Prospects for Abundances of Elements in Meteoroids. A. F. COOK, Smithsonian Astrophysical Observatory and Harvard College Observatory, C. L. HEMENWAY, State University of New York at Albany and Dudley Observatory, and P. M. MILLMAN, National Research Council of Canada. - Collisional cross-sections for emission in individual multiplets or groups of multiplets of sodium, calcium, magnesium and iron have recently been determined by C. A. Boittnot and H. A. Savage (1970 Astrophys. J. 161, 351; 1974 Astrophys. J., in press; 1971 paper presented at I.A.U. Colloquium No. 13 in Albany) and luminous efficiencies have been computed by them. The spectrally resolved luminous efficiency of iron (droplets vaporizing in free molecular flow) has been measured by D. G. Becker and J. F. Frichtenstein (1971 Astrophys. J. 166, 699). Television technique has been recently developed for spectroscopy of faint meteors (C. L. Hemenway, A. Swider and C. Bowman, 1971 Canadian J. Phys. 49, 1361; P. M. Millman, A. F. Cook and C. L. Hemenway 1971 Canadian J. Phys. 49, 1365). All that is needed is to put television observations on a photometric basis. An interim attempt to use the faint early portion of a photographed spectrum (A. F. Cook, I. Halliday and P. M. Millman 1971 Canadian J. Phys., in press) merely shows that the radiation was generated in a slip flow of the meteor's own vapors so that we must go to fainter meteors via television in order to measure abundances.

Distribution of the Asteroids. M. LECAR and F. A. FRANKLIN, Smithsonian Astrophysical Obs. and Harvard College Obs. - Computer simulation of the Sun, Mars, Jupiter, Saturn, and a few hundred massless asteroids was used to examine the hypothesis that the asteroids were initially distributed uniformly from Mars to Jupiter. The perturbations of the planets removed most of the asteroids from between the inner 2/3 Jupiter resonance and Jupiter. However, the asteroids between the inner 1/2 and 2/3 Jupiter resonances remained. Large-amplitude oscillations in the semimajor axes of the asteroids in the inner 1/2 Jupiter resonance were induced, but these did not result in a gap. To match the observations, which indicate a clear gap at 1/2 and very few asteroids between 1/2 and 2/3, an additional mechanism is required. Asteroid-asteroid collisions seem to us to be the most likely candidate, and we plan to simulate that effect next.

A High Resolution Radio Continuum Survey of M51 and NGC 5195 at 1415 MHz. D. S. NATHER, E. F. VENNER, C. P. VAN DER KUIJL, and W. H. BROWN, Sterrewacht Leiden - This paper reports the results of a survey at 1415 MHz of M51 and its companion, NGC 5195, with the aperture-synthesis type radio telescope at Westerbork which has a resolution corresponding to a distance of 400 pc at the distance of M51 and a sensitivity of 1 x 10^-22 W m^-2 Hz^-1.

The most striking feature of the radio picture is the clear delineation of two spiral arms in M51 with the maxima of their emission displaced to the inside edge of the bright optical arms and coincident with the dust lanes. The inner radio arms were unresolved by the aerial beam which implies that their width is less than 150 pc. This is first-class observational evidence of the existence of the compression regions associated with the large-scale shocks predicted by Roberts and Yuan (Astrophys. J. 161, 887, 1970) to occur on the basis of their non-linear analysis of the density-wave theory. It is also clear from this result that, in M51, most of the spiral arm emission does not arise in super-nova remnants which would lie in the bright optical arms.

Other outstanding features of the radio survey are the inter-arm links, the intense radio bridge connecting the two galaxies, the detection of linear polarization in parts of the spiral arm emission, the strong nuclear emission of M51 and NGC 5195, the discrete sources in the spiral arms (one a super-nova remnant candidate), and the marked asymmetry in the radio emission which is most likely produced by the interaction between the two galaxies.

A comparison is made with the other high resolution radio surveys of the Galaxy, M31 and M33.

Shock Waves in Barred Spiral Galaxies. W. W. Roberts, Jr. Univ of Virginia - The possibility that density waves and galactic shock waves may be very real manifestations in disk-shaped galaxies is here considered further: not only for normal spirals, but also for barred spirals as well. In particular, it is suggested that the bar structure in barred spiral galaxies could very well be a density wave-shock wave manifestation. The model galaxy considered here is a thin disk consisting of gaseous and stellar components whose base state of motion is a circular motion about the galactic center in the plane of the disk. Superimposed on this disk is a stellar density wave which, together with the...