progressing cosine curve over the full cycle of light variation. A physical interpretation of these differences is discussed.

All the observations were then used to determine the orbital elements of the system.

Galactic Distribution of Supergiants. WILLIAM BUSCOMBE, *Mount Stromlo Observatory*.—A summary of photometric and spectroscopic data for stars later than class B5 and more luminous than absolute visual magnitude -4 has been compiled in *Mount Stromlo Mimeogram* No. 8. Included are the HD number with other designations for nearly 1000 stars, with radial velocity (available for 50% of entries), visual magnitude, spectral classification on the MK system (or for Cepheids the period of pulsation), the assumed absolute magnitude, the color excess from multicolor photoelectric photometry, and an estimate of distance (again for just 50% of the stars).

Variable stars believed to be associated with the halo population (such as RV Tauri, semiregular and some Cepheids) are specifically excluded, usually because the available data are too incomplete to present statistics on a comparable basis.

Although the incompleteness of detection of non-variable supergiants even to 9th magnitude, and of Cepheids to 13th magnitude, vary considerably over the sky, the distribution with galactic longitude is given. Broad frequency minima in all spectral types are noted at 215° and 332° , and narrower ones at 35° , 95° , 153° , 256° , and 272° .

L^{II}	B6-B9	A	F	G	K	M	Cep.
0-60	8	8	19	16	4	1	63
60 120	28	59	36	23	24	6	89
120 180	35	43	17	11	18	17	58
180 240	9	15	12	11	6	6	55
240 300	4	13	30	9	8	11	122
300 360	4	4	7	4	2	1	62

Grateful acknowledgment is made to the hospitality of Professor J. Landi Dessy at Cordoba, where most of the literature search was carried out. Mrs. E. R. Wilkie has given valuable assistance in arranging the list of stars.

Study of Venus by cw Radar—Results of the 1964 Conjunction. ROLAND L. CARPENTER (introduced by George O. Abell), *Jet Propulsion Laboratory and University of California, Los Angeles*.—Between February and August 1964, when Venus was closest to the earth, radar observations were made on a nearly daily basis at the NASA/JPL Deep Space Instrumentation Facility at Goldstone, Cali-

fornia. The antenna was 85 ft in diameter, the transmitter power was 100 kW, and the system noise temperature was approximately 35°K . One of the experiments undertaken was to obtain high-resolution spectra of the reflection from Venus of a single radio frequency of 2388 Mcps ($\lambda=12.5$ cm), commonly referred to as a cw or continuous wave signal. The reflectivity found from these spectra was 0.115 ± 0.01 . Measurements of the bandwidth of the spectra have confirmed the conclusions, based on the 1962 radar observations, that Venus rotates retrograde and that its axis is nearly perpendicular to its orbit. At the time of the writing of this abstract, the analysis of the bandwidth data indicates a sidereal period of 249 ± 6 days with the spin axis pointing toward $\alpha=76^\circ\pm44^\circ$, $\delta=-67^\circ\pm4^\circ$. This indicates that the axis is probably within 20° of the orbit pole. The 1964 observations also substantiated the existence of features on the spectra that moved slowly with time. The evidence indicates that these features are caused by different physiographic areas on Venus' surface. With the rotation found from the 1964 bandwidth data, a search was made to determine whether or not the feature seen in 1962 could be identified with one of the 1964 features. A tentative identification has been made, and it appears that this may lead to a more accurate rotation period. We have also obtained depolarized spectra. The depolarized reflectivity was 0.0066 ± 0.005 indicating that the reflected signal from Venus was approximately 89% polarized. The reflections from near the limb were found to be approximately 50% polarized. The depolarized spectra also show features that correlate with the matched polarization spectra. The features are very pronounced and show the same motion as the features on the matched polarization spectra. A study of both the matched and depolarized spectra should lead to one of the first radar maps of the equatorial regions of Venus.

Presupernova Models. H.-Y. CHIU AND E. E. SALPETER, *Goddard Institute for Space Studies and Cornell University*.—When $T>10^9$ °K the evolution of stars is dominated by neutrino emission processes. Photon processes play very little part in determining the structure and the evolution of the core of such stars (H.-Y. Chiu, *Ann. Phys.* **16**, 321, 1961). Recently we have obtained a series of evolutionary stellar models with an initial central temperature $T\cong10^9$ °K. One result showed that the homology hypothesis (one of the conclusions of this hypothesis is that the central density ρ is roughly proportional to T^3) completely fails in such cases. A neutrino star (whose "neutrino luminosity" is many orders of magnitude higher than the maximum allowable optical luminosity of a star) tends to develop a dense de-