Let m_1 denote the apparent magnitude of the brightest cluster member. Then $\rho_f \sim [10^{8(m_1+3)/5} - 10^{3m_1/5}] \sim D^3$. However, if all the clusters are identical and d is constant, then $\rho_c \sim D^2$ and the relationship $\rho_c = \rho_f$ cannot be maintained.

Presumably, as D grows, Zwicky's selection yields clusters of increasing average populations $\bar{N}(D)$, smaller clusters becoming unnoticeable. To determine the luminosity function, knowledge of both $\bar{N}(D)$ and of $\bar{d}(D)$ is necessary.

Zodiacal Light Measurements from Balloons.

E. P. NEY, W. F. HUCH, AND R. MAAS, *Department of Physics, University of Minnesota*.—We have used constant-level balloons floating at 110 000 ft to measure photometrically and to photograph zodiacal light. A 3.5-cm-aperture telescope which has an angular field of 10° is flown in a gondola so that the telescope is directed at a zenith angle of 80° . The gondola is rotated in azimuth at an angular speed of 1 revolution in 5 minutes by an auxiliary rotator attached to the balloon. The telescope contains a rotating polaroid which turns at a speed of 10 rev/minute. The field lens of the telescope produces an image on the photo surface of an EMI 9514B multiplier. The output of the multiplier modulates the frequency of a GMD radiosonde transmitter. The stability of the balloon at ceiling is good enough so that the rotation speed of the gondola is essentially determined by the rotator.

We have made five partially or completely successful flights prior to sunrise at Minneapolis and during the lunar first quarter. The results of the polarization and intensity measurements will be discussed.

In one flight we carried a camera in which the film was continuously advanced to compensate for the gondola rotation. We were able to photograph the zodiacal light at 110 000 ft in this flight.

The principal advantage of studying zodiacal light from balloons is that the atmospheric extinction even on the horizon is only 20% and it is therefore possible to look at smaller solar elongation angles without interference from the atmosphere.

Photoelectric Photometry of NGC 3379. K. H. PRENDERGAST AND R. H. MILLER, *Yerkes Observatory*.—The large E0 galaxy NGC 3379 has been studied using a photoelectric photometer in a point-by-point scan of some 400 points. The observed light-intensity distribution has been used to infer a three-dimensional mass-density distribution, which in turn can be used to study the equilibrium of the galaxy in the sense of stellar dynamics. The equilibrium study is the object of this research. Maps of the measured points and intensity profiles will be given along with a review of progress in the study of the dynamics of the galaxy.

Is the Martian Blue Haze Produced by Solar Protons? CARL SAGAN, *Planetary Sciences Department, The Rand Corporation, and Department of Astronomy, University of California, Berkeley*.—The hypothesis that solar protons produce the Martian blue haze is examined. To reach the atmospheric depth at which the observed haze layer is localized, proton energies in excess of 2 Mev are required. In order to produce sufficient molecular ionization to obscure surface detail in the blue, the steady-state proton fluxes must be greater than $10^{11} \text{ cm}^{-2} \text{ sec}^{-1}$ at Mars. So that magnetic deflection of solar protons by the terrestrial magnetic field can explain the clearing of the blue haze which is observed at opposition, the interplanetary magnetic field strength must be less than 10^{-8} gauss. Recent observations argue strongly against these required interplanetary magnetic field strengths and solar proton energies and fluxes. Several further observational tests are suggested, but at the present time it appears that this hypothesis should be rejected.

Fine-Structure in Jovian Decametric Radio Noise. HARLAN J. SMITH AND JAMES N. DOUGLAS, *Yale University Observatory*.—The 5–40 Mc Jupiter radio noise storm records normally show fine-structure characterized by bursts having durations of the order of a second. Several observations by Shain in 1956 gave very poor correlation of such fine structure between identical stations only 25 km apart. Shain's work, plus increasing evidence that radio star scintillations at 20 Mc often have durations as short as several seconds, led to general acceptance of ionospheric scintillation as the cause of the fine structure. However, a 1958 50-km baseline experiment of the authors indicated that amplitude scintillation of pre-existing fine structure was more likely the correct explanation.

The present paper discusses results of recent observations from a 4-station network including separations up to 100 km from the Yale Observatory's Bethany Station. All degrees of correlation were observed, but the strongest storms indicate that correlation is frequently nearly perfect for fine-structure features down to 0.01 sec. No presently known ionospheric disturbance moves at 10^4 km/sec or displays detailed fine-structure fluctuations simultaneous to 0.01 sec on a scale of size of 100 km. Accordingly we conclude that (1) these records show a radically new form of ionospheric scintillation, or (2) they reflect irregularities in interplanetary plasma, or (3) much fine structure exists in the signals as they leave Jupiter. The final explanation of the fine structure may include elements of all these sources, as well as the conventional slower ionospheric amplitude distortions associated with radio star scintillation.

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