rate proportional to the temperature. Partial degeneracy and relativistic effects are included in the isothermal core computations.

Fitting of the core and outer zone (accomplished by equating neutrino and radiation loss rates) shows that electron degeneracy sets in at the center when the mass of the core becomes about one-half solar mass; subsequently, the degenerate region grows somewhat rapidly with increasing temperature and density. When the core mass becomes about one solar mass, both the central density and temperature become high enough for the carbon flash to occur. The outer boundary of the isothermal core is always nondegenerate. Thus, neither the Schönberg–Chandrasekhar limit for a nondegenerate isothermal core, nor the Chandrasekhar limit for a degenerate configuration gives the critical stage for the contracting carbon–oxygen core.

The lifetime of the contraction phase up to the onset of the carbon flash is not much different from our previous estimate, since it is determined essentially by the rate of gravitational contraction in the nondegenerate region.

Apparent Lithium Isotope Ratios in F5-G8 Main Sequence Stars. G. H. HERBIG, *Lick Observatory*.—The isotopic splitting of the $\lambda 6707$ resonance line of $Li\ I$ between Li^6 and Li^7 is $0.16\ \text{\AA}$, or $7\ \text{km/sec}$. Although the line is somewhat more diffuse than lines of heavier elements (due to unresolved doublet structure and larger thermal broadening) in the spectra of Li -rich F5 to G8 dwarfs, the isotopic shift is well above the uncertainty of measurement (0.3 to $0.5\ \text{km/sec}$) on 120 -inch coude spectrograms of dispersion $4\ \text{\AA/mm}$. Since the structure of $\lambda 6707$ is intrinsically blended in these stars, this first attempt to evaluate the contribution of Li^6 was based on its effect on the center of gravity of the Li^7 line. The Li^6/Li^7 ratio determined in this way from visual settings on photographic spectrograms is here called the *apparent* isotope ratio because of the approximations implicit in this approach. The results for 14 bright stars show clearly that Li^7 is the preponderant isotope in these objects (as in the sun, earth, and stone meteorites), but that there is evidence for apparent Li^6/Li^7 ratios near 0.3 in several stars.

Cinematography of Spatial and Temporal Variations in Auroral Forms with an Image Orthicon TV System. GRADY T. HICKS, *E. O. Hulburt Center for Space Research, U. S. Naval Research Laboratory* AND T. NEIL DAVIS (introduced by H. Friedman), *Geophysical Institute of the University of Alaska* (now National Academy of Sciences-NASA Resident Research Associate at Goddard Space Flight Center).—Variations in auroral forms have been

recorded with a cinematographic technique using an image orthicon TV system. The auroral image was displayed on the TV monitor at an adequate brightness level for recording with a movie camera at 24 frames per second on 16-mm Plus X film.

Using projection frame rate the same as initially recorded frame rate, a movie will be shown illustrating different types of auroral forms which occurred at Fort Churchill, Canada, in October 1963.

Probable Nova in the Globular Cluster M14.

HELEN SAWYER HOGG, *David Dunlap Observatory* AND AMELIA WEHLAU, *Hume Cronyn Observatory*.—The globular cluster M14 in Ophiuchus has been photographed on 124 nights in 23 of the years from 1932–1963 inclusive by H. Sawyer Hogg with one of the two large Canadian reflectors, the 72-inch of the Dominion Astrophysical Observatory or the 74-inch of the David Dunlap. During the past year a systematic program of photometry of these plates has been carried out with the Becker iris photometer at the Hume Cronyn Observatory. In the course of this program, Amelia Wehlau has discovered the image of a star on the David Dunlap plates of 1938.

The star is present on all eight plates taken in 1938 and does not appear on any of the other 247 plates in our collection. The 1938 plates cover an interval of one week, with the first on 21 June and the last one 28 June, with average exposure time of 35 min. The nova is close to variables Nos. 67 and 42 (*Dominion Astrophys. Obs. Publ.* 7, No. 5, Plate II, 1938), with coordinates of $x = +30''$, $y = +4''$ on the same center. Ironically, a 5-yr systematic hunt for variables in the cluster had ended just before the nova appeared.

Our observations apparently rule out the star as a U Gem variable like those in M5 and M30. If the identification of this star as a nova is not disproved, it is the second nova recorded in a globular cluster and the first to be recorded photographically. Nova T Scorpii reached visual magnitude 7 in M80 in 1860.

The magnitude of our nova hovers around 16.0, with 15.6 and 16.25 as extreme values, but there is some background effect so near the cluster center. For 15 RR Lyrae variables whose periods and light curves we have determined in this cluster, the average mean magnitude is 17.87 and the average median is 18.03. It is probable that the nova which we caught so fleetingly on David Dunlap plates reached a maximum brighter than 10.

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Photographic and Spectroscopic Observation of the Solar Eclipse 20 July 1963. CURTIS J. HUMPHREYS (introduced by Charlotte M. Sitterly),