theory has been applied to Baker's one-zone model [*Stellar Evolution* (Plenum Press, New York, 1966), p. 333] to estimate how the convection varies as the star pulsates. In general, the convective heat flux increases as the star compresses and so exerts a stabilizing influence. Furthermore, because the variations in the convective velocities are not in phase with the pulsation, the turbulent pressure can do work on, or be worked on by the star, and so influence the growth or decay of the pulsations. When the characteristic time scale of the convection is very much greater than the pulsation period, the effect is stabilizing, but when the convection time scale is short, the converse is true.

Although no definite conclusions concerning the stability of a star can be drawn from the one-zone model, it does seem likely that convection tends to stabilize stars at the right-hand edge of the Cepheid instability strip, bringing theoretical predictions into closer agreement with the observations, and also provides an important destabilizing mechanism in the long-period variables.

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Integrated Colors and Magnitudes of Open Clusters. DAVID F. GRAY, *University of Western Ontario*.—Integrated colors and magnitudes may be the only observable characteristics of some stellar systems. As a convenient standard of reference we can use the integrated colors and magnitudes of open clusters in the galaxy which are easily found by summing the luminosities of the individual stars comprising the cluster.

The integrated colors and magnitudes of open clusters have been shown to be correlated along a line interpreted as an aging trajectory (Gray, D. F., *Astron. J.* **70**, 362, 1965). In the present investigation artificial cluster evolution is investigated numerically to see if in fact any given cluster moves parallel to the observed correlation. This pseudoevolution is accomplished by subtracting, sequentially in order of brightness, the flux of each star from the cluster total. The giant stage of the star's life is neglected.

In the majority of cases the cluster does follow the expected trajectory. It is also found that the computed tracks depend only slightly on the cluster's luminosity function.

Each computed track must eventually end up on the stellar main sequence if the faintest stars left in the cluster are main sequence objects. After evolving parallel to the observed correlation, the cluster usually drops steeply onto the stellar main sequence. This is particularly noticeable in the $U-B$

plane where the characteristic wiggle of the stellar main sequence holds the color between 0.0 and 0.10 for a three-magnitude range in M_V .

Models of Interstellar Grains. J. MAYO GREENBERG, *Rensselaer Polytechnic Institute*.—A detailed analysis is made of several criteria for distinguishing between various interstellar grain models. The observations of extinction in the ultraviolet out to $\lambda^{-1} \approx 8 \mu^{-1}$ lead to interpretive difficulties for all presently well-studied grain models—dielectric spheres, core-mantle (mostly spherical), and dielectric cylinders. If "normal extinction" is required to be satisfied in the range $1 \leq \lambda^{-1} \leq 3 \mu^{-1}$ then the calculated extinction for the above models does not rise as much as required by stated observational results at $\lambda^{-1} \approx 8 \mu^{-1}$. Up to $\lambda^{-1} = 5 \mu^{-1}$ the latter two models are reasonably satisfactory. Anomalous extinction curves in the far infrared as reported by Johnson are equally difficult to satisfy by the three general models if one assumes normal extinction in the visible. The anomalous extinction can be most easily accounted for by locally *very* anomalous grains.

The orientation by magnetic fields and subsequent polarization are more easily satisfied by elongated dielectric than by spheroidal core-ice mantle particles.

Excitation of Interstellar OH by Plasma Shielding Currents. HOWARD D. GREYBER, *Martin Company*.—A new mechanism for the excitation of the interstellar OH (hydroxyl) radical is proposed that apparently explains many of the very puzzling features of the interstellar OH radio emission. The mechanism invokes the Debye shielding current that must be present when a plasma expands against a magnetic field (or vice versa). Such a current would arise, for instance, at the border of a hot nebula which is expanding against the general spiral arm magnetic field, such as IC 1793 (W3) and NGC 6334.

Because of the characteristic resonance denominators in the usual calculation of quantum-mechanical transition probabilities, the excitations (and therefore line strengths) depend *critically* on the values of the *local* velocities, conductivities and magnetic fields. Thus the model explains qualitatively the compactness of the OH emission sources, the great departure from expected line-intensity ratios and the presence of OH emission at the edges of the ionized hydrogen regions.

Because of the high conductivity and consequent "snowplow" nature of the plasma-magnetic field interaction, the magnetic field will be strongly amplified *locally* at the edge of the expanding nebula