degrees of linear polarization or atypical dependences of polarization parameters on wavelength.

We propose that depolarization occurs within the sources themselves, the depolarizing medium actually being immersed within the emitting regions.

A Spectroscopic Study of the Ap Star System 112 Herculis. COURTNEY E. SELIGMAN AND L. H. ALLER, *University of California, Los Angeles.*—112 Herculis is a binary system with a period of about 6.36 days. The primary exhibits unusually strong lines of mercury, manganese, and gallium.

Six high-dispersion plates secured with the coudé spectrograph of the 120-in. reflector at Lick Observatory have been used to refine Meyer's orbit (*Lick Obs. Bull.* No. 388, 1927). Two of the plates exhibit lines of the secondary component and have been used to derive relative masses, relative monochromatic luminosities, rotational velocities, and atmospheric abundances.

The system appears to consist of a B8V star and an A5V star. The primary appears to be a synchronous rotator; the secondary may rotate a bit faster.

Magnesium and calcium are underabundant in the primary, suggesting that we are dealing with a metallic-line star. Iron and titanium are probably normal. Chromium and silicon may be underabundant. Phosphorous and manganese are definitely overabundant. Gallium appears to be 10 000 times as abundant as is normal. Aluminum is not observed, and appears to be strongly underabundant. The one mercury line is not usable, because the lower level is metastable.

The secondary abundances appear to be consistent with the assumption that the two stars have the same composition.

On the Effects of Finite Disk Thickness and Gas Content on Spiral Structure. FRANK H. SHU, *Massachusetts Institute of Technology.*—The density wave theory of spiral structure in disk galaxies outlined previously by Lin and Shu (*Astrophys. J.* **140,** 646, 1964; *Proc. Natl. Acad. Sci.* **55,** 229, 1966; *Proc. IAU-URSI, Symp.* No. 31, 1967) is extended to include the effects of finite disk thickness and the presence of a fair amount of interstellar gas.

In the theory based on a model of infinitesimal thickness, there exists a decided discrepancy between the theoretically predicted values of the stellar velocity dispersion required for stability and those actually observed in our own Galaxy. With the consideration of the effect of the finite thickness of the disks of stars and gas, this discrepancy disappears.

The numerical form of the resultant dispersion relation between wave frequency and wavelength for spiral waves does not differ appreciably from that obtained on the basis of the simple theory. The relative participation of gas and stars in the spiral structure of our own Galaxy is found to be about the same in the solar vicinity. In the interior parts, stars will play the more important role.

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Objective-Prism Temperature and Luminosity Classification of M-Type Stars in the Yellow-Red Spectral Region. LEE W. SIMON, *Northwestern University.*—This report describes a classification system for temperature and luminosity, developed by the author in 1964, for the spectra of M-type stars appearing on the plates of the Michigan–Mount Wilson Southern Hα (LHα) Survey. The objective prism spectra, extending from λ5300 to λ6650, having a dispersion of 450 Å/mm at Hα, cover a useful magnitude range down to 11th mag.

Temperature classification is found to depend mainly upon the strength of the TiO bands at λ5847 and λ6159, although the strength of the sodium *D* line provides an additional criterion in the dwarfs.

Luminosity differentiation of dwarfs and giants is dependent upon the sodium *D* line as a negative luminosity indicator, the strength of the CaH λ6385 band in the dwarfs, and the strength in the giants and weakness in the dwarfs of the TiO λλ5847, 6159 bands.

Application of the classification system to 41 standard stars and 61 HDEC stars yielded the correct luminosity class of dwarf or giant and revealed a systematic tendency for the LHα system to classify the HDEC M0 to M4 types one temperature subdivision too late. It is difficult to assign a luminosity class to LHα spectra earlier than K8 or M0.

The LHα plates, covering the southern sky south of −30°, will be surveyed for dwarf M stars.

Effect of Non-LTE on the Radio Recombination Lines of Hydrogen. JANET P. SIMPSON, *University of California, Berkeley.*—H II region models were calculated for (1) the Orion Nebula, (2) a large low-density H II region, (3) a compact H II region, and (4) the Rosette Nebula. The models for Orion have varying temperatures and large density fluctuations; the other models have constant temperature and smoothly varying density. The equation of transfer as given by L. Goldberg (*Astrophys. J.* **144**, 1225, 1966) was used to calculate the brightness temperature of the continuum, T_B, and the line brightness temperature, T_{L+C}, for the transitions 109α, 137β, 158α, 197β, and 225γ. Each line was calculated twice: once with $b_n=1$ and $d \ln b_n/dn=0$ (LTE) and once with the b_n's and