ments yield $35 \times 10^{-18} \text{ cm}^2$, five times larger than the hydrogenic approximation. Comparison with previous experimental results for the lower levels of magnesium shows that silicon completely dominates the bound-free metal opacity between about 1300 and 2000 Å.

Results of flux calculations using empirical solar models with temperature inversions, incorporating the improved metal opacity, and assuming LTE show that the continuum radiation short of 1682 Å (the absorption edge of the first excited level of silicon) originates in the low chromosphere above the temperature minimum. Consequently, we conclude that the Fraunhofer spectrum seen at longer wavelengths should disappear fairly abruptly at 1682 Å. This result is consistent with the appearance and tracings of the rocket ultraviolet spectrum. The calculations also show that the silicon ground state continuum beginning at 1526 Å is in emission, and that there is significant limb brightening at shorter wavelengths; again, this agrees with the observations.

Longward of 1682 Å the predicted flux increases by two orders of magnitude. That such a large increase is not observed in the solar spectrum indicates that an additional source of absorption is required redward of 1682 Å. A careful survey of possible continuous metal absorbers suggests that these will be inadequate to account for the missing opacity, which may, however, be supplied by overlapping bands of carbon monoxide.

From these results it follows that one must look at wavelengths longer than 1682 Å to observe details of the solar temperature minimum.

Interaction of Supernova Remnants with the Interstellar Medium. PETER GOLDREICH, *University of California, Los Angeles* AND WALLACE L. W. SARGENT, *University of California, San Diego*.—We investigate the way in which the shock-wave produced in the interstellar medium by a supernova explosion slows. The shock path and the motion of the gas behind the shock are computed numerically using von Neumann and Richtmyer's method of artificial viscosity. We take into account the effects of radiative cooling behind the shock front. The cooling has an important effect on the motion for old remnants and leads to thermal instabilities in objects as old as the Cygnus Loop. We conclude that the visible filaments in the Loop are regions of thermal instability where the density rises and the temperature falls by large factors from their values immediately behind the shock front in a distance of the order of 0.01 pc. A shell of cool gas having a density about 10^2 times that in the undisturbed interstellar medium must lie behind the filaments in the Cygnus Loop. The mass in this shell should be greater than $100 M_\odot$ and is perhaps as great as $1000 M_\odot$.

We also investigate the motion taking into account the interstellar magnetic field. In this case, as has been shown by van der Laan, the compression of the magnetic field limits the density rise in the thermal instability behind the shock.

Intergalactic Hydrogen in the Virgo Cluster. S. J. GOLDSTEIN, JR., *Leander McCormick Observatory*.—A fixed horn antenna having a $10^\circ \times 10^\circ$ beam and a switched load radiometer with a maser preamplifier was used to observe the 21-cm spectrum of the Virgo Cluster of galaxies. An upper limit to the antenna temperature is 0.024°K relative to regions outside the cluster with filters of 2 Mc/sec width. If the excitation temperature of the intergalactic hydrogen is sufficiently greater than the background continuum radiation that absorption can be ignored, and if the velocity spectrum is that defined by the galaxies, the density of optically thin neutral hydrogen in the cluster does not exceed that outside the cluster by an amount that gives 5.6×10^{12} solar masses in the cluster. For comparison, Holmberg has obtained 3.1×10^{13} solar masses for the galaxies in the cluster.

Estimates of Primordial Halogen Abundance Ratios from Studies of Chondritic Meteorites. GORDON G. GOLES AND L. PAUL GREENLAND, *University of California, San Diego, and U. S. Geological Survey*.—Neutron activation analyses of Cl, Br, and I in meteorites indicate that these halogens are geochemically coherent in most carbonaceous and enstatite chondrites. There is some evidence that whatever fractionation process has operated on the parent materials of these meteorites, has left halogen abundance ratios unchanged. Thus, the present mean abundance ratios (Cl/Br=410, Cl/I=4500, Br/I=11, all in atoms per atom) are probably good approximations to the abundance ratios in the primordial solar nebula. These ratios may be used as additional boundary conditions on nucleosynthetic models.

Values of the Einstein A Coefficients for the Λ Doublet Transitions of the Ground State of OH. W. MILLER GOSS AND HAROLD WEAVER, *Radio Astronomy Laboratory*.—In order to calculate abundances of OH from the four lines at 18 cm, the Einstein A's are necessary. A recalculation of these quantities for the Λ doublet transitions arising from the ground state ($^2\Pi_{3/2}$) of OH has been made. The expression for the dipole matrix element as reported by Dousmanis, Sanders, and Townes (*Phys. Rev.* **100**, 1735, 1955) is incorrect. The correct formulation has been given by Meyer (unpublished thesis, University of California, Berkeley, 1961).