in that the high-velocity carbon stars are found to have low lithium abundances. No correlations with other parameters such as effective temperature have been found.

The simplest explanation of the velocity correlation is in terms of the stellar mass, and the depletion of lithium during contraction to the main sequence by stars of small mass. If this is correct, the presence of lithium in stars that have mixed to great depths and have brought C^{12} and C^{13} to their surfaces sets considerable restraint on the mixing process. Furthermore the very high lithium content of WZ Cas the WX Cyg indicates that post-main-sequence lithium production has taken place.

Model Atmospheres of the Major Planets.

LAURENCE TRAFTON, *Air Force Weapons Laboratory*.—Model atmospheres of the major planets have been constructed by using recently discovered sources for the dominant thermal opacity. These sources are the pressure-induced absorption in molecular hydrogen and the pressure-induced enhancement resulting from the mixing of molecular hydrogen and helium. They are responsible for most of the greenhouse effect observed in the upper atmosphere of each major planet. These model atmospheres are nongray and were constructed in hydrostatic equilibrium. They incorporate a first-order correction to account for convection. The thermal opacity of ammonia does not play a significant role in the atmosphere of any major planet except Jupiter and here, it was found to play a relatively small role. Each planet is represented by several models having different values of the effective temperature and He/H_2 ratio. These quantities were considered as free parameters to be determined by fitting the models to the observations. Most of the models indicate the existence of a tenuous fog or mist overlying a cloud zone.

In the case of the Jovian models, it was necessary to include the $10\text{-}\mu$ band of ammonia in order to explain the observed limb darkening in the 8 to $14\text{-}\mu$ region of the spectrum. It was also necessary to include helium in order to explain the scale height observations. Jovian models which are compatible with all the observations have high effective temperatures indicating that Jupiter has an internal heat source yielding greater than about one-tenth of the incident solar flux. In addition, an upper limit of about two on the He/H_2 ratio is implied by the Jovian models.

Unstable Spectrum of 10 Lacertae. ANNE B. UNDERHILL AND R. C. P. VAN HELDEN, *Sonnenborgh Observatory*.—The star 10 Lacertae has rather sharp lines which make it a good object for radial-velocity studies. Nevertheless, the published radial-

velocity measurements, whether from high-dispersion spectrograms or from those of moderate dispersion, do not cluster as tightly about a mean value of the velocity as the measuring accuracy would indicate should be the case had this star a constant radial velocity.

Series of spectrograms were obtained with the IM spectrograph of the Dominion Astrophysical Observatory on 17 November and 19 December 1964, each series lasting about 4 h. No exposure time was longer than 10 min and each of the spectrograms was exposed to a fixed count on the exposure meter. Thus all the spectrograms are as identical as possible with regard to density and quality.

The 30 spectrograms have been measured for radial velocity. The results scatter over a range of 10 km/sec, though the probable error of each spectrogram is only ± 2 km/sec. There is no definite indication of a periodic variation of the radial velocity with time.

The appearance of the spectrum appears to change in an erratic manner from spectrogram to spectrogram, that is in a matter of 6 to 8 min. The absorption lines at times appear to be broader than at other times. Occasionally the lines of O II appear to be quite sharp and distinct; at other times they cannot be seen. These changes of spectrum do not appear to be caused by photographic effects nor are they due to malfunction of the spectrograph. Possibly the rather broad profiles ($0.6\text{ \AA}$ wide at half-intensity) which are found on high-resolution spectra are a result of time integration during long exposures over erratic changes such as appear in these spectra.

Galaxy Redshifts from Spectral Scans. G. DE VAUCOULEURS, *McDonald Observatory*.—The scanner at the Cassegrainian focus of the 82-in. reflector (dispersion $13\text{ \AA/mm}$ in second order) has been used to measure radial velocities of galaxies. The entrance slot was usually $16 \times 4\text{ mm} = 2' \times 30''$ giving an effective resolution of about $15\text{ \AA}$ at the matching exit slit; the scan speed was $20\text{ \AA/min}$ with a time constant $\tau \approx 1$ sec and the recorder chart scale was $12\text{ \AA/cm}$. One observation consists of two symmetric scans (increasing and decreasing λ). The wavelength calibration was derived from scans of standard emission lines (mercury arc, nebular lines in M42 and M57, and $\lambda 5577$ of the night airglow).

Preliminary analysis of velocities derived from scans of two stars and seven galaxies gives for the accidental and systematic errors:

Average deviation (km/sec):	Stars		Galaxies	
	(Abs.)	Emission	Absorption	
Internal, accidental: (mean-lines)	± 29	± 30	± 76	
External, accidental: (mean-standard)	± 52	± 55	± 96	
External, systematic: (mean-std.)	-45	$+13$	-13	