Galactic Structure from Photoelectric Distances of Early-Type Stars. ARTHUR BEER, *Cambridge Observatories, Sproul Observatory*.—An analysis is presented of 3080 direct observations of the integrated light of the H_γ region in 435 stars of types O and B in the northern sky and brighter than $7^m.5$. Two independent and consistent series of measurements were obtained, in 1960 and 1961, with the narrow-band spectrometer attached to the 36-inch reflector ($f/18$ coudé focus) of the Observatories, Cambridge, England. Using the pulse-counting method and two photomultipliers fed by appropriate windows in the focal-plane diaphragm of the grating, simultaneous readings were recorded of the intensity A due to the light through the H_γ window at $\lambda\lambda 4325-4357$, as well as of the total intensity B due to two comparison windows placed at $\lambda\lambda 4255-4289$ and $\lambda\lambda 4399-4427$. At least two successive one-minute counts S per star were made in each of its nights, followed after about every third star by counts L of a standard lamp. The quotients $S(B)/L(B)$ over $S(A)/L(A)$ gave the final H_γ ratios R . On the average, each star was covered by 7.1 observations; each of these took an over-all telescope time of 7.4 min, inclusive of the lamp measurements spaced in the mean by 22.8 min.

The program included 130 standard stars whose known absolute magnitudes were adopted for the present calibration, as a result of discussions by R. W. Petrie, Victoria 1953, by I. M. Kopylov, Crimea 1958, and by U. Sinnerstad, Stockholm 1961. The error of the mean of all the R values per star is $\pm 0.65\%$, corresponding to $\pm 0^m.1$ in absolute magnitude; and this, together with the intrinsic scatter within the whole of the calibration stars, leads to an estimated total error in luminosity of the order of about ± 0.3 mag.

Using measured color excesses to allow for interstellar absorption, the calibrated R values provide some three hundred new B-star distances. Their mapping with respect to the 21-cm $H\text{ I}$ pattern of the Milky Way amplifies the author's conclusions from his recent equivalent-width measurements on some 420 spectrograms of 137 southern stars (Beer, A. *Monthly Notices Roy. Astron. Soc.* **123**, 191, 1961). New evidence is discussed, based on a close relationship between R and the MK luminosity system, comparisons with the concept of equivalent width, and the spatial distribution of clusters, associations, and $H\text{ II}$ regions. The over-all picture has been correlated with proposed features of galactic structure and Milky Way arms.

There are clearly great potentialities in further developments of this rapid observational method, particularly in view of the suggested large-scale applications to faint stars (e.g., by extending the counting time to several minutes), and it might well replace

methods of detailed equivalent-width measurements by its speed, accuracy, and scope.

Steady-State Space Distribution of Meteoric Particles under the Operation of the Poynting-Robertson Effect. ROBERT E. BRIGGS, *Smithsonian Astrophysical Observatory*.—Orbits obtained from a random sample of photographic meteors are used to construct a distribution function for the number of meteoric particles continuously injected into the solar system. The Poynting-Robertson effect is then introduced with the result that every particle must ultimately be destroyed by a close approach to the sun. The resulting steady-state distribution of orbits is derived, and from it relative values of the space density of particles are computed at many points in the solar system. Absolute values of the space density are determined by comparison of zodiacal-light observations with the theoretical apparent brightness of the system of particles due to scattered sunlight. Brighter portions of the zodiacal light are well reproduced with either of the two scattering laws used. Both laws include a diffraction term; one law also produces a gegenschein effect. Numerical results at the earth's distance are found to be in substantial agreement with recent density estimates by Ingham.

21-cm Hydrogen Observations of the Central Region of the Galaxy. B. F. BURKE AND M. A. TUVE, *Department of Terrestrial Magnetism, Carnegie Institution of Washington*.—The 21-cm hydrogen emission has been studied along the galactic plane from longitude $l=301^\circ$ to $l=330^\circ$. The observations were made using the Carnegie 54-channel spectrograph and 60-foot dish at Derwood, Maryland. Cross sections were made through the galactic plane every 2° of longitude over the entire sector, and every half-degree of longitude in the vicinity of the galactic center. In the regions where we overlap the observations taken at Dwingeloo by Oort and Rougoor, the agreement appears to be excellent.

The "3.5-kpc expanding arm" described by Oort and Rougoor has been analyzed in detail, and followed to more southern longitudes than was possible at Dwingeloo. This feature continues to be prominent until it merges with the background of galactic hydrogen at the most southern longitudes. The observed velocities can be represented by a uniformly rotating and expanding arc for only about 10° of longitude toward the southern side of the galactic center. Regularities then appear which cause difficulties for this simple model.

In addition, starting at about $l=320^\circ$, other features appear at negative velocities which can be