NaOH and 0.5 molar $K_4Fe(CN)_6$ and further in different types of glasses: *viz.*, cobalt, lead, uranium, vicor, soft, and Pyrex glasses. This confirms the suggestion by Hatton, Rollin, and Seymour[9] that these latter signals must indeed be attributed to Si^{29}. A comparison of the resonance frequency of Si^{29} signal in cobalt glass with that of deuterium in D_2O gave

$$\nu(Si^{29})/\nu(H^2) = 1.29410 \pm 0.00007. \qquad (6)$$

Assuming the spin of Si^{29} to be $\frac{1}{2}$, the sign and value of the magnetic moment were determined to be

$$\mu(Si^{29}) = -0.55492 \pm 0.00004. \qquad (7)$$

Experiments are at present under way to determine the spin of Si^{29}. If one accepts the shell model of Mayer,[10] one is led to the conclusion that since the sign of the moment of Si^{29} was found to be negative the spin can only be 1/2 or 5/2 and, inasmuch as the latter value is quite improbable, it is likely that the above assumption about the spin will be justified.

We would like to express our appreciation to Professor Felix Bloch for his continued interest in our work.

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Line Breadths in the 5-mm Microwave Absorption of Oxygen*

B. V. Gokhale and M. W. P. Strandberg
Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, Massachusetts

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Direct measurement of line breadths in the microwave absorption spectrum of oxygen at $\lambda = 5$ mm has been reported by Burkhalter *et al.*[1] and by Anderson *et al.*[2] From these reports it may be seen that the agreement between the two investigations is not entirely satisfactory. Hence it seems desirable to report measurements that we have made.[3]

The measurements were made by means of a Zeeman modulation spectrograph using a modulation frequency of 26.5 cps. The direction of the Zeeman field was chosen to be at right angles to the direction of the magnetic field vector in the radiation. This was accomplished by using two long magnets in the shape of hollow cylinders of rectangular cross section, each having a slot along its length for insertion of the wave-guide absorption cell. The lines of flux were all parallel to a plane at right angles to the length of the cylinder. The direction of the field in the gap was parallel to the electric vector of the radiation in the wave guide, which was propagating in its lowest mode.

The strength of the field was varied between zero and about 50 gauss to produce a square wave time variation. The strength of the field was sufficient to "modulate away" completely the absorption lines at the pressures used (0.75 mm to 6 mm of mercury) during the "field-on" half of the cycle. With the direction of the field as described above, only the transitions $\Delta M = \pm 1$ (σ transitions) are responsible for the absorption. This arrangement may be seen to give a stronger signal than any other field direction.

Five-mm microwave power was generated by a crystal doubler driven by a 1-cm klystron. The latter was locked to the resonant frequency of a K-band wave meter by means of the Pound circuit. The wave meter was slowly tuned to change the frequency. A second 1-cm klystron was made to follow the signal generator at a frequency difference of 12 Mc/sec to provide superheterodyne detection. The shape of the line was ultimately traced on an Esterline-Angus recorder.

Table I. Observed line-breadth parameters.

Transition	Frequency, in Mc/sec	Half-breadth at half-intensity, in cm^{-1}/atmos
$K_+ = 1$	56,265.2 ±0.5	0.035 ±0.007
$K_+ = 3$	58,446.3 ±0.4	0.028 ±0.003
$K_+ = 13$	62,412.9 ±0.8	0.025 ±0.003
$K_- = 3$	62,486.2 ±0.4	0.037 ±0.003
$K_- = 7$	59,164.2 ±0.2	0.028 ±0.005
$K_- = 9$	58,324.9 ±0.3	0.021 ±0.003
$K_- = 11$	57,612.3 ±0.4	0.034 ±0.006
$K_- = 15$	56,364.2 ±0.5	0.048 ±0.003

Observations were usually made at four different pressures (about 6, 3, 1.5, 0.75 mm Hg) and the observed widths plotted against the pressure. A straight line was then drawn through these points so as to give the least-square deviation. The slope of this line gave the line-breadth parameter. This straight line shows a nonzero line breadth at zero pressure, presumably caused by residual field in the gap, which could not be balanced out completely. This residual breadth was of little concern since line breadth varied by a factor of about 3 over the range of pressures used in the investigation. Table I gives the results and their probable errors.

These results cannot be immediately compared with those given in references 1 and 2 since they do not contain any limits of error.

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The Diffusion of Metastable Neon Atoms in Mixtures of Helium and Neon*

F. A. Grant
Department of Physics, University of Maryland, College Park, Maryland

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A short time after the cessation of excitation, the $^3P_2$ metastable level of neon decays exponentially, and the mean life T_m is defined by the equation

$$N = N_0 \exp(-t/T_m),$$

in which N is the number of metastable atoms per cc.

T_m can be expressed as a function of the pressure by the equation:[1]

$$1/T_m = (B/p) + Z,$$

in which

$$B = [(5.81/c^2) + (\pi^2/L^2)]Dp,$$

where p is the pressure in mm of mercury, c is the discharge tube radius in cm, L is the discharge tube length in cm, and D is the diffusion coefficient. The term Z is not proportional to the pressure, but the experimental results are consistent with an equation of the type

$$1/T_m = (B/p) + Cp^n,$$

in which n is 0.7 for pure neon,[2] and approaches 0.5 as the helium-neon ratio increases.

If p/T_m is plotted as a function of Cp^{n+1}, a straight line is obtained; B is the intercept on the p/T_m axis, and C is the slope.

In pure neon the B/p term represents the rate of diffusion to the walls of the energy of excitation of the metastable atoms. This process is complicated by the phenomenon of the imprisonment of resonance radiation. To reduce the relative importance of this effect, helium gas was introduced in the discharge tube. The energy levels of helium are all above the energy of excitation of the $^3P_2$ metastable neon level.