tions[1,4,5,7] shows that the values and curves reported there are also consistent with this value of the anisotropy.)

Our experimental value for the anisotropy differs from the theoretical value for the cascade 4(2)2(2)0: $A_{\text{theor}}=0.167$. To explain the discrepancy, we considered two possibilities:

1. The assignment 4(*E*2)2(*E*2)0 is wrong. We tried to fit all experimental data together with our value of A by assuming other spin- and parity-assignments and by taking into account mixtures of different multipole radiations. No other assignment, however, seems compatible with all known facts.

2. The directional correlation is influenced by the electron shell.[10,11] To test this assumption, we applied an external magnetic field H in the direction of the fixed counter. According to Goertzel,[12] such a field should restore the undisturbed correlation if the field strength H satisfies the relation $\mu H \gg \hbar\omega$, where μ and $\Delta\nu=\omega/2\pi c$ are the magnetic moment and the hyperfine splitting of the atom if the nucleus is in the intermediate level. (Goertzel's statement is only valid for magnetic interactions. We assume, however, that other interactions are too weak to have an appreciable effect.) The directional correlation of Ni^{60} remains, however, unchanged for field strengths H up to 8000 oersted (corresponding to inner fields of $\sim$15,000 gauss in the metallic source). This allows an estimate of the lifetime T of the intermediate nuclear state. The existence of an attenuation by the shell implies $\omega T\sim 1$. The failure of the external magnetic field H to restore the directional correlation means $\hbar\omega \gtrsim \mu H$. These two conditions (with $\mu\sim\mu_{\text{Bohr}}$) give an upper limit for T: $T\lesssim 10^{-11}$ sec. If one assumes further an upper limit for the magnitude of the hyperfine splitting, $\Delta\nu<1$ cm^{-1}, one gets $T\sim 10^{-11}$ sec. This value for the lifetime of the first excited state of Ni^{60} is in essential agreement with the value calculated from the Weisskopf formula[13] for an electric quadrupole transition.

From the present experiments it is, however, impossible to decide if the discrepancy between theoretical and experimental anisotropy is caused by the influence of the electron shell or if other effects have to be considered. Before definite conclusions can be drawn, the measurements have to be repeated with stronger external magnetic fields. The precise determination of the directional correlation of other 4(*E*2)2(*E*2)0 cascades would perhaps also give more information.

We wish to thank Professor P. Scherrer for his continued interest, Dr. M. R. Schafroth and Mr. K. Alder for many valuable discussions, and Mr. R. Hiltbrunner for his assistance during the measurements.

* Now at the University of Illinois, Urbana, Illinois.

[1] E. L. Brady and M. Deutsch, Phys. Rev. **78**, 558 (1950).
[2] F. Metzger and M. Deutsch, Phys. Rev. **78**, 551 (1950).
[3] Waggoner, Moon, and Roberts, Phys. Rev. **80**, 420 (1950).
[4] J. R. Beyster and M. L. Wiedenbeck, Phys. Rev. **79**, 411 (1950).
[5] R. M. Steffen, Phys. Rev. **80**, 115 (1950).
[6] H. E. Petch and M. E. Johns, Phys. Rev. **80**, 478 (1950).
[7] B. L. Robinson and L. Madansky, Phys. Rev. **84**, 604 (1951).
[8] Aeppli, Albers-Schönberg, Frauenfelder, and Scherrer, Helv. Phys. Acta (to be published).
[9] F. R. Metzger, Phys. Rev. **85**, 727 (1952).
[10] H. Frauenfelder, Phys. Rev. **82**, 549 (1951).
[11] Aeppli, Bishop, Frauenfelder, Walter, and Zünti, Phys. Rev. **82**, 550 (1951).
[12] G. Goertzel, Phys. Rev. **70**, 897 (1946).
[13] V. F. Weisskopf, Phys. Rev. **83**, 1073 (1951).

Superconductivity in the Cobalt-Silicon System

B. T. MATTHIAS
Bell Telephone Laboratories, Murray Hill, New Jersey
(Received June 4, 1952)

A COBALT-SILICON melt with 75 atomic percent Si has been found to become superconducting at 1.33°K. This was determined both by measuring the magnetic flux change and by observing the Meissner effect. The bulk properties thus obtained indicate that about half of the sample becomes superconducting. X-ray analysis[1] shows two phases: pure silicon and $CoSi_2$ in roughly equal proportions.

Whereas it has been impossible to detect superconductivity at temperatures above 1.27°K in pure $CoSi_2$, measurements on melts with more than 75 atomic percent Si indicate, from the volume of the sample which becomes superconducting, that $CoSi_2$ is the superconducting phase. This suggests that the transition temperature in $CoSi_2$ has been slightly raised in our samples by the strain resulting from its rapid crystallization into the $CoSi_2$ in an excess of silicon. This suggestion is further supported by the fact that annealing a melt with 75 atomic percent Si lowered the transition temperature.

As cobalt is ferromagnetic and silicon is a semiconductor at best, the probability is low that either element is a superconductor, even at the lowest temperatures. Superconducting compounds of nonsuperconducting elements have thus far been limited to some borides, carbides, nitrides of molybdenum and tungsten, CuS, and a large number of Bi-compounds. In the periodic system, however, Mo, W, Cu, and Bi are very close to the two groups of superconducting elements. This has given rise to the hypothesis[2] that superconducting elements or compounds are essentially confined to these two regions in the periodic table. The present example indicates that this hypothesis is not reliable.

[1] I want to thank Dr. E. A. Wood and Professor W. H. Zachariasen for their help and advice in this analysis.
[2] B. T. Matthias and J. K. Hulm, Phys. Rev. (to be published).

A Quantitative Determination of the Abundance of Telluric CO above Columbus, Ohio*

J. H. SHAW AND J. N. HOWARD
Department of Physics and Astronomy, Ohio State University, Columbus, Ohio
(Received April 9, 1952)

LINES of the 0–1 absorption band of CO at 4.7μ have been observed in solar spectra recorded at Columbus, Ohio,[1,2] and at the Jungfraujoch, Switzerland,[3,4] and it has been shown that the absorption is of telluric origin. However, recent measurements made by Goldberg, McMath, Mohler, and Pierce[5,6] at Lake Angelus, Michigan, and Mt. Wilson, California, who have studied the solar spectrum in the CO overtone region at 2.3μ, have so far failed to reveal any absorption which can be ascribed to telluric CO. Thus, estimates of the average amount of telluric CO above these various geographic locations vary very widely, and in addition daily variations in the amount of CO present has also been reported.[1,4]

In order to make an accurate measurement of the amount of atmospheric CO above Columbus, Ohio, observations on the line $R(2)$ of the fundamental band of CO in the solar spectrum were made on several days during January and February, 1952. The region of the solar spectrum studied is shown in Fig. 1, and it is seen that the $R(2)$ line, marked with an arrow, appears to be free of other strong interfering lines. Measurements of the total absorption of this line for various solar altitudes are shown in Fig. 2.

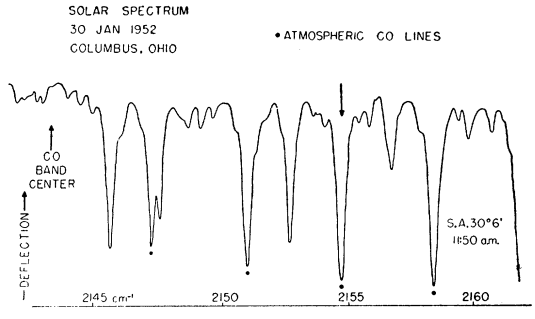

FIG. 1. The solar spectrum near 4.7μ.