# PHYSICS

Chairman: MARSHALL DIXON, Butler University

CHARLES S. MORRIS, Manchester College, was elected chairman for 1960

## ABSTRACTS

**(d,p) Reactions in Bismuth and Uranium.**[1] F. R. SWANSON, G. B. HOLM, J. R. BURWELL and D. W. MILLER, Indiana University.—A double-focusing magnetic spectrometer has been employed to observe the energy and angular distributions of proton groups from $Bi^{209}$ targets bombarded by 11-Mev deuterons. The Q value of the most energetic proton group, previously unobserved, is found to be 2.34 ± 0.03 Mev. As the ground-state Q-value calculated from known binding and disintegration energies is 2.38 Mev, this group may represent either the ground-state or a low excited-state transition, or both. Broad but distinct proton groups were also observed corresponding to groups of states in $Bi^{210}$ with mean excitation energies of 0.41, 0.88, 1.5, 2.02, 2.56, 2.81, 3.15, and 4.03 Mev. The observed properties of these groups yield interesting information on the neutron-proton interaction outside a closed-shell core of the atomic nucleus.

**Energy Levels in $Ne^{22}$.** M. B. SAMPSON, H. J. MARTIN and D. W. MILLER, Indiana University.—The 21.8-Mev alpha particle beam from the Indiana University cyclotron has been used to excite the $F^{19}(\alpha,p)$ $Ne^{22}$ reaction. The outgoing proton energies have been measured in a double-focusing magnetic spectrometer. A large number of proton groups were seen and could be identified with the Fluorine reaction. Groups were found corresponding to the ground state of $Ne^{22}$ and known states at 1.28- and 3.37-Mev excitation energy. A state found at 4.52-Mev excitation energy was located at 4.9-Mev in earlier work. Additional proton groups indicated previously unknown states in $Ne^{22}$ at excitation energies of 5.18, 5.67, 6.41, 6.88, and 7.48-Mev. All of the energy measurements are ± .040 Mev.

**Beta-Gamma Directional Correlation Measurements in First Forbidden Transitions.** H. J. FISCHBECK and R. G. WILKINSON, Indiana University.—The energy dependence of the anisotropy coefficient for the first forbidden beta decay and the subsequent gamma-ray has been studied in the cases of $Rb^{86}$ and $La^{140}$. The measurements were made with a small shaped field 180° beta-ray spectrometer which defined the electron energy and a moveable scintillation gamma-ray detector. In the case of $Rb^{86}$ the anisotropy ranges from + 0.06 at 160 kev to + 0.19 at 630 kev. The values obtained at seven energies in this range are accurate to about 5%. It is hoped that with these more reliable data a theoretical analysis of the results may lead to a knowledge of the matrix elements involved in the decay. In the case of $La^{140}$ the measured positive anisotropy of + 0.12± 0.03

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at 1.67 Mev is to be compared with the theoretical value of + 0.133 prevails for a spin sequence $4^- — 2^+ — 0$. This data together with the results of Langer's shape determination of the high energy beta group makes the spin assignment of $4^-$ to the ground state of $La^{140}$ unambiguous.