A Computer Program for Nongray Stellar Atmospheres. OWEN GINGERICH, *Smithsonian Astrophysical Observatory*.—A versatile computer program for nongray stellar atmospheres in the F0 to K2 range has been developed for use with the IBM 7090 at Smithsonian Astrophysical Observatory. The program constructs a model atmosphere based on an arbitrary temperature distribution, calculates a series of fluxes and intensities (using either the Eddington approximation or the exact integrals), and corrects the temperature distribution according to one of three procedures. The opacity may be gray, or derived from the $a(H)$, $a(H-)$ and Rayleigh scattering; furthermore, absorption lines can be simulated by a discontinuous opacity, which may be depth dependent.

Two different formulations of the condition of radiative equilibrium can be exploited to correct the temperature distribution: the flux (determined by the phi operator) must be constant at each depth, or the derivative of the flux (determined by the lambda operator) must vanish so that the absorption balances the emission at each depth. The latter formulation is especially applicable near the surface of a star where the first criterion is insufficient to determine the run of temperature.

A powerful initial correction to the temperature distribution is accomplished with the Poincaré-Lighthill-Krook perturbation method, which combines both criteria, varying not only the temperature but also the optical depth (the independent variable). The Strömberg-Swihart method, based on the phi operation, can then be used to achieve a flux constant to better than $\frac{1}{2}\%$, and a final correction of the temperatures near the surface is possible by a modified lambda operation method.

The monochromatic fluxes depend critically on the temperature distribution throughout the atmosphere, and by the use of the three methods successively a close approximation can be obtained.

This work has been supported in part by the National Science Foundation.

Remarks on the Dynamical Stability of Galaxy Clusters. EUGENE A. GODFREDSEN, *Harvard College Observatory*.—Masses of galaxies determined by applying the virial theorem to galaxy clusters are systematically higher than those obtained by using the rotational velocity profiles of individual galaxies. This result has been interpreted by some writers as evidence that clusters of galaxies are not dynamically stable. There are, however, several factors which could cause the masses derived from the virial theorem to be too high. The following effects, if operative, all tend to give spuriously high masses.

(1) The mass-average of the square of the velocities relative to the center of mass gives the

average kinetic energy of the cluster. If there is an tendency towards equipartition of energy, the mass-average will be smaller than the ordinary average.

(2) Foreground and background field galaxies often cannot be distinguished from cluster members. Although this effect may contribute substantially to the kinetic energy for clusters with only a few members, it is negligible for large clusters. What appear to be single large clusters may, however, because of the large range of absolute magnitudes, be superpositions of two or more clusters. This would likewise cause the kinetic energy of the cluster to be overestimated.

(3) Observational errors in the radial-velocity measurements are often appreciable. These errors all cause the measured value of the sum of the squares of the velocities to be higher than the true value. This effect is most pronounced for small clusters.

Some of the effects mentioned above are not present in the case of the Local Group. The rotational velocity of the Milky Way plays an important role because it is comparable to the radial velocities of the other members of the group. Within the probable errors of the available data, detailed calculations show that the Local Group is dynamically stable if the rotational velocity of the Milky Way at the sun is about 260 km/sec.

Spectral Indices of 60 Discrete Sources. S. J. GOLDSTEIN, JR., *Harvard College Observatory*.—Flux densities of 60 discrete sources were measured with a 60-ft reflector and maser radiometer at 1422.4 Mc at Harvard Observatory. The sources have galactic latitudes numerically greater than 10 deg, and were selected from the 85.5-Mc survey by Mills, Slee, and Hill and from the 159-Mc Third Cambridge Survey of Edge *et al.* The observations consisted of at least two scans in right ascension and two scans in declination across each source; thus the position at 1422.4 Mc could be compared to that reported at lower frequency. In only three cases was the difference in positions greater than 7 minutes of arc. Calibration was obtained from observations of Cas A and the adoption of Findlay's flux density.

Spectral indices obtained for these sources have a narrower range than has been previously reported and seem independent of flux density. An explanation is given for the apparent correlation between flux density and spectral index found by other observers. The sources that are identified with galaxies in the Shapley-Ames catalogue have indices confined to the central part of the spectral index distribution, while those identified with more distant anonymous galaxies have a wider distribution of indices. This result is in conflict with recent findings of Heeschen. The sources listed as