multiple galaxies and from the virial theorem is possibly significant.

A Curve of Growth Analysis of the Circumstellar Envelope of Alpha Orionis. RAY WEYMANN, *California Institute of Technology*.—Alpha Orionis shows perhaps the strongest set of violet-displaced absorption cores of strong resonance lines which have been shown by Deutsch to be common to all luminous, sufficiently late-type stars, and which have been interpreted as evidence of general mass ejection in this part of the H-R diagram.

On recent high-dispersion spectrograms, displaced cores have been found for at least 16 elements, arising from low-lying metastable levels which have E.P. from 0.00 up to 1.5 ev. An "effective continuum" is defined by supposing the photospheric component to have a symmetric profile, and equivalent widths down to about 25 mÅ are measurable. Stromgren's curve of growth is used to estimate the number of atoms in the line of sight. Assuming the abundance ratios to be those recently given by Aller, one finds $N \approx 10^{22}/\text{cm}^2$. With the observed mean velocity of ~ 10 km/sec, and the assumption of a constant-velocity spherically symmetric steady flow, the rate of mass loss is $> 10^{19}$ g/sec.

The physical conditions in the envelope as deduced from the level of ionization and excitation are briefly discussed and the possible relevance of this work to the problem of the mechanism responsible for the ejection is mentioned.

On the Structure of the Cometary Nucleus. FRED L. WHIPPLE, *Smithsonian Astrophysical Observatory and Harvard College Observatory*.—A study of our cometary knowledge indicates that a comet must have a nucleus with some internal rigidity, provided with a greater source of gaseous material than is possible by adsorption or other gaseous attachment processes. The gravitationally incoherent model of a comet as presented by Lyttleton is shown to be inadequate as is his process of condensing cometary material from interstellar matter by the focusing effect of the solar gravitational field.

The icy comet model accounts well for the major cometary features but does not adequately account for cometary bursts at great solar distances, as in the case of Comet Schwassman-Wachmann.

Some meteoric evidence points to "new" comets, in the Oort sense, as containing material of very low density, like icy "feathers," as contrasted to fairly rigid relatively dense particles from the central portions of the nuclei of extremely large and old comets such as Comet Encke.

The detailed structure of the cometary nucleus will probably not be clearly known until samplings have been made by space probes, an experiment to be

anticipated with extreme interest as our Space-Science Program progresses. Studies of micrometeorites may, however, give important clues.

Slow-Drift Solar Radio Bursts: Harmonic Frequency Ratios, Frequency Drift Rates, and Solar Longitude Variation. MARION B. WOOD, *National Bureau of Standards, Boulder, Colorado*.—Second harmonic to fundamental frequency ratios yield a mean value less than 2 when measured at the low frequency edges of slow-drift radio bursts, whereas the mean value of the high frequency edge ratios is 2.00. No significant solar longitude variation is found in either the number of bursts occurring or in the harmonic frequency ratios; further, fundamental bands do not drop out with increasing solar longitude. No definite relation is found between rate of frequency drift and subsequent geomagnetic disturbance.

A Search for $C^{13}N^{14}$ (0,0) Band Features in the Far-Infrared Spectra of Some Cool Carbon Stars. ARNE A. WYLLER, *Geophysics Research Directorate, Air Force Research Division, Bedford, Massachusetts*.—In the present study a comparison has been made between the rotational fine structures of certain CN bands in the spectra of the " C^{13} poorer" carbon star 19 Psc, (N0,C6₂), and the " C^{13} richer" star Y CVn, (N3,C5₄). Previous work on the C^{13} abundances in carbon stars depended mainly on the utilization of the C_2 Swan bands. The $C^{13}C^{13}$ (1,0) band at $\lambda 4752$ shows strongly in Y CVn, but very weakly in 19 Psc. Independent determinations by J. O. Climenhaga [1960, *Publ. Dominican Astrophys. Obs.* 11, No. 16 (in press)] and A. A. Wyller (1959, *Astron. J.* 64, 57) concur that for 19 Psc the C^{12}/C^{13} ratio is at least 10:1.

Present evidence from high dispersion (10 Å/mm) Mt. Wilson material indicates that the $C^{13}N^{14}$ (0,2) head at $\lambda 4588.3$ is also clearly present in the spectrum of Y CVn, but very weak or absent in that of 19 Psc.

Medium dispersion (31 Å/mm) Mt. Wilson IZ-plates of 19 Psc and Y CVn do not convincingly reveal corresponding $C^{13}N^{14}$ (0,0) features around $\lambda 10900$. The dispersion allows a detailed examination of the rotational fine structure, utilizing the recent analysis of the (0,0) red CN band by Rigutti (McKeller, A., and Richardson, E. H., 1954, *Contrib. Com. Astrophys. Obs.* No. 39). There is little or no differentiation between the general intensity variation of this band structure in the spectra of 19 Psc and Y CVn. This is contrary to the observed intensity differences in the isotopic (0,2) violet CN band for the two stars.

The blue continuum absorption is markedly stronger in Y CVn than in 19 Psc (Rigutti, M.,