30 and 40 in the sense that with the image intensifying system plates are obtained in 10 and $7\frac{1}{2}$ min, respectively that are equal in density to 300-min exposures directly on the IIa-0 plates. The gain in the rate of recording information is determined by the efficiency of the photocathode, by the resolution of the system, by the statistical processes involved in the electron multiplication, and by the granularity of the recorded image. An increase in the electron multiplication would increase the rate of blackening but not the information rate.

Spectrograms that demonstrate a useful gain of 10 over direct plates have been obtained with these tubes on the DTM spectrograph at Lowell Observatory. Dispersions of 90 and 22 Å/mm are available at the photocathode with 3 and 12-in. focal length cameras.

The development of these tubes was supported by grants from the National Science Foundation.

Light-Time Effects in the Galaxy. KENNETH L. FRANKLIN, *The American Museum–Hayden Planetarium.*—Through what angle will a part of the Galaxy turn during the time its light takes to reach the observer (r/c years)? $D=K(v/R)r$, where v is the rotational velocity in km/sec of a point in the Galaxy at a distance R kpc from the galactic center seen at a distance r kpc from the sun. K is a conversion factor equal to 1.92×10^{-4}. Constants entering the calculation of K were 3.16×10^{7} sec/yr, 3.26×10^{3} yr/kpc, 57.3 deg/rad, and 3.09×10^{16} km/kpc. Values of v/R were taken from M. Schmidt's model of the Galaxy (*Bull. Astron. Inst. Neth.* 468, June 1956). The values of D were computed graphically for various values r and v/R, and galactic loci of equal angles were found. Since the maximum value of D is less than half a degree (occurring near the galactic center) the effect is completely negligible with the present resolving power of radio telescopes used in galactic research.

Polarimetric Detection Method of Lunar Luminescence. T. GEHRELS, *Lunar and Planetary Laboratory, University of Arizona.*—Luminescence was detected photometrically and it was independently confirmed by polarization measurements. Three lunar regions were observed in April 1959 and again in November 1963; $(I_1-I_2)/(I_1+I_2)$ differed systematically. Assuming the luminescence is not polarized it subtracts out in (I_1-I_2) but not in (I_1+I_2).

In 1956/59 the lunar surface was 10–20% brighter than in 1963 November/1964 January. The effect is fairly constant from day to day, with a few notable exceptions, while it presumably depends on the solar cycle (Gehrels, T., Coffeen, T., and Owings, D., unpublished).

Origin of Emission Cores in Lines of Ionized Calcium and Magnesium. LEO GOLDBERG AND ROBERT W. NOYES, *Harvard and Smithsonian Observatories.*—Transitions between doubly excited $4pnl$ levels and singly excited $4snl$ levels of the *Ca* I atom are shown to be probable contributors to the emission cores of the *Ca* II H and K lines in the solar spectrum. The contribution to the source function from this process is calculated and found to reach a maximum at a height of approximately 300 km above the photosphere. Preliminary calculations of line profiles and center-to-limb variations for the H and K lines of both *Ca* II and *Mg* II are presented and discussed.

Mechanism for Generating a Dipole Magnetic Field in Astrophysical Objects. HOWARD D. GREYBER, *Northeastern University.*—A mechanism suggested originally by D. H. Menzel for the generation of a loop current during the formation of stars, is described in some detail. The analysis demonstrates the possibility in spiral galaxies (Greyber, H. D., *Astron. J.* **68**, 536, 1963), and earlier references mentioned therein) and strong radio sources and "quasars" of direct conversion of gravitational energy by contraction into magnetic field energy and the acceleration of charged particles. The mechanism explains, at least in principle, the question of how energy can be generated at the optical galaxy and released at the radio source locations which are often many optical diameters from the associated optical object. The relevance to production of cosmic rays and to energy production in strong radio sources and the quasi-stellar objects will be discussed. The polarization of light from M82 gives evidence of a magnetic dipole field of galactic dimensions (Elvius, A., *Lowell Obs. Bull.* 119, 1963). Recent work on M82 by Sandage and Miller (*Science* **144**, 405, 1964) is not inconsistent with this interpretation, which was suggested by Greyber in 1960 on theoretical grounds to explain galactic structure.

Variable Nebulae, NGC 2261 and NGC 6729. RICHARD C. HALL, *Goethe Link Observatory.*—Photoelectric polarization measurements of the cometary nebula, NGC 6729, were made in July 1963 with the 69-in. Perkins telescope in Flagstaff, Arizona. The polarization was measured using a diaphragm of 27″ and ranges from 2.5%, for R CrA, to 13% for the regions of highest polarization. In the nebula, the electric vector appears per-