Division of Argonne, Dr. R. Spence, Head of the Chemistry Division of Harwell, Dr. H. A. C. McKay, leader of the heavy-element group at Harwell, and Professor M. Siegbahn, director of the Nobel Institute of Physics for their encouragement and interest in the research. The American and British authors would also like to thank Professor Siegbahn for the hospitality extended during this project.

* This work was performed under the auspices of the U. S. Atomic Energy Commission, the United Kingdom Atomic Energy Authority, and the Swedish Atomic Energy Commission.

[1] Choppin, Harvey, and Thompson, J. Inorg. Nuclear Chem. 2, 66 (1956).

β-γ Circular Polarization Correlation in Au^{198} and Co^{58}†

F. Boehm and A. H. Wapstra*
California Institute of Technology, Pasadena, California

(Received June 17, 1957)

THE β-γ circular polarization correlation provides a valuable tool for the study of the beta-decay interaction.[1,2] Recently a large interference term due to the presence of S and T or V and A interaction has been found in the allowed J-J transition of Sc^{46}.[3] We report here studies of the J-J transitions in Au^{198} and Co^{58}. Both nuclei exhibit a simple β-γ cascade and are, therefore, quite suitable for a circular polarization correlation experiment. The spin pattern for both decays is $2(\beta)2(\gamma)0$. Preliminary results in Au^{198} have been reported earlier.[1] In the meantime Frauenfelder *et al.*[4] and de Waard *et al.*[5] have measured the electron polarization of Au^{198}. Since the combination of the electron polarization data with our circular polarization correlation result can yield interesting information on the beta-decay coupling, improvement of our preliminary data seemed desirable. The anisotropy in the electron emission of Co^{58} has been studied by Ambler *et al.*[6] and Postma *et al.*[7] using the nuclear alignment technique. Ambler *et al.* have pointed out that their result if explained by an S, T interaction leads to a different ratio of Fermi to Gamow-Teller matrix elements than that given by Griffing and Wheatley[8] from the study of the anisotropy of γ rays from aligned Co^{58} nuclei. In the present experiment a different sign of the correlation coefficient is expected to appear.

The circular polarization of the γ rays in coincidence with the β particles was measured be using the method described in reference 1. Sources of 50–150 microcuries strength were deposited on a 0.8-mg/cm² Mylar backing. Single and coincidence counts were recorded under similar experimental conditions as described in reference 3. The relative difference in coincidence counting rate for opposite magnetic field directions is found to be, in the case of Au^{198}, $\delta=(+0.75\pm0.12)\%$, which leads to a value of $A=+0.52\pm0.09$ for the asymmetry parameter A defined in reference 1. This result is in good agreement with our earlier value. For Co^{58} the result is $\delta=(-0.27\pm0.13)\%$ and $A=-0.14\pm0.07$.

Au^{198} is a first forbidden transition. A rough analysis of our results with the help of the formulas by Alder, Stech, and Winther[2] has been carried out. Combination of the present results with the small longitudinal electron polarization found by Frauenfelder *et al.*[4] and de Waard *et al.*[5] would favor parity conservation in Fermi transitions.[9]

The result on Co^{58} is in agreement with the values corresponding to[6] $A\cong-0.20$ and[7] $A=-0.22\pm0.03$ derived from the measurements on aligned nuclei. The theoretical value for a pure Gamow-Teller transition is $A=-0.166$. If we make use of our result on Sc^{46} for the magnitude of the S, T (or V, A) interference term it seems likely that the Fermi matrix element is smaller than about $\frac{1}{4}$ of the Gamow-Teller matrix element. This is in slight disagreement with the ratio 1/2.8 found by Griffing and Wheatley.[8]

We are very much indebted to Dr. B. Stech for many helpful discussions and Professor J. W. M. DuMond for his interest in this work.

† Supported by the U. S. Atomic Energy Commission.

* On leave of absence from the Institute for Nuclear Research, Amsterdam, and the Technical University, Delft, Netherlands.

[1] F. Boehm and A. H. Wapstra, Phys. Rev. 106, 1364 (1957).
[2] Alder, Stech, and Winther, Phys. Rev. 107, 728 (1957); Report, University of Illinois (unpublished).
[3] F. Boehm and A. H. Wapstra, Phys. Rev. 107, 1202 (1957).
[4] Frauenfelder, Bobone, von Goeler, Levine, Lewis, Peacock, Rossi, and De Pasquali, Phys. Rev. 107, 909 (1957).
[5] H. de Waard (private communication).
[6] Ambler, Hayward, Hoppes, Hudson, and Wu, Phys. Rev. 106, 1361 (1957).
[7] Postma, Huiskamp, Miedema, Steenland, Tolhoek, and Gorter, Physica 23, 259 (1957).
[8] D. F. Griffing and J. C. Wheatley, Phys. Rev. 104, 389 (1956).
[9] *Note added in proof.*—New measurements on Au^{198} by P. E. Cavanagh *et al.* (private communication) and C. S. Wu *et al.* (private communication) indicate, however, that the longitudinal electron polarization is nearly $-v/c$ in this nucleus. In that case our experiment agrees well with the two-component neutrino theory and indicates a maximum amount of interference between different T (or A) and S (or V) matrix elements.

Spin and Magnetic Moment of P^{32} by the Electron Nuclear Double-Resonance Technique

G. Feher, C. S. Fuller, and E. A. Gere
Bell Telephone Laboratories, Murray Hill, New Jersey

(Received July 15, 1957)

THE spin and magnetic moment of 14-day P^{32} was determined by the electron nuclear double resonance[1] (ENDOR) technique. The P^{32} obtained from Oak Ridge was diffused[2] into high-resistivity silicon plates having a total volume of 0.25 cm³.

The paramagnetic resonance signal observed at ~9000 Mc/sec and 1.2°K is shown in Fig. 1. It corre-