Solar X-Ray Spectra in the 2-20 keV Range. T. A. CHUBB, H. FRIEDMAN, AND R. W. KREPLIN, *U. S. Naval Research Laboratory*.—In 1959, three sounding rockets were launched with proportional counters to measure the spectral energy distribution of solar x-rays from 2–20 keV. One rocket was fired when the sun was quiet; the remaining two when the activity was characterized by subflares. The spectrum of the quiet sun fell rapidly and monotonically from 2 to 11 keV. From the slope of the spectrum for energies up to 4 keV, a temperature of about 10^7 °K was derived. Over the same range, the two flights during subflare activity gave similar results but departed markedly from the quiet spectrum at higher energies. Above 4 keV, the flux rose to a maximum near 10 keV in one case and 12 keV in the other, and then declined rapidly toward zero near 16 keV. The presence of this emission peak may be evidence of an intensification of line emission or recombination radiation associated with *Fe XXV* and *XXVI*.

Variable Spectrum of AX Monocerotis. ANNE PYNE COWLEY, *University of Michigan Observatory*.—The variable spectrum of AX Monocerotis has been studied on 138 plates, 11 of which are high-dispersion spectrograms from Mt. Wilson. The appearance of the metallic shell lines of *Fe II*, *Ti II*, *Cr II*, *Ni II*, and others is found to be periodic. All previous reports of the observation of these metallic lines are in agreement with this finding.

A revised orbital period of 232.5 days has been determined from remeasurement of the faint absorption lines of the K-type companion which are visible in the region near *H α* . Three additional plates taken recently at Lick Observatory supplement Merrill's original 11 high-dispersion observations, thus providing a base line of 20 cycles by which to improve the period. The new elements are:

$$\begin{aligned} P &= 232.5 \text{ days} & \gamma &= +6.5 \text{ km/sec} \\ e &= .02 & \omega &= 8^\circ \\ T &= \text{JD } 2433390.8 \\ a \sin i &= 164 \times 10^6 \text{ km} \\ K &= 51.5 \text{ km/sec} \end{aligned}$$

Because there are only two observations on the descending branch of the velocity curve these elements are considered provisional.

The metallic shell spectrum may be explained by gaseous material streaming between the two stars, principally from the late-type star towards the B star. In addition, a grazing atmospheric eclipse of the B star by the outer chromosphere of the K star may occur. The amount of material leaving the K

star appears to be extremely variable, thus causing some occurrences of the metallic shell spectrum to be very weak and short in duration. At other times the ionized metallic lines may last for as long as two months. This variation may be due to irregular prominence activity on the K star. In nearly every case the maximum strength of the shell lines occurs prior to the actual conjunction of the two stars. The next observable conjunction with the B star more distant will occur JD 2438444 although the metallic lines may appear as early as December 1963.

Computer Program for Stellar Pulsation. A. N. COX AND K. H. OLSEN, *Los Alamos Scientific Laboratory*.—Several recent investigations (e.g., Cox, J. P., *Astrophys. J.* **132**, 594, 1960; Baker, N., and Kippenhahn, R., *Z. Astrophys.* **54**, 114, 1962) have shown that, for Population I Cepheids, the pulsation exciting mechanism is the low gamma and high opacity in the region of second helium ionization. Previous studies have been limited to small amplitudes where linearized hydrodynamic and radiation flow equations can be used.

A general computer program has been written at Los Alamos which numerically integrates the non-linear, time-dependent set of coupled hydrodynamic and energy flow equations (including convection). A brief description of the difference equations, the necessary boundary and stability conditions and their application to mass shells is given. Equations of state and opacities (including line effects) are taken from other Los Alamos codes.

This program has been applied to a series of envelope models to study nonlinear effects, limiting amplitudes of pulsation, and the region of the H–R diagram in which this exciting mechanism is operative. The chemical composition adopted for these studies was a helium/hydrogen ratio of 0.15 by numbers. The results of the computations are described in the following abstract (Cox *et al.*).

Self-Excited Pulsations in Stellar Envelope Models. JOHN P. COX, *Joint Institute for Laboratory Astrophysics, Courant Institute of Mathematical Sciences, New York University*, ARTHUR N. COX AND KENNETH H. OLSEN, *Los Alamos Scientific Laboratory*.—The general methods described in the preceding abstract (Cox and Olsen) have been applied to stellar envelope models to investigate the operation of second helium ionization as an exciting agent for stellar pulsations. The envelope models possess about 10^{-4} of the total stellar mass, have a temperature at the bottom of about 10^5 °K, and are divided into 20 mass zones each. The lower boundaries of the envelopes are kept fixed in time and a steady