Comparison of Radio and Optical Radial Velocity Data in the Vicinity of the Sun. V. RUBIN, *Georgetown University Observatory*, J. BURLEY, *Goddard Space Flight Center and Georgetown University Observatory*, A. KIASATPOOR, B. KLOCK, G. PEASE, E. RUTSCHEIDT, AND C. SMITH, *Georgetown University Observatory*.—To determine whether the stars and the gas within 3 kpc of the sun share the same motions, the radial velocities of 1461 O-B5 stars, $|b^{\text{II}}| < 11^\circ$, $r < 3.0$ kpc, have been investigated by methods which approximate the procedures used in analyzing the 21-cm observations of neutral hydrogen. The radial velocities come principally from Wilson's catalogue and observations of Feast and Thackeray. For 896 stars, absolute magnitudes M from MK classifications or from Petrie, and $B-V$ colors (or colors which could be converted to $B-V$) are available. Of the remaining, 156 stars have known values of M , but no absorption; 177 have absorption measures, but no M ; and 232 have neither. These latter stars are sufficiently bright so that it can be shown that they are within 3 kpc of the sun.

The stars in the sample were divided into 5° zones by longitude. In each zone a plot of the frequency distribution in radial velocity results in a curve which can be compared with the corresponding 21-cm curve, modified to include only radiation from within 3 kpc of the sun. Although for many zones the stellar curve is similar to the hydrogen curve, the spread in radial velocity is often larger than that predicted by the Oort model. The region $190^\circ < l^{\text{II}} < 280^\circ$ exhibits an excess of negative radial velocities, even after the application of a $+10$ km/sec correction to the Lick radial velocities (Feast and Thackeray, *Monthly Notices Roy. Astron. Soc.* **118**, 1958). Deviations from circular motion and random velocities larger than the random gas velocities must exist.

Galactic Space Motions of O-B5 Stars within 3 kpc of the Sun. V. RUBIN, *Georgetown University Observatory*, J. BURLEY, *Goddard Space Flight Center and Georgetown University Observatory*, A. KIASATPOOR, B. KLOCK, G. PEASE, E. RUTSCHEIDT, AND C. SMITH, *Georgetown University Observatory*.—In the catalogue of O-B5 stars described in the preceding abstract, 777 stars have distances sufficiently well determined so that space velocities may be studied as a function of R , distance from the center of the galaxy. From radial velocities and proper motions on the N30 system, cylindrical galactic velocity components Θ , Π , and Z were computed: Θ , in the direction of galactic rotation; Π , radial from the center of the galaxy; and Z , perpendicular to the galactic plane. A mean curve of Θ as a function of R was formed, by weighting each star by the inverse square of its computed

probable error. For $R < 8.0$ kpc the variation is linear, and $\Theta_R - \Theta_\odot$ lies above the radio curve. For $R > 8.0$, the curve is flat. This result is consistent with deviations from a double sine in the radial velocities of O-B5 stars which may be noted in recent studies (see Feast, M. W., and Thackeray, A. D., *Monthly Notices Roy. Astron. Soc.* **118**, 134, 1958).

The corresponding curve in Π indicates that for $R < 7.0$ kpc, stars are receding from the center of the galaxy. Some values of mean $\Theta_R - \Theta_\odot$ and mean Π are given below.

R (kpc)	5.7	7.0	8.2	10.0
$\Theta_R - \Theta_\odot$ km/sec	$+40 \pm 15$	$+15 \pm 5$	0 ± 1	0 ± 5
Π km/sec	$+10 \pm 5$	0 ± 2	-2 ± 1	-5 ± 3

A change in the adopted parameters $R_\odot = 8.2$ kpc, $\Theta_\odot = 215$ km/sec results only in a translation of these curves. The effects of systematic errors ΔM in the calibration of the absolute magnitudes and systematic errors in the proper motion system will alter only the distance scale in the Π vs R curve. The circular velocity Θ_R will be decreased ~ 5 km/sec for all $R < 7.7$ kpc if proper motions on a mean N30 and FK4 system are adopted. For ΔM positive and small, Θ_R will decrease, but the resulting curve will still lie above the radio curve.

Structure of the Lower Atmosphere of Venus. CARL SAGAN, *University of California, Berkeley*.—If the centimeter microwave emission from Venus arises from its surface, the radar reflectivities and microwave brightness temperatures give mean darkside surface temperatures of about 670°K . Extrapolations of the phase data to small phase angles indicate mean brightside surface temperatures of at least 750°K . If the cloudtop pressures and temperatures are known in both hemispheres, the surface pressures and darkside subadiabatic indices can be derived. A re-analysis of the CO_2 absorption bands near 0.8 and 1.6μ and of the Regulus occultation data indicates (1) that the same cloud level, at $T_c \simeq 234^\circ\text{K}$, is responsible for the reflection and emission throughout the visible and infrared, and (2) that the brightside cloudtop pressure is at least as great as the darkside cloudtop pressure, the most probable values being 0.6 atm and 90 mbar, respectively. Even with a small phase effect these cloudtop pressures give surface pressures ~ 50 atm. The darkside lapse rates are substantially subadiabatic, in contradiction to the aeolosphere model. Failure of the Urey equilibrium on Venus results in surface pressures of this order or greater; and similar values are obtained from the atmospheric structure deduced from Spinrad's measurements of the near infrared CO_2 band at $7820 \text{ \AA}$. The altitude