A periodogram analysis with prewhitening before each successive periodogram has been carried out to obtain the frequencies and amplitudes of the component terms. The resulting expression for the light curve is

$$\begin{aligned}\Delta m(t) = & -0.0809 - 0.0256 \cos(40.075t + 0.313) \\ & - 0.0072 \cos(79.748t + 0.488) \\ & - 0.0063 \cos(41.205t + 0.790) \\ & - 0.0052 \cos(59.480t + 3.580),\end{aligned}$$

where $t=0$ at JD 2437840.0. There is an uncertainty in the frequencies of $\pm 2\pi$ rad per sidereal day. This results from the spacing of the observations at multiples of one sidereal day. The difference between the period of the largest component found here differs from that found by Struve, Sahade, and Zeberg (Astrophys. J. **125**, 692, 1957) by an amount corresponding to 2π rad per sidereal day.

Comparison of the predicted curve and the observed values shows reasonable agreement. However, at some phases deviations up to 0.01 mag. remain.

The color curves show no apparent variation of $U-B$ but $B-V$ is smaller at maximum light than at minimum.

Periodograms have been constructed using the published radial velocity and light curves of three other Delta Scuti type stars, CC And, Delta Sct, and DQ Cep. Satisfactory agreement between predicted and observed curves is obtained.

Dissipation of Magnetic Energy in a Solar Flare.

DONAT G. WENTZEL, *The Observatory, University of Michigan, Ann Arbor, Michigan*.—A flare is thought to occur because of a collapse of chromospheric gases toward a magnetically neutral region. Where the rate of collapse reaches the hydromagnetic velocity, inhomogeneities permit the gas to twist the magnetic fields and turbulence may be set up. Effects of this turbulence are investigated. First, the turbulence enhances the rate at which magnetic energy is dissipated: Opposing fields are pressed together at eddy boundaries during a time D/v (D is the eddy size; v the eddy velocity), permitting dissipation of the fields only within a skin depth, L , given by $D/v = 4\pi\sigma L^2$. Hence the turbulence maintains a localized but high rate of dissipation. The total dissipation time is $(D/v)(D/L) = (4\pi\sigma D^3/v)^{1/2}$. Second, the turbulence cushions the collapse and finally stops it. At this time, the fields are most twisted and are dissipating most rapidly. If the flare is dense enough so that the dissipated energy is rapidly radiated away, then the end of the collapse marks the maximum of the flare light curve. Correspondingly, the total dissipation time of the twisted magnetic fields is to be identified with the decay time of the light curve. For $v \simeq 200$ km/sec

and plausible values for σ (in an ionized gas), a decay time $\simeq 10^3$ sec requires $D \simeq 40$ km. Third, during the rise time the collapse drives the turbulent velocities to exceed the hydromagnetic velocity, causing shocks and perhaps acceleration of charged particles; thereafter, the turbulence is driven only by the already twisted fields and is less violent, in accord with the few available observations. Fourth, since turbulence and flaring occur only where the rate of collapse can reach and has reached the hydromagnetic velocity, the possibility of flare occurrence and the increase in flare area with time may be computed for any initial model. Fifth, after the twisted fields are dissipated, the remaining large-scale field is similar to that existing before the flare, so that a very similar flare may occur at a later time, as is sometimes observed.

A Small Emission Nebula in the Wing of the Small Magellanic Cloud.

BENGT E. WESTERLUND, *Mt. Stromlo Observatory* AND KARL G. HENIZE, *Dearborn Observatory*.—The small emission nebula Lindsay 593 (Astron. J. **66**, 169, 1961), independently discovered by Westerlund (unpublished), lies in the extreme wing of the Small Magellanic Cloud at a distance of 6.0 deg from the heart of the Cloud, twice that of the next most distant nebula in this direction. Direct photos with the Mount Stromlo 74-inch reflector show a small, roughly circular nebula 1.2 pc in radius with a narrow spur extending an additional parsec to the southwest. The spectrum shows a weak continuum with strong emission lines of hydrogen and forbidden O II only. The radial velocity of $+217 \pm 7$ km/sec confirms membership in the Small Cloud. The ratio of $\lambda 3729$ to $\lambda 3726$ indicates an electron density of 40 cm^{-3} (assuming $T_e = 10^4 \text{ K}$) while the mean electron density measured by the total energy radiated at $H\alpha$ is 100 cm^{-3} . Adopting a mean value of 70 cm^{-3} we find a mass of 12 solar masses for the nebula. The visual absolute magnitude of the central star is -3.5 . A value of $B-V = -0.07 \pm 0.05$ has been measured but is somewhat uncertain due to the effects of the nebula. The mass-luminosity relation predicts a mass of approximately 24 solar masses for the central star.

The symmetry of the nebula, its isolated position, and the lack of visible nebula about other early-type Cloud members in this vicinity point to the possibility that the nebula is being ejected from the central star. This possibility is compatible with reasonable time intervals, rates of mass ejection and rates of expansion. If we assume a rate of mass ejection of 10^{21} g/sec, equal to that estimated for P Cygni by Pagel, we find that ejection must have taken place at this rate for 8×10^5 yr and that the average expansion rate must be 1.5 km/sec.