The strength of $\lambda 8446$ blend relative to $\lambda 7774$ suggests that there is probably no Lyman- β emission in the region occupied by oxygen atoms. Although exact times of appearance and disappearance of O I blends was impossible to determine from our limited observations, it appears that both apparitions coincide with predicted times of secondary minimum. It is likely that they arise from a cloud of oxygen gas, probably surrounding the early-type component, which produces absorption when in front of the larger M-type component.

Measurements of radial velocities for these blended O I lines were difficult because of small dispersion and their composite nature, but in the most cases our spectrograms do not indicate strong stream motions for the oxygen atoms. Only in October-November 1944 was there evidence of oxygen outflow at 15 to 20 km/sec.

Population of Atomic Levels by Dielectronic Recombination. LEO GOLDBERG AND ANDREA K. DUPREE, *Harvard College Observatory*.—Under conditions found in H II regions, the populations of excited levels of atoms are determined primarily by the balance between electronic recombination and cascade into the levels and spontaneous transitions out of them. The bare nucleus of a hydrogenic ion can combine only by radiative capture but an ion that has one or more electrons can capture an electron by dielectronic recombination. This process may occur at a much faster rate and with a wholly different dependence on n and l than that of radiative capture. Illustrative calculations have been performed for Ca I in which the levels are assumed to be populated by dielectronic and three-body recombination and cascade, and to be depopulated by spontaneous downward transitions and collisional ionization.

The results show that (1) the capture of electrons by dielectronic recombination can greatly increase the populations of highly excited levels as compared with their equilibrium values; (2) there will be a value of the total quantum number n for which b_n , the ratio of the actual population to that in thermodynamic equilibrium, has a maximum value. This maximum occurs at $n \sim 50$ to 100 for $N_e = 10^4 \text{ cm}^{-3}$ and at $n \sim 100$ to 200 for $N_e = 10^2 \text{ cm}^{-3}$; (3) recombination lines from complex atoms should be found in emission and, with the appropriate conditions, in absorption.

A Stochastic Theory for the Wavelength Dependence of Linear Polarization of Radio Sources. SAMUEL J. GOLDSTEIN, JR., *Leander McCormick Observatory*.—The following model is proposed: The source contains n elementary radiators or cells of

equal power output which have perfect linear polarization independent of frequency. Some cells m have identical polarization angles, while the remaining $n-m$ cells have polarization angles which are independent random variables with a uniform probability density function over the range 0 to 2π . Between each cell and the observer is a medium which produces Faraday rotation of the polarization angles. The Faraday rotations are independent Gaussian random variables with a standard deviation of $R \text{ rad/m}^2$. The fractional polarization is the expected value of the sum of the polarization vectors divided by n , and is given by the formula

$$u(\lambda) = [(2n)^{-1} + m(m-1)n^{-2} \exp(-R^2\lambda^4)]^{\frac{1}{2}},$$

where λ is the wavelength in meters.

The model fits the observations of many radio galaxies and quasi-stellar sources including 3C33, MSH 23-64, 3C196, and Her A; but it fails to fit the observations of Cyg A and Tau A. The source Cyg A has an increase in fractional polarization with wavelength near 1 cm, but the model can give only constant or decreasing fractional polarization with wavelength. Extensions of the model which could describe Cyg A and Tau A seem feasible. The average rotation measure of the source (a measurable quantity) is independent of the fractional polarization in the present theory.

Burn and Sciamia (*Monthly Notices Roy. Astron. Soc.* **133**, 5, 1966) have described a theory based on a Fourier transform relation between the fractional polarization and a function which distributes the radiated power with Faraday depth. (At a certain Faraday depth, the number of rotations to the observer is constant.) The Burn and Sciamia theory requires that the average polarization angle of each Faraday depth is identical, but no such assumption is required in the present theory.

Convection in Pulsating Stars: Time-Dependent Mixing-Length Theory in the One-Zone Model. D. O. GOUGH, *Joint Institute for Laboratory Astrophysics*.—By considering in detail the motions of convective elements, Vitense's mixing-length theory of turbulent convection has been reformulated so that it can be used in stellar envelopes whose ensemble mean properties are time dependent. To determine in which regions of the H-R diagram radially pulsating stars lie, it is usual to perform a linear stability analysis of static models. The time dependence of the perturbations is exponential; the equation of motion of the convective elements can then be integrated analytically, and explicit expressions for the variations in convective heat flux and turbulent pressure can be obtained.

To gain insight into how convection can affect the stability of a star, the revised mixing-length