We are indebted to Mary Novick, Robert Keyes, Jerome Lerner, and Jack May for assistance in various phases of these experiments. A final report on this work will be submitted to this Journal.

[1] Hornyak, Lauritsen, and Rasmussen, Phys. Rev. **76**, 731 (1949).
[2] D. Saxon, Phys. Rev. **73**, 811 (1948).
[3] Perlman, Ghiorso, and Seaborg, Phys. Rev. **77**, 26 (1950).

A 1.0-Mev Energy Level in C^{13}

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THERE has been some discussion recently in the literature[1-3] as to whether C^{13} has a 1.0-Mev energy level as obtained from the reaction $C^{12}(dp)C^{13}$. A carbon target[4] was bombarded by 10-Mev deuterons from the Washington University cyclotron. The recoil particles were recorded in Ilford E-1 nuclear emulsion plates which were placed at various angles to the cyclotron beam. At 90° there was a homogeneous group of particles which was attributed to the reaction $C^{12}(dp)C^{13}$. There were no recoil particles from the reaction in which C^{13} would be left in the 1.0-Mev excited state. However at 115° and 155° there were two prominent groups of proton tracks, the first of which was analyzed as being due to the above reaction where C^{13} was left in the ground state, and the second as being due to the reaction where C^{13} was left in the 1.0-Mev excited state. These results indicate that there is an angular dependence for the second group of tracks.

To prove that there was no oxygen in the carbon target as a contaminant which would be producing these proton groups due to the ground state of O^{17} and the well-known 0.88-Mev level, a second target composed of Li_2O was bombarded with 10-Mev deuterons and the recoil particles were recorded at 90° to the beam. In this case there were two homogeneous proton groups from the reactions $O^{16}(dp)O^{17}$ and $O^{16}(dp)O^{17*}$. If oxygen were a contaminant of the carbon targets causing the observed groups at 115 and 155° one would also expect the two groups of particles at 90°.

The reason that Buechner[1] and Heydenburg[2] did not find the 1.0-Mev level in C^{13} may be the fact that they used lower bombarding energies.

I wish to thank Dr. R. N. Varney for his constant interest, encouragement, and assistance.

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[1] Buechner, Strait, Sperduto, and Malm, Phys. Rev. **76**, 1543 (1949).
[2] Heydenburg, Inglis, Whitehead, and Hafner, Phys. Rev. **75**, 1147 (1949).
[3] K. Boyer, Phys. Rev. **78**, 345 (1950).
[4] To be published in greater detail later.

Gamma-Gamma-Correlation Experiments*

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THE correlation of successive gamma-rays has been reported previously for a number of radioactive substances.[1] We have also investigated the gamma-gamma-correlation for several of these activities and for a few other isotopes. The apparatus consisted of two scintillation gamma-counters with 931-A photomultipliers and stilbene crystals. Figure 1, curve A, shows the observed function for Co^{60} and Fig. 2 that of Rh^{106}. These are essentially in agreement with the observations of Deutsch and Brady. The significance of the function for Co^{60} has been discussed by Brady and Deutsch[1] and by Segrè and Helmholtz.[2] The explanation of the Rh^{106} data is still a matter for speculation.

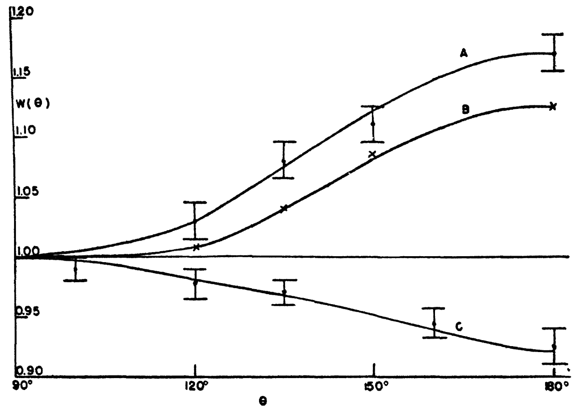

FIG. 1. Gamma-gamma-correlation functions of Co^{60} (curve A), Cs^{134} (curve B), and Ag^{110} (curve C).

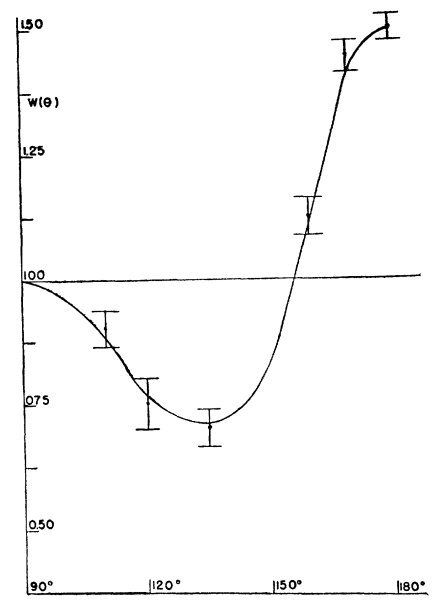

FIG. 2. Gamma-gamma-correlation function of Rh^{106}.

Figure 1, curve B, is the observed function for Cs^{134}. It will be recalled that Cs^{134} has essentially three gamma-rays in cascade, the upper gamma occurring about 25 percent of the time.[3] It is possible to explain the experimental data with the assumptions that the two lower transitions are quadrupole between states possessing angular momenta $J=4$, 2, and 0, and that the upper transition is quadrupole with $J=4$, 5, or 6 for the uppermost state. The polarization correlation experiments[4] and the measurements of the total absolute conversion coefficient[5] for Cs^{134} indicate that one of the lower transitions may be magnetic quadrupole.

Curve C is the observed correlation function for Ag^{110}. An interpretation of this function is difficult because of the large number of gamma-rays present in the structure.[6]

We have also observed that the correlation function for Na^{24} is the same as that of Co^{60}, and have found some evidence of gamma-gamma-correlation in Hf^{181} and Tb^{160}.

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[1] E. L. Brady and M. Deutsch, Phys. Rev. **74**, 1541 (1948).
[2] E. Segrè and A. C. Helmholtz, Rev. Mod. Phys. **21**, 293 (1949).
[3] L. G. Elliott and R. E. Bell, Phys. Rev. **72**, 979 (1947). K. Siegbahn and M. Deutsch, Phys. Rev. **73**, 410 (1948).
[4] A. Williams and M. L. Wiedenbeck, Phys. Rev. **78**, 822 (1950).
[5] M. L. Wiedenbeck and K. V. Chu, Phys. Rev. **72**, 1171 (1947).
[6] Kai Siegbahn, Phys. Rev. **77**, 233 (1950).