are based on a model atmosphere derived from A. K. Pierce's photoelectric observations of the limb-darkening and energy distribution. Fifteen elements were selected for which f -values and equivalent widths are known with sufficient accuracy. For each element the lines were arranged in groups according to excitation potential and wave length. A pair of points defining a theoretical curve of growth in the transition region was then computed for each line group. The computations were carried out with the electronic computers, MIDAC and IBM 650 of the University of Michigan.

Corresponding calculations for model atmospheres of B stars were carried out using graphical integration methods. The results show that the shape and position of the curve of growth depend strongly on the stage of ionization as well as on the excitation potential and wave length.

*University of Michigan,
Ann Arbor, Mich.*

Field, George B. The radiofrequency effects of intergalactic hydrogen.

Recent observations indicate that the opacity of intergalactic hydrogen is small at both 21 cm and 10 m wave lengths. We have studied the relation of such observations to the amount and physical state of hydrogen gas in intergalactic space. In particular, various mechanisms which affect the opacity of HI are analyzed in detail. It is concluded that the present upper limits on radiofrequency opacities are still too large to provide data of cosmological interest.

*Harvard College Observatory,
Cambridge, Mass.*

Franklin, K. L. Outer galactic structure from O, B, carbon stars, and neutral hydrogen.

A comparison is made between observed direction-velocity data for 21-cm radiation of neutral hydrogen, and similar data for O and B stars. The 21-cm observations are taken from recent Dutch sources, and from work in the Carnegie Institution of Washington, Department of Terrestrial Magnetism. The stellar data are obtained from R. E. Wilson's catalogue of radial velocities. Within the completeness of Wilson's catalogue, it is shown that the early stars do not necessarily share the positions and velocities of the observed hydrogen. The conclusion by the Case workers that carbon stars are members of the spiral arm

population is supported in part by the 21-cm observations.

*Carnegie Institution of Washington,
Washington, D. C.*

Garstang, R. H. Transition probabilities for $[FeV]$.

Transition probabilities are already available for most astrophysically important forbidden lines of atoms in the two short periods. A series of computations has been undertaken to extend our knowledge of the transition probabilities of forbidden lines of iron in various stages of ionization. Many years ago Pasternack studied $[FeVII]$ and $[FeVI]$. The first ion chosen for study in the present investigation was $[FeV]$. The techniques introduced into the theory of atomic spectra by Racah have been applied to the calculation of the strengths of quadrupole lines in configurations of the types d^n and $d^{n-1}s$. This enabled the LS-coupling line strength matrix to be set up for the d^4 configuration. The energy levels of FeV have been analyzed by empirical methods using known electrostatic and spin-orbit matrices. The matrix of the transformation to intermediate coupling was obtained and used to calculate the magnetic dipole and electric quadrupole line strengths of FeV in intermediate coupling. Recent work by Hartree on the interpolation of exchange wave functions has provided reliable values of the quadrupole moment integrals used in deriving absolute transition probabilities. The calculated relative strengths of lines in observable multiplets are in reasonable agreement with observations of AX Persei and NGC 7027. Numerical work is now in progress for $[FeIII]$ and some preliminary calculations have been done for $[FeII]$.

*University of London Observatory,
Mill Hill Park,
London, N.W. 7, England.*

Goldberg, Leo, Muller, Edith A. and Aller, Lawrence H. The chemical composition of the solar atmosphere.

The abundances of some 40 elements relative to hydrogen have been redetermined in a new investigation of the chemical composition of the solar atmosphere from the Fraunhofer spectrum. The measurements of equivalent widths by the Utrecht group and by Allen's have been supplemented by infrared data and by measurements of selected lines on vacuum spectrograph plates from the McMath-Hulbert Observatory.