rise to synchrotron radio emission throughout the entire radio band. It further appears that jets of electrons are projected downward into regions of higher density in the lower chromosphere where they give rise to x-ray emission by the brehmsstrahlung process. The energy range of the x-radiation is generally consistent with electron energies of about 10^5 – 10^6 ev.

Interpretation of Measurements on Emission Edges in Be Spectra. DEAN B. McLAUGHLIN, *The Observatory, University of Michigan*.—Students of Be spectra differ in their views regarding the apparent shifts of emission lines and their central absorptions (McLaughlin, *Astrophys. J.* **134**, 1015, 1961; Underhill, *ibid.*, p. 1017). In an attempt to resolve this question, the H_β structure was measured on microphotometer tracings of 30 spectrograms of β^1 Monocerotis, covering the full range of V/R variation. These measures were compared with micrometer settings made directly on the spectrograms.

General conclusions are as follows:

(1) The position measured as the edge of a strong emission component on the spectrogram is identified as the steepest gradient of density as recorded on the tracing.

(2) The measured edge of a weak emission component with uniform gentle gradient is near the half-intensity point of the profile.

(3) Assuming that the position of the absorption, as measured on the spectrogram, has been correctly identified on the tracing, the velocities of the emission lines have been obtained. The results confirm the conclusion stated by Merrill (*Astrophys. J.* **116**, 501, 1952): "The emission as a whole shifts in the same direction as the core, but by a smaller amount." Specifically, in β^1 Monocerotis, the amplitude of emission velocity is between 60 and 70% of that of the absorption velocity.

Result (3) disagrees quantitatively with the conclusion drawn from micrometer measures alone. The explanation probably lies in the manner of measuring weak components (2). When an emission is weak, its edge is measured farther out in the fading wing, which tends to increase the apparent amplitude of emission velocity to approximate equality with that of the central absorption.

Period-Luminosity Relation of the RR Lyra Variables. D. H. McNAMARA AND M. ROGERS, *Space Sciences Laboratory of North American Aviation*, AND R. HUERTA, *Brigham Young University*.—Photometric observations of galactic RR Lyra variables (including dwarf Cepheids) in Strömgren's $c-1$ system, along with another parameter K , have been

analyzed for absolute magnitudes, M_v , $B-V$ colors, and K-line strengths. These stars (with the exception of the stars of Bailey type c) are found to obey a period-luminosity relation with a slope of -3.3 in the M_v - $\log P$ plane. The slope -3.3 is consistent with the assumption that the stars obey the $P\sqrt{\rho}=Q$ relation providing they differ very little in mass.

The K-line measures reveal a large variation in the strength of the K line in agreement with Preston's (*Astrophys. J.* **130**, 507, 1959) spectroscopic observations.

Radar Results as Constraints on the Models of Venus. DUANE O. MUHLEMAN, *Harvard College Observatory and The Jet Propulsion Laboratory*.—The three significantly different models of the surface and atmosphere of Venus are apparently unresolvable with existing optical, infrared, and radio data. Briefly, these models may be described as: a CO_2 , N_2 , H_2O atmosphere model, a dust-cloud model, and an ionospheric model. The radar observations around the 1961 inferior conjunction of Venus offer considerable information concerning these models, particularly for the ionospheric model.

The primary data from the radar observations pertinent to this problem are the determinations of the reflectivity at 12.5 and 68 cm of 10–15%, the lack of relative dispersion effects in delay times, the absorptivity at these two frequencies. In particular, the data show that the ion density at Venus must be less than about 5×10^8 cm^{-3} . The required $\int Ne^2 dz$ for the ionospheric model is about 10^{26} cm^{-5} forcing one to postulate a "hole" in the Venusian model over about 67% of the planetary disk around the anti-solar point. Such a structure would introduce phase effects in the disk temperature that are inconsistent with the observations.

The relatively low reflectivity that has been observed in the radar experiments suggests a low dielectric constant (1–5) for the Venusian surface material which is most consistent with the dust model of the surface and atmosphere. However, the radar results strongly supporting the idea of synchronous rotation of Venus weigh against the dust model and tend to support the model containing water vapor and the associated greenhouse explanation of the observed disk temperature.

Center-Limb Effects on Solar Abundances. EDITH A. MÜLLER AND J. PAUL MUTSCHLECHNER (now at U. S. Naval Ordnance Test Station, China Lake, California), *The Observatory, The University of Michigan*.—Several investigators have pointed out that deviations from local thermodynamic equilibrium (LTE) can introduce large differences between the