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To Eugene Paul Wigner on his Sixtieth Birthday

THIS issue of Reviews of Modern Physics is dedicated to Eugene Wigner on his sixtieth birthday. The undersigned speak for all the contributors to this issue as well as the scientific community as a whole in felicitating him on his fruitful sixty years. The variety of the subject matter of the contributions indicates the pervasive influence that his ideas have had on the development of physics.

Eugene Paul Wigner was born in Budapest, November 17, 1902. Among his schoolmates were John von Neumann and Leo Szilard. (The impact of these three on intellectual life in the U. S. has been such that it is now customary to award the title of "honorary Hungarian" for appropriate achievement.) He went to Berlin as a student in 1921 and there received a doctorate of chemical engineering from the Technische Hochschule in 1925. From 1925 to 1930 he divided his time between Berlin and Göttingen and was successively assistant in Berlin (1926–7) and Göttingen (1927–8), and privat dozent 1928–30. In 1930 he came to the United States as lecturer in mathematical physics at Princeton and has remained there ever since, with interludes at the University of Wisconsin (1937–8), the metallurgical laboratory of the University of Chicago (1942–5), Oak Ridge (1946–7), and Leiden (1957–8).

An account of the scientific and technological achievements of Eugene Wigner is too long a story to be given here, although it would be very educational. Such an account could anyhow not be given in full. Wigner's habit of completing a masterly analysis of some topic in physics, writing it up, and filing it away, is already well known. What is not known is the present content of Wigner's filing cabinet.

It is characteristic of much of his work that it involves hard mathematical analysis built on simple physical assumptions. The neophyte is usually overwhelmed by the former. When confronted, for example, by the classification of the representations of the inhomogeneous Lorentz group, which is the main mathematical part of Wigner's analysis of relativistic invariance in quantum mechanics, the neophyte may tend to overlook the accompanying basic physical ideas. But the connoisseur will savor the deep physical understanding implicit in the choice of the starting point and the generality of the physical conclusions to be gained from the analysis. Those who had carefully read the preface of Wigner's great 1939 paper on relativistic invariance and had understood the physical ideas in his 1931 book on group theory and atomic spectra were not surprised by the turn of events in quantum field theory in the 1950's. A fair part of what happened was merely a matter of whipping quantum field theory into line with the insights achieved by Wigner in 1939.

It is striking how much longer it took for physicists to assimilate the physical ideas as opposed to the mathematical techniques involved in Wigner's analysis of invariance in quantum mechanics. It took the parity revolution of 1956 to jar a substantial fraction of the profession into thinking clearly about the subject. The generation of physicists educated after 1956 will have difficulty in understanding the curious mixture of indifference, incomprehension and puzzlement with which, for example, the famous paper on time inversion invariance of 1931 was initially treated. The basic ideas involved are now so much a part of our way of thinking that one does not ask from where they came. Perhaps this illustrates the remark of one of the present generation of theoretical physicists: "It sometimes appears that there are communication barriers between Wigner and other physicists, but there seems to be no barrier at all between Wigner and physics."

A characteristic feature of Wigner's way of working is its down-to-earth quality. There are many young men who, their heads bulging with information on Hilbert spaces, have come to him with an idea, only to have him try it out first on 2×2 matrices. (It usually helped.) Another aspect of this down-to-earth quality is his great respect for and knowledge of facts. If one comes to discuss a crystal with him, it is a good bet that he will be able to give off hand its density, structure, thermal conductivity, and the slow neutron cross section of its elements. Moreover, the stuff he is thinking about probably has the right color.

To the legends based on what he has done should be added those based on how he said what he had to say. For example, having had explained to him a selection rule on meson decay, he said "Perhaps, I am not as surprised as I should be." Another example: A piece of work is "amusing" if it is correct and beautiful; it is "interesting" if it is wrong and messy.

Wigner is a scientist with an acute sense of responsibility both for the science which he has created and for the nonscientific consequences of his scientific and technological achievements. His sense of scientific responsibility has made him a sort of present-day "conscience" of physics: If a new idea receives his unqualified approval, it is probably sound. His sense of social responsibility, and his uncompromising dedication to man's freedom, has led him to give much of his time and talent to the service of the United States Government. For the past eight years he has been a member of the General Advisory Committee of the Atomic Energy Commission; he has served on many panels of the President's Science Advisory Committee; he has lent his common sense and moral integrity to several Pugwash meetings; perhaps most important, he has served as a deeply trusted informal adviser to many government scientific administrators.

If Wigner's achievements were confined to his pure physics, he would be ranked among our generation's great pure scientists. If his achievements were confined to his technology, he would be ranked among our generation's great engineers. That his achievements in both science and technology have received much recognition—the Medal for Merit, the Fermi Award, the Atoms-for-Peace Award, the Franklin Medal, and the Max Planck Medal—merely reflects the good judgment of the committees that award these honors. Those of us who have been fortunate enough to be closely associated with this remarkable man, who has deeply enriched our outlook on science and on the world, can only hope that his beneficent influence on physics, technology, and the world at large will increase, and that Wigner himself will enjoy many, many, more years, during which he may continue to inspire the newer generation of physical scientists.

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