Glimm and Witten Receive National Medal of Science

James G. Glimm   **Edward Witten**

On October 22, 2003, President Bush named eight of the nation's leading scientists and engineers to receive the National Medal of Science. The medal is the nation's highest honor for achievement in science, mathematics, and engineering. The medal also recognizes contributions to innovation, industry, or education.

Among the awardees are two who work in the mathematical sciences, JAMES G. GLIMM and EDWARD WITTEN.

James G. Glimm

Glimm has made outstanding contributions to shock wave theory, in which mathematical models are developed to explain natural phenomena that involve intense compression, such as air pressure in sonic booms, crust displacement in earthquakes, and density of material in volcanic eruptions and other explosions. Glimm also has been a leading theorist in operator algebras, partial differential equations, mathematical physics, applied mathematics, and quantum statistical mechanics.

Glimm's work in quantum field theory and statistical mechanics had a major impact on mathematical physics and probability and dramatically raised the scientific level of those fields.

Glimm established a center of applied mathematics at the State University of New York at Stony Brook, where, through a network of collaborations with research groups elsewhere, he has been a key player in present-day research in applied mathematics.

James Glimm was born in Peoria, Illinois, on March 24, 1934, and received his Ph.D. from Columbia University in 1959. He is the Distinguished Leading Professor of Mathematics at the State University of New York at Stony Brook.
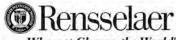
Edward Witten

Witten is a world leader in "string theory", an attempt by physicists to describe in one unified way all the known forces of nature as well as to understand nature at the most basic level. Witten's contributions while at the Institute for Advanced Study have set the agenda for many developments, such as progress in "dualities", which suggest that all known string theories are related.

Witten's earliest papers produced advances in quantum chromodynamics (QCD), a theory that describes the interactions among the fundamental particles (quarks and gluons) that make up all atomic nuclei. Witten also suggested searches for cosmic dark matter that are now under way.

Witten discovered many relations between "supersymmetric quantum theory" and geometry. Supersymmetry lies at the basis of theoretical fundamental particles scientists are still seeking at the Fermilab Tevatron and soon at the Large Hadron Collider under construction at CERN.

Witten's mathematical insights relating the physics of gauge theory to the mathematics of knots and manifolds led to a revolution in understanding

the classification of higher-dimensional spaces. For this work Witten became the only theoretical physicist ever to receive the Fields Medal, the most prestigious award in pure mathematics. He is also credited with demonstrating applications of algebraic geometry and topology, core disciplines of modern mathematics, to deep problems of string theory and gauge field theories.

Edward Witten was born in Baltimore, Maryland, on August 26, 1951, and received his Ph.D. in physics from Princeton University in 1976. He is the Charles Simonyi Professor of Physics at the Institute for Advanced Study in Princeton.

About the National Medal of Science

The National Medal of Science was established by Congress in 1959. It was intended to be awarded annually by the president of the United States for outstanding contributions to knowledge in the physical, biological, mathematical, or engineering sciences. Congress expanded this definition in 1980 to recognize outstanding work in the social and behavioral sciences. In 1962 President John F. Kennedy awarded the first Medal of Science to the late Theodore von Karman, professor emeritus, California Institute of Technology. A committee of twelve scientists and engineers is appointed by the president to evaluate the nominees for this award. The National Science Foundation (NSF) administers the National Medals of Science for the White House.

Including the current awardees, 409 individuals have received the National Medal of Science. The awardees in mathematics and computer science are: Raoul Bott, Richard D. Brauer, Felix E. Browder, Alberto P. Calderón, George F. Carrier, Shiing-Shen Chern, John Cocke, Paul J. Cohen, Ronald R. Coifman, George B. Dantzig, Joseph L. Doob, William Feller, Michael H. Freedman, Kurt Otto Friedrichs, Kurt Gödel, Herman H. Goldstine, Ralph E. Gomory, Samuel Karlin, Richard M. Karp, Joseph B. Keller, Stephen C. Kleene, Donald E. Knuth, Martin D. Kruskal, Peter D. Lax, Saunders Mac Lane, John McCarthy, John W. Milnor, Cathleen Synge Morawetz, Allen Newell, Jerzy Neyman, Louis Nirenberg, Calyampudi R. Rao, Isadore M. Singer, Stephen Smale, Donald C. Spencer, Elias M. Stein, Marshall H. Stone, John Griggs Thompson, John Wilder Tukey, Karen K. Uhlenbeck, Hassler Whitney, Norbert Wiener, Shing-Tung Yau, Oscar Zariski, and Antoni Zygmund.

—Compiled from NSF news releases