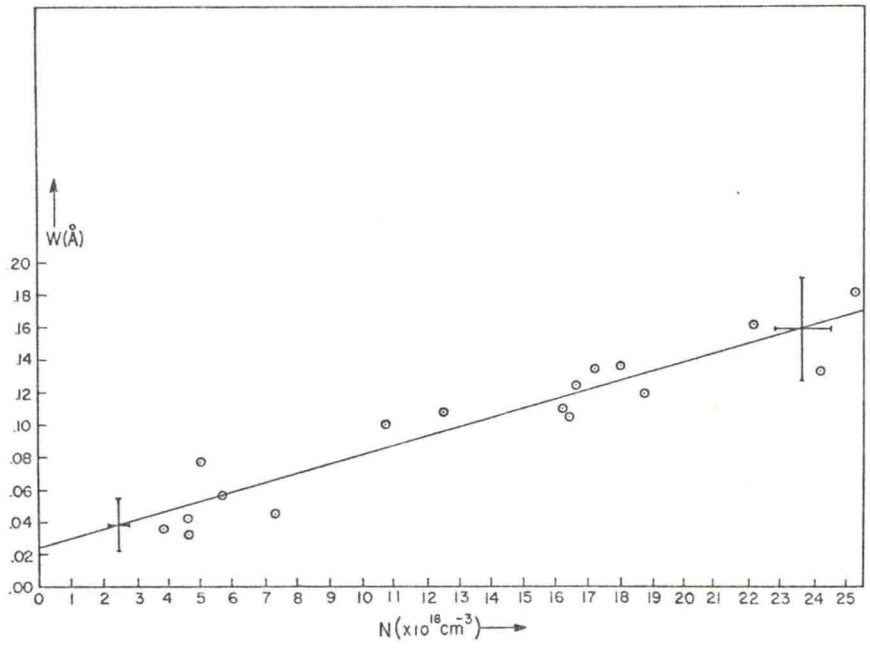

FIG. 4. Width of Si I λ4103 line plotted against number density of perturbing argon atoms. Theory predicts a slope 7×10^{-21} Å/cm^{-3} and experiment gives $5.7 \pm 0.6 \times 10^{-21}$ Å/cm^{-3}.

large scatter in the data points. The indicated lines are "least-square" fits to the data. The temperature dependence of the widths is very slight since it is proportional to $T^{3/10}$; therefore, slight corrections to the widths of the order of 3% were possible and the various data points could all be normalized to 5800°K. The results in this figure, though, were typical, i.e., the measured widths were less than the theoretical widths as calculated from the formulas of Griem.[1] These widths were calculated by simply adding the widths of the upper and lower states.

Figure 4 gives the data obtained for the Si I λ4103 line. This spectral line was negligibly affected by Stark broadening; the improvement in the scatter of the data over Fig. 3 reflects this fact. Again, the experimental widths are smaller by about 30% than the theoretical widths and the width of the spectral line is finite at zero density.

An idea of the accuracy of the technique can be obtained by noting the finite width of the spectral line at zero density. Although isotopic splitting could cause such zero density widths[5] still Kusch[6] in a recent report on arc measurements of the van der Waals broadening of silicon lines by argon did not observe such effects. His work was performed on uv lines using a spectrograph for dispersion; although he has not performed studies of any of the presently reported spectral lines, in principle, one would expect that they would have the same behavior. In spite of this present deficiency, the interferometer-shock-tube combination holds great promise in line broadening studies, and this work is being extended to the measurement of Stark broadening constants.

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