

THE 1963 NOBEL PRIZE IN PHYSICS

THE Swedish Royal Academy of Sciences has announced that the 1963 Nobel Prize in physics is to be given jointly to Eugene P. Wigner of Princeton University, who will receive half of the cash award of \$51 000, and to Maria Goeppert Mayer of the University of California and J. Hans D. Jensen of the University of Heidelberg, who will share the other half.

Professor Wigner, who is known for the range of his contributions in mathematical physics, was honored for his early recognition of the importance of symmetry principles and for his application of those principles during the past three decades in dealing with a wide variety of physical problems. He was the first to apply the methods of group theory to the quantum mechanics of atomic spectra and the first to introduce the concept of parity. He classified atomic states by the symmetry behavior of the wave function under the operation of reflection, and employed this concept of parity to explain the experimental observation that certain energy transitions did not occur. In later years, he extended the group-theoretical approach to nuclear spectra as well. His work on the Lorentz group provides a firm foundation for much current activity in relativistic quantum theory.

The proposal in the mid-thirties that nuclear forces are charge independent implied that the nuclear Hamiltonian is symmetric with respect to the exchange of any two nucleons. This symmetry property led Professor Wigner to introduce the concepts of isobaric spin and isobaric spin multiplets, which he subsequently developed further. He and his collaborators also were responsible for the extensive development of the scattering-matrix concept, an important ingredient in the theory of nuclear scattering and reaction rates. Another of his achievements in the early thirties was his quantum-mechanical formulation of time invariance.

Professor Wigner is also known for his contributions to nuclear reactor theory, for which he has been honored with the Fermi Award (1958) and the Atoms for Peace Award (1960). A member of the Princeton faculty almost continuously since 1930, he was born in Budapest in 1902 and received his doctorate from the Berlin Technische Hochschule in 1925. He has served as president of the American Physical Society (1956) and has been a member of the General Advisory Committee

to the Atomic Energy Commission for a number of years.

Professors Mayer and Jensen were honored for their development of the nuclear-shell model. In 1948, when the liquid-drop model was in vogue, Mrs. Mayer published the first complete evidence for the existence of particularly stable nuclei with 20, 50, 82, or 126 protons and/or neutrons. The following year, Professor Jensen (collaborating with O. Haxel and H. E. Suess) and Professor Mayer independently proposed a model in which nucleons are arranged in systems of "shells" inside the nucleus. Closed shells occur when there is a "magic number" of nucleons. The theory assumes that the nucleons move almost independently of each other under the influence of a common potential. To account for the order in which the shells are filled, a strong spin-orbit coupling term is introduced in the potential, so that the orbital (l) and spin vectors of each individual nucleon form a total angular momentum vector (j) for the nucleon. Those nucleons with $j = l + \frac{1}{2}$ occupy a lower energy state than those with $j = l - \frac{1}{2}$. The model was successful in predicting the magic-number properties, and gave the first satisfactory representation of the angular momentum, parity, and magnetic dipole moment of the ground levels and of the low-lying excited levels of nuclei.

Mrs. Mayer, who is professor of physics at the University of California at La Jolla, was born Maria Goeppert in Kattowitz, Germany. She received her PhD from the University of Göttingen in 1930—the same year she married physical chemist Joseph Mayer, who is known for his work in statistical and quantum mechanics and who is also a faculty member at La Jolla. She spent the thirties at Johns Hopkins, and the war years at Sarah Lawrence College and Columbia. From 1945 until 1960, when she went to California, she was associated with the University of Chicago and the Argonne National Laboratory.

Professor Jensen was born in Hamburg in 1907 and received his doctorate from the University of Hamburg in 1932. He remained there until 1941, when he went to the Technische Hochschule in Hanover. Since 1949 he has been at the University of Heidelberg. In 1955, he and Mrs. Mayer co-authored the book *Elementary Theory of Nuclear Shell Structure* (Wiley).