NASA grant NsG-414 and of computer facilities supported by NSF grant GP-279.

Relaxation of a Collisionless Self-Gravitating Gas. MYRON LECAR, *Smithsonian Astrophysical Observatory*.—The dynamical evolution of a one-dimensional collisionless self-gravitating gas was investigated by numerical experiments. The evolution of a system of N particles is governed by the equations of motion of the single-particle distribution function, $f(x, v, t)$, for times $\ll N^2 \tau [\tau^{-1} = (4\pi G \rho)^{1/2}]$ $f(x, v, t)$ goes to $f(E)$ in a time $\ll N \tau$.

X-Ray Survey of the Northern Sky, Observation of Spectra in the Energy Range from 20 to 100 keV.

WALTER H. G. LEWIN, GEORGE W. CLARK, AND WILLIAM B. SMITH, *Massachusetts Institute of Technology*.—X-ray surveys of the northern sky in the energy range above 20 keV have been carried out with an actively shielded 400 cm² Na I(Tl) spectrometer. Balloon flights on 19 July 1966 and 13 February 1967 cover the sky from -10° to $+75^\circ$ Dec. and 285° to 105° R. A. and from -17° to $+90^\circ$ Dec. and 70° to 360° R. A., respectively. A map of hard x-ray sources is presented together with results on the spectra. Possible time variations on those sources which were observed during both flights (Tau X-1 and Cyg X-1) are discussed.

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Radiative Lifetimes of Excited Ions of Carbon, Nitrogen, Oxygen, and Neon using the Foil-Excitation Technique.

MYRON R. LEWIS, FREDERICK S. ZIMNOCH, THEODORE MARSHALL, AND EDMUND H. CARNEVALE, *Parametrics, Inc.*, AND DORDON W. WARES, *Air Force Cambridge Research Laboratories*.—Radiative lifetimes of excited states of multiply ionized carbon, nitrogen, oxygen, and neon have been measured by passing a high-energy (1 to 2 MeV) singly ionized beam of the element of interest through a thin (~ 1000 Å) carbon foil and observing the decay of light intensity as a function of distance downbeam of the foil with a monochromator and cooled photomultiplier. The foil causes stripping of additional electrons and excitation of the resulting ions. The excited ions are free to decay spontaneously without external influences. Optical transitions were observed between 2000 and 5000 Å. These transitions arise primarily from energy levels considerably above the ground state of the ion and are generally free from cascading effects. Over 100 lifetimes have been measured and

are presented. Where a transition is singular or dominant it has been possible to extract the transition probability directly. Some new spectral lines have been observed and have been classified. A number of the lines observed appear in astronomical spectra. Although some of these data have been presented in part elsewhere in preliminary form, this constitutes a summary of the finalized values.

Chemical Abundances in the A Peculiar Star HD 168733.

S. J. LITTLE AND L. H. ALLER, *University of California, Los Angeles*.—The remarkable character of the spectrum of HD 168733 has been noted by Bidelman; we have employed high-dispersion coude spectrograms from Lick Observatory to measure wavelengths, intensities, and secure identifications for lines of 14 elements.

An abundance analysis by model atmosphere methods yields the results given in Table I. Mihalas'

TABLE I.

Ion	Number of lines	Log abundance HD 168733	RSS ^a	Ion	Number of lines	Log abundance HD 168733	RSS ^a
H		12.00	12.00	Cl II	22	8.3 ± 0.7	6.25
He I	2	10.9	11.21	Ti I	5	$9.4 \pm (?)$	4.58
C II	5	9.6 ± 0.2	8.60	Ti II	55	7.2 ± 0.3	4.58
N II	13	9.0 ± 0.3	8.05	Cr II	38	6.5 ± 0.2	4.90
O I, II	none	< 8.9	8.95	Mn II	none	< 6.0	4.80
Mg II	3	7.4 ± 0.3	7.40	Fe I	12	8.2 ± 0.2	6.59
Si II	3	7.65 ± 0.2	7.50	Fe II	20	8.2 ± 0.2	6.59
Si III	4	7.9 ± 0.2	7.50	Fe III	7	9.3 ± 1.0	6.59
S II	3	6.8 ± 0.2	7.35	Sr II	3	6.3 ± 1.0	2.70

^a RSS = Revised solar system values based on: Goldberg, L., Müller, E. A., and Aller, L. H. 1960, *Astrophys. J. Suppl.* 5, 1. Müller, E. A., and Mutschlechner, J. P. 1964, *ibid.* 9, 1. Aller, L. H. 1961, *The Abundances of the Elements* (Interscience Publishers, New York), p. 162. —, 1965, *Advances in Astronomy and Astrophysics* (Academic Press Inc., New York), Vol. 3, p. 1.

LTE model atmospheres have been employed to compute theoretical line intensities and hydrogen-line profiles. The existing data appear to yield a best fit for an effective temperature of 15 600°K and $\log g = 3.70$. Some of the derived abundances are sensitive to the adopted temperature.

Note that chlorine, titanium, chromium, iron, and particularly strontium are especially abundant. At these temperatures, lines of oxygen and Mn II would not be expected in the observed spectral regions for normal abundances. Magnesium, silicon, and probably helium are normal. A rise in temperature that reduces the abundance of carbon and nitrogen will have the effect of increasing the abundance of iron, titanium, chromium, and strontium.

Anomalous 18 cm Absorption and Emission of Interstellar OH. M. M. LITVAK, A. L. MCWHORTER, M. L. MEEKS, AND H. J. ZEIGER, *Lincoln Laboratory*