Chicago.—Among the 20 A-type stars within a distance of 20 pc from the sun there are four pairs and one triple system in which the components have space velocities which differ by 4 km/sec or less. In a fifth pair the space velocities of the components differ by 5 km/sec. Thus 13 of these stars, two-thirds of the sample, appear to be components of moving pairs or the triple system. Typically, the components of these systems are separated by distances of the order of a few parsecs.

If these stars could be considered to be a random sample of a kinematically homogeneous population of stars governed by a Schwarzschild distribution of the velocities, then the probability of the occurrence of so many close pairs (in velocity space) is very low. Therefore, it is possible that one is dealing here with physical pairs. The arrangement of the components of these systems in the color-magnitude diagram may be consistent with this possibility. Such pairs could be used to derive a lower limit on the time of relaxation for the motions of stars in the solar neighborhood.

The suggested pairs are: Sirius and δ UMa, α Pic and β Leo, β Pic and δ Cap, π Ara and α Cep, and δ Leo and α Oph. The first of these is associated with the Ursa Major Stream. The components of the triple system are α Gem, κ Phe, and α PsA. Additional interest attaches to this system because α Gem is itself a multiple system containing an additional A-type star.

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Preliminary Report on a Lunar Latitude Fluctuation. THOMAS C. VAN FLANDERN, *U. S. Naval Observatory*.—Reductions of regular and extreme grazing occultations at the U. S. Naval Observatory (USNO) during the past few months, using Watts' limb corrections from "The Marginal Zone of the Moon," indicate a surprisingly large fluctuation in the moon's latitude, with an amplitude of about half a second of arc. A large correction to the longitude of the moon's ascending node (approximately +5 sec of arc) is implied. It is shown that systematic effects of limb irregularities may account for the failure of previous investigators to detect this term. Evidence from USNO meridian circle observations, and from the occultation results of Her Majesty's Nautical Almanac Office, is also presented.

Evolutionary Implications of the Crystallization of White Dwarfs. H. M. VAN HORN, *The University of Rochester*.—The identification of the two sequences of white dwarfs observed by Eggen and

Greenstein (*Astrophys. J.* **141**, 83, 1965) with the loci in the H-R diagram which correspond to crystallization of the ion plasma in the deep interior of such stars (Van Horn, *Astron. J.* **71**, 874, 1966) leads to an approximate composition identification for each sequence. This permits some inferences to be made concerning the previous evolutionary history of the white dwarfs. In particular, if the composition of the fainter sequence of white dwarfs is of carbon and oxygen, as this comparison implies, then it is reasonable to associate the origin of the planetary nebulae with the carbon flash. The identification of the brighter sequence of white dwarfs with objects composed of elements of higher atomic weight, on the other hand, implies that these latter stars originated from much more highly evolved phases of stellar evolution.

High-Energy Electrons and Emission of the Omnidirectional Synchrotron Radiation in Radio Frequency and X-Ray Regions. SATYA DEV VERMA, *University of Chicago*.—We summarize the recent measurements of the flux and differential energy spectrum of primary electrons in the 0.1 to 300 BeV energy region taken near the present solar minimum period. There is an indication that the electron spectrum changes slope around 5 GeV, from 1.8 ± 0.15 to 2.65 ± 0.15 . We wish to point out that the recent observations of the omnidirectional intensity and the spectrum of the nonthermal radio frequency background radiation above 200 MHz are consistent with the steepening of the electron energy spectrum. Radio observations in the 10 to 100 MHz region are in agreement with the corresponding electron energy spectrum (0.3 to 5 BeV) within 50%. This indicates that the residual solar modulation of electrons in the 0.3 to 5 BeV energy region is not large.

If we assume that the electron energy spectrum extends up to about $\sim 10^5$ – 10^6 BeV with the same slope (2.65), then the synchrotron emission of the ultra-high-energy electrons would contribute to the recently observed diffuse component of cosmic x rays, although it does not completely account for the large flux. This would also give a possible explanation to the small number of air showers (0.7%) that are believed to be produced by the soft component of the cosmic rays.

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On The Relative Abundances of Elements of Intermediate, $16 \leq Z \leq 28$ Charge in Cosmic Ray