galaxies involved in this study exhibit such emission lines.

The results of the least square solutions indicate that within the observational errors $\Delta\lambda/\lambda$ is constant for a wavelength ratio of 5×10^5 to 1. This result is consistent with the Doppler interpretation of the line shift phenomenon observed in extragalactic nebulae.

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A Coherence Analysis of Fraunhofer Line Radial Velocity Fine Structure and Continuum Brightness Fluctuations near the Center of the Solar Disk. FRANK N. EDMONDS, JR., *The University of Texas*.—Cross correlation analyses between fluctuations in radial velocity V and continuum brightness I have been carried out for four sets of measurements made near the center of the solar disk; those obtained from a McMath-Hulbert spectrogram (w18), those of R. S. Richardson and M. Schwarzschild (*Astrophys. J.* **111**, 351, 1950) (RS), those of H. H. Plaskett (*Monthly Notices Roy. Astron. Soc.* **114**, 251, 1954) (P), and those of R. Servajean (*Ann. Astrophys.* **24**, 1, 1961) (S). These analyses employed a coherence technique which gives the coherence or cross correlation between the Fourier components of the same wavelength for each set of fluctuations, and the phase difference (across the solar disk) between these Fourier components. The analyses also computed power spectra, RMS's and filtered and unfiltered cross correlations.

A significant VI coherence with 180° phase difference was found in the wavelength range 1200–5200 km (on the surface of the sun) for the RS measurements, no VI coherence was found for the w18 measurements, and the S and P measurements gave inconclusive results. These results cannot be explained in terms of differences in the solar atmosphere levels making an appreciable contribution to line formation and to continuum formation. The inconsistent picture presented by the four VI coherence analyses can be explained in terms of a negative VI cross correlation existing for wavelengths < 5000 km plus certain differences in instrumental and atmospheric resolution for the four sets of measurements. However, an explanation in terms of a heterogeneous convection pattern at the sun's surface seems more reasonable.

Photoelectric Measurements of Polarization in the Irregular Galaxy M82, NGC 5128, the Pleiades and Other Objects. AINA ELVIUS, *Uppsala Observatory*, AND JOHN S. HALL, *Lowell Observatory*.—Photoelectric observations were made with a dc polarimeter attached to the 69-inch Perkins Reflector of Ohio Wesleyan University and the Ohio

State University at the Lowell Observatory at its new site near Flagstaff. Circular apertures of $27''$ and $40''$ were usually used. The main survey was made in integrated light. Some of the highly polarized regions were later studied in blue and yellow light.

M82 was studied thoroughly. Its brightest spot shows very little polarization. Other parts of the main body show 2–3% with the electric vector parallel to the main axis of the object in general agreement with three measures in the central areas by Dombrowsky (*Astron. Circ. U.S.S.R.* No. 176, 1956). In the outer faint filaments the polarization is as high as 15%. The electric vectors are perpendicular to the filaments, indicating that the filamentary structure is associated with a magnetic field, similar to a dipole field.

The A5 spectrum and red color of M82 suggest vast clouds of solid particles. It seems reasonable to assume that the same particles scatter light from the bright inner parts which also contain hot emission regions. Elongated grains oriented in the magnetic field would explain the observations as suggested by A. Elvius (*Uppsala Astron. Obs. Medd.* No. 121, 1959). The flat radio spectrum of M82, observed by Lynds (*Astrophys. J.* **134**, 659, 1961) may be caused by thermal radiation from the $H\ II$ regions, or by synchrotron radiation. Both processes could contribute to the observed polarization.

Five percent polarization has also been detected in NGC 5128 (Centaurus A). Observations of 10 other galaxies gave no strong evidence of polarization.

Extensive observations have been made of nebulosity in the Pleiades. Polarization as large as 10% was detected in some areas showing filamentary structure. The reductions are complicated by the polarization of regions within the cluster which are apparently free of filamentary structure.

Atomic Hydrogen in Galaxies. EUGENE E. EPSTEIN, *Harvard College Observatory*.—Results are presented of $H\ I$ 21-cm emission line observations of 40 galaxies investigated with the Harvard maser-equipped 60-foot antenna; a statistical discussion is given of these galaxies and eight galaxies previously investigated elsewhere. In this sample of 48 galaxies no $H\ I$ emission was detected from any of the six E, two S0, and one Sa type galaxies that were investigated; however, three of the ten Sb, fourteen of the seventeen Sc, and all of the twelve Irr galaxies that were investigated were positively detected. Seventeen of the Sc and Irr galaxies had not been previously detected. The spectral distributions of the $H\ I$ emission, from which the systemic velocities, $H\ I$ masses, and total mass estimates were calculated, were obtained for each of the detected galaxies. Upper limits to the $H\ I$ masses were estimated for the undetected