details. Refinements in photographic photometry permit a more accurate description of lunar albedo and the lunar photometric function. The success of these technical development activities should not only aid the field of lunar astronomy but also make lasting contributions to other areas of astrometry.

Propagation of Waves in the Solar Atmosphere. ROBERT F. STEIN, *Columbia University*.—

The frequencies and horizontal wavenumbers at which the normal modes (large amplitude quasi-standing waves) of the solar atmosphere occur were calculated for a semiempirical model of the region around the temperature minimum. At high frequencies the waves are compressional, modified by gravity, and can propagate into the upper atmosphere; at low frequencies the waves are gravitational, modified by compressibility, and can also propagate into the upper atmosphere. Between these two passbands is a trap band where the waves are completely reflected. Three types of fundamental modes were found. The fundamental acoustic mode has $\omega \approx 8 \times 10^5 \text{ } k_H \text{ sec}^{-1}$ for horizontal wavelengths smaller than 1000 km and goes to a constant frequency with a width $0.05 > \omega > 0.032 \text{ sec}^{-1}$ for horizontal wavelengths greater than 2000 km. The fundamental acoustic-gravity mode behaves like an acoustic mode for horizontal wavelengths greater than 6000 km, where it is composed of many narrow resonances of nearly constant frequency in the range $0.032 > \omega > 0.009 \text{ sec}^{-1}$. At smaller horizontal wavelengths it narrows and changes its behavior to that of a gravity mode with a frequency $\omega \approx 0.03 \text{ sec}^{-1}$. The fundamental gravity mode has $\omega \approx 7.5 \times 10^5 \text{ } k_H \text{ sec}^{-1}$ at horizontal wavelengths greater than 3000 km and approaches a constant frequency $\omega \approx 0.028 \text{ sec}^{-1}$ at small horizontal wavelengths. The calculated fundamental acoustic-gravity mode covers the range of frequencies and horizontal wavelengths ($0.03 > \omega > 0.015 \text{ sec}^{-1}$, $\lambda_H > 5000 \text{ km}$) where the spectral density of the observed solar oscillations, as calculated by Pierre Mein (*Compt. Rend.* **260**, 1867, 1965), is large. It was also found that the height of the maximum vertical velocity shifts to greater altitudes as the frequency increases through the wide acoustic-gravity fundamental mode. This might explain the observed increase in the frequency of the oscillations with height.

Stellar Rotation and Luminosity. PETER A. STRITTMATTER, *University of California, San Diego*.—The possibility of a correlation between stellar luminosity and rotational velocity is examined. It is found that, for stars on the upper main sequence in the Hyades and Praesepe clusters, such a correlation exists in that, at a given color, the more rapid rota-

tors tend also to be brighter. A quantitative estimate of the shift in magnitude due to rotation is made and indicates that a star with an equatorial velocity of 100 km/sec would appear 0.1 m above the zero rotation main sequence. The redshift is roughly proportional to the square of the rotational velocity. The data appear to be in good general agreement with theoretical predictions for nonuniformly rotating stars with zero large-scale circulation currents (Roxburgh, I. W., and Strittmatter, P. A., *Monthly Notices Roy. Astron. Soc.*, to be published).

Statistical Procedure for Computing Line-Blanketed Model Stellar Atmospheres. S. E.

STROM AND R. KURUCZ, *Smithsonian Astrophysical Observatory and Harvard College Observatory*.—In order to treat the problem of line blanketing in computing model stellar atmospheres, we have developed a modified picket-fence approach. We divide the frequency range between the Lyman limit and 44 000 Å into 16 separate regions and for each of these regions we compute at 34 optical depths a function $N(H)$. This function describes the number distribution of the ratio of line to continuum opacity H . It is computed using a compilation of transition probabilities and excitation potentials for 28 500 spectral lines.

The function $N(H)$ is used to choose five values of H for each frequency region. Corresponding to each H is the fraction W of the particular frequency region occupied by opacity ratios equal to or less than H . The values of H and W for each frequency region and the continuum opacities are then used as input to a modified version of the stellar atmosphere program discussed by Strom and Avrett (*Astrophys. J. Suppl.* **12**, 1, 1965).

We have tested the numerical accuracy of our program by comparing with the results obtained by Avrett for a grey atmosphere and a simple picket-fence absorption coefficient.

Finally, we discuss the use of this program for the analysis of Procyon.

Abundance Analysis of the A Stars α Lyr, γ Gem, 63, 64, and 68 Tau. S. E. STROM AND K. M.

STROM, *Smithsonian Astrophysical Observatory and Harvard Observatory*.—We present the results of abundance analyses which use as their basis the grid of nongray stellar atmosphere models reported by Strom, Gingerich, and Strom (*Astron. J.* **70**, 148, 1965). In all cases, we compute, using a program designed for the IBM 7094, a value of abundance for each observed line of a particular element in the stellar spectrum. The calculated line profiles and resulting equivalent widths are then compared,