°K and 64 000°K, respectively, whereas Harman and Seaton calculate 100 000°K and 62 000°K.

The chief advantage of the above method is that the central star does not have to be observed. Consequently, temperatures are measured for NGC 7027 (135 000°K), NGC 2440 (110 000°K), and IC 4997 (53 000°K) none of which have an observable central star.

In addition, temperatures are obtained for NGC 3242 (82 000°K), NGC 7009 (70 000°K), IC 418 (36 000°K), VV 267 (84 000°K) and the Orion Nebula (40 000°K). The chief exciting star of the latter is ϑ^1 Ori C, classified as O6, which has an effective temperature of about 36 000°K. The temperatures derived are very insensitive to the exact model nebula assumed and show a good correlation with nebular ionization level.

Multicolor Photometry of Supergiants. THOMAS KELSALL, *Goddard Space Flight Center*.—Photoelectric observations of about 125 A0Ib-K5Ib stars have been obtained using the 16-in. telescopes at Kitt Peak National Observatory. The photometric system is the composite one used by Crawford (*Astron. J.* **66**, 281, 1961) on giant stars. The system is composed of the four filters, *wby*, of Stromgren's system, and the three filters, *abc*, of Crawford's system. The *abc* filters define two-color indices