tremely high. This confirms the observation of the visual workers that flares have a "hard outline." This steep gradient disappears in the post maximum stages of the flare. One also finds that the bright core of the flare is extremely small at the maximum.

I am deeply indebted to Dr. H. Dodson and Mr. E. Dennison for their aid in this work.

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Omer, Guy C., Jr. The Coma cluster of nebulae.

Several independent nebular count surveys over plates centered on the Coma cluster of extragalactic nebulae have been intercompared. The plate material consists of nine overlapping 20-inch Astrographic plates counted by G. C. Omer, a 20-inch Astrographic plate counted by C. D. Shane, a 48-inch Schmidt plate counted by A. G. Wilson, a different 48-inch Schmidt plate counted by T. L. Page and G. C. Omer, and a Metcalf plate¹ counted by the Harvard group. These various counts appear to be mutually consistent and to indicate that:

1. The Coma cluster is $1^{\circ} 40'$ in radius.
2. This cluster contains about 800 members.
3. The luminosity function for this cluster is essentially the same as the function derived by E. Holmberg² from the nearby nebulae.
4. The radial distributions of the bright and the faint members of this cluster appear to be identical.

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1. *Harvard Bull.* No. 896, 1934.

2. *Medd. Lunds Astr. Obs.* Ser. II, No. 128, 1950.

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Parker, Eugene N. An analytical investigation of turbulence and acoustics in the solar ionization zone.

An investigation of the turbulence field to be expected in the solar ionization zone requires an extension of the existing turbulence theories to cover the case of an inhomogeneous field where convective forces are producing the turbulence. Heisenberg's development of isotropic homogeneous turbulence was used because it affords a simple physical picture of turbulence and is therefore readily generalized to the inhomogeneous field. Isotropy was assumed for the solar convection turbulence field.

A convective driving and a diffusion term were worked out on this basis and inserted in Heisenberg's field equation. Thus it is possible to compute the velocity field in the ionization zone as well as the diffusion of this turbulent velocity field up into the solar atmosphere.

Second, in order to compute the acoustical radiation which the velocity field of the ionization zone produces, it was necessary to reformulate radiation theory since many misconceptions are associated with the conventional viewpoint. An inhomogeneous wave equation was obtained giving rigorously the velocities of radiation particles in terms of the velocity field producing the turbulence. Because of the complexity of the velocity of a turbulent field, the inhomogeneous term in the wave equation can be computed only approximately from the turbulence field.

As a result of the above analysis the turbulence velocity field is found to have velocities ~ 0.6 km/sec in agreement with observations on the solar granules.¹ Further, the turbulence diffuses only ~ 200 km into the atmosphere above the convection zone. The acoustical radiation for the entire velocity field is found to be completely inadequate to heat the corona. The differences between this and previous results by Mr. Schwarzschild² are readily tracked down in the theory. Finally, from the reformulation of radiation theory it follows that supersonic turbulence in the chromosphere is an impossibility unless the entire energy of such a velocity field is replenished, say, every 50 seconds, a truly fantastic energy source being required.

1. R. S. Richardson and M. Schwarzschild, *Ap. J.* **111**, 351, 1950.

2. *Ap. J.* **107**, 1, 1947.

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Pearce, Joseph A. Absolute dimensions of the eclipsing variable HD 190786-V477 Cygni.

During the past season a series of thirty-two single-prism spectrograms of dispersion 51 Å/mm at $H\gamma$ were secured of this 9th magnitude eclipsing variable, discovered by Tamm in 1947. The spectral classes of the components were found to be A3 and F5, the lines being moderately sharp and amenable to accurate measurement. The A-type primary star, which has 87 per cent of the light of the system, is eclipsed by the slightly smaller darker companion at primary minimum, this eclipse being annular according to Wallenquist.

The following spectrographic elements were