mospheric polarization observed by Dollfus may be tentatively ascribed to argon since other abundant gases are much lighter and have therefore certainly escaped. Dollfus' measures imply a surface pressure of 1.2 mm and an atmospheric mass of 3.3×10^{18} g.

The pressure corresponds to a sublimation temperature of 56°K . Mercury's coldest spot must be hotter than this if the argon is not to freeze out. Walker calculated an antisolar temperature of 28°K , maintained by conduction of solar energy and by radioactive decays. Maintaining at least 56°K would require at least a thirty-fold increase in conductivity or radioactivity. Alternatively, atmospheric circulation at ~ 10 m/sec with temperature differences of $\sim 10^\circ\text{K}$ would also suffice. However, the observed near-agreement between insolation and infrared emission at the subsolar point suggests that the heat convected to the dark side is less than 3% of the total, and therefore, that the dark-side temperature is less than 250°K .

The suggested dark-side temperatures, between 56° and 250°K , may be detectable by radio methods. For example, 250°K would give a 340° disk temperature at 90° phase angle (including the known bright-side contribution), in agreement with the $370 \pm 125^\circ\text{K}$ observed at 3-cm wavelengths by Howard *et al.* Whether the dark side is really warm could be tested by observations near conjunction, predicted antenna temperatures (85-ft antenna) lying between $0^\circ 02$ and $0^\circ 09$ K for the conjunctions of October 1962 and January 1963.

The quoted mass of argon is 1.0×10^{-8} times the mass of Mercury; the same ratio for the earth is 1.1×10^{-8} . Is this merely a coincidence, or is it because the mass and constitution of the mantle, the effectiveness of degassing, and the lack of exospheric escape are all similar for the two planets?

Model-Independent Correlation of Stars and Neutral Hydrogen. GEORGE B. FIELD AND EMERY S. FLETCHER, *Princeton University Observatory*.—Radial velocities of O and B stars, Population I Cepheids, galactic clusters, and $H\text{ II}$ regions are compared with those of $H\text{ I}$ gas at the same galactic longitude. The method used is to obtain distances from the stellar velocities in accordance with the Schmidt model of galactic rotation and to superpose the resulting plot on the combined Leiden–Sydney map of the distribution of neutral hydrogen. A strong correlation is found, the stars falling preferentially at the same velocities as the gas arms. Where a random distribution would have caused 39% of the stars to be found in the gas, the observed percentages ranged from 73% for the Cepheids to 85% for the clusters; many, if not all, of the poorly correlated cases may be accounted for by real and observational

dispersion in the stellar velocities. This correlation is independent of the model of galactic rotation, a change in the model producing identical changes in the positions of stars and gas. The most straightforward interpretation is that stars and gas are associated, and that the poor correlation between distances of stars and gas found by several investigators is due to errors in the distance assigned to the neutral hydrogen.

In principle, this method may be used to order the ages of objects less than a few times 10^8 yr old by noting the relative tendency to lose correlation with the gas. It may also be used to assign distances to gas features when stellar distances are available.

Final Model of β Lyrae. SERGEI GAPOSCHKIN, *Harvard College Observatory*.—Among puzzling binaries, β Lyrae has occupied a foremost place. More than half a century of spectroscopic and photometric observation has brought a bewildering array of phenomena, many of which have defied explanation. Two main mysteries surrounded the system, one with reference to the invisibility of the eclipsing star, the other to the mass of the eclipsed one (and consequently to the mass of the whole system, often given as about 100 solar masses).

In 1936, I suggested a solution to the first mystery, finding it necessary to assume that the eclipsing star should be the smaller; so the constant visibility of the spectrum of the brighter one was explained. Twenty years later I proposed another solution which removed the major puzzle by concluding that the eclipsing star, although smaller and apparently fainter, must be heavier (not lighter), must have a smaller range in radial velocity, and must have a thick moving envelope changing or camouflaging its spectrum so that according to the theory of moving envelopes a set of emission rather than absorption lines may occur.

Support for this conclusion was found in the old observations made in 1896 exhibiting the predicted range of radial velocity of the heavier component. It appears now that the recent astrometric determination of the absolute magnitude of the visible star, on the basis of the assumption that β Lyrae is astrometrically a multiple system, provides a striking confirmation of the model proposed six years ago. The astrometric value of the magnitude is $-4^m 1$ (*Astrophys. J.* 135, 429, 1962), mine was $-4^m 01$ (*Z. Astrophys.* 39, 133, 1956). Thus, the current model of β Lyrae, no longer enigmatic, may be said to consist of two moderately heavy stars, surrounded by a large atmosphere in which all sorts of orthodox streams and currents occur. In addition, there is a moving envelope around the heavier star, making it fainter and camouflaging its spectrum.