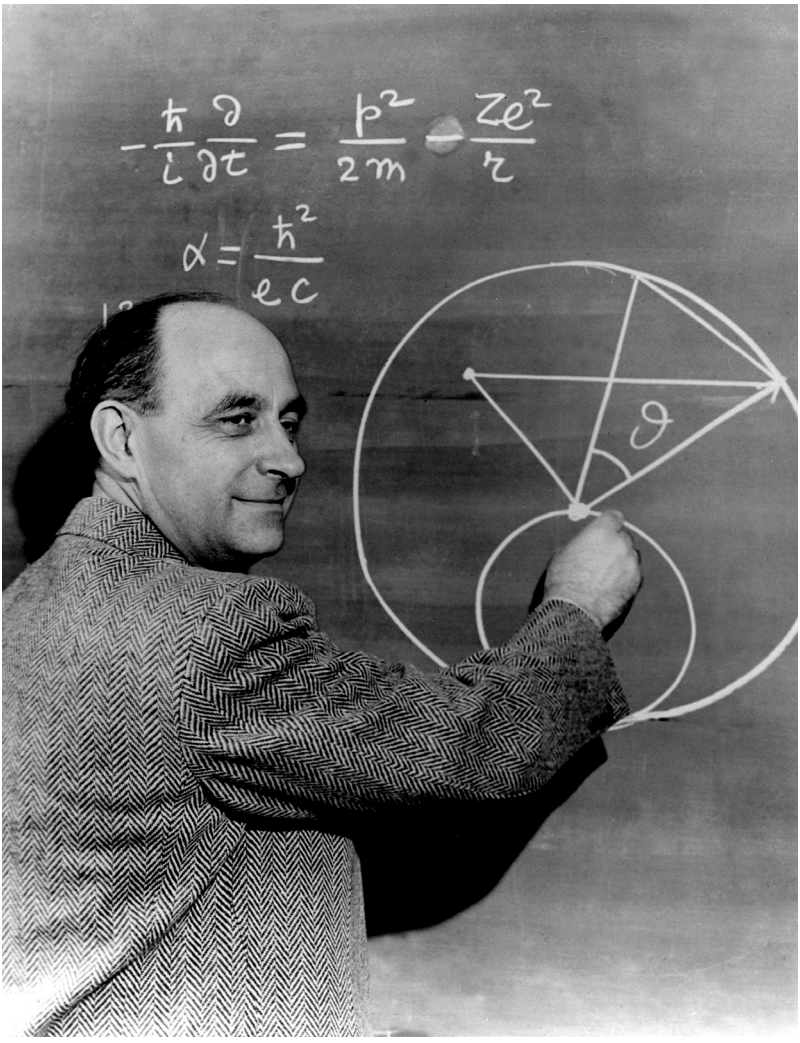
2023

ENRICO FERMI AWARDS CEREMONY

An award given by
the President of the United States
and the U.S. Department of Energy


$-\frac{\hbar}{i}\frac{\partial}{\partial t} = \frac{p^2}{2m} - \frac{Ze^2}{r}$
$\alpha = \frac{\hbar^2}{ec}$
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President Joe Biden
and
Secretary Jennifer Granholm

welcome you to the presentation of the

2023 ENRICO FERMI AWARDS

presented to

Darleane C. Hoffman

and

Gabor A. Somorjai

Tuesday, June 6, 2023
3:00 p.m. Pacific Time

Lawrence Berkeley National Laboratory
One Cyclotron Road, Berkeley, CA 94720

"For scientific discoveries advancing the field of nuclear and radiochemistry, for distinguished service to the Department's missions in national security and nuclear waste management, and for sustained leadership in radiochemistry research and education."

DARLEANE C. HOFFMAN

University of California, Berkeley
Lawrence Berkeley National Laboratory

Darleane C. Hoffman was born in Terril, Iowa, and completed bachelor's and doctorate degrees in chemistry at Iowa State University. There she met and married Marvin M. Hoffman. In 1953, Hoffman joined Los Alamos Scientific Laboratory as a radiochemist where she conducted groundbreaking studies of the fission properties of fermium-257 and created methods for separating plutonium and the actinides. These methods became the basis for analyzing nuclear test debris and were used in the national security community for programs in nonproliferation and treaty verification. Her group's studies of radionuclide migration at the Nevada Test Site helped formulate methods for safe storage of nuclear waste and its isolation from the environment. Hoffman's group was the first to demonstrate the presence of transuranium elements in nature.

In 1984, Hoffman became a professor of chemistry at the University of California, Berkeley, and leader of the Heavy Element Nuclear and Radiochemistry Group at Lawrence Berkeley National Laboratory. Hoffman's development of "atom-at-a-time" chemistry made possible the study of elements with half-lives of less than one minute. Her group investigated the chemistry of elements 104 (rutherfordium), 105 (dubnium), 106 (seaborgium), 107 (bohrium), and 108 (hassium). She and colleagues confirmed the discovery of element 106, which was named for Nobel Laureate Glenn Seaborg. Hoffman also served as the charter director of Lawrence Livermore National Laboratory's Seaborg Institute for Transactinium Science.

Hoffman's awards include: the U.S. National Medal of Science, Los Alamos Medal, American Chemical Society's Priestley Medal, Women in Technology International Hall of Fame, American Chemical Society's Garvan-Olin Medal, Sigma Xi Procter Prize for Scientific Achievement, and Membership in the Norwegian Academy of Science and Letters.

“For seminal advances in molecular studies of surfaces through the use of single crystals, for the development of techniques for quantitative determinations of surface structure, and for establishing the molecular foundations of heterogeneous metal catalysis.”

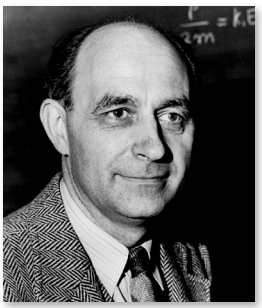
GABOR A. SOMORJAI

University of California, Berkeley
Lawrence Berkeley National Laboratory

Gabor A. Somorjai received a bachelor's degree in chemical engineering from the Technical University of Budapest. He earned a doctorate in chemistry from the University of California, Berkeley, where he became an assistant professor after serving as a staff scientist with IBM for four years. In 2002, Somorjai was appointed University Professor, the highest honor bestowed to a faculty member in the University of California system. He is also a Faculty Senior Scientist at Lawrence Berkeley National Laboratory.

Somorjai is a member of the National Academy of Sciences (NAS) and the American Academy of Arts and Sciences. Among his honors are the NAS Award in Chemical Sciences (2013), Eni New Frontiers of Hydrocarbons Prize (2011), BBVA Foundation Frontiers of Knowledge Award (2010), Honda Prize (2011), and F. A. Cotton Medal (2003). Somorjai also received the National Medal of Science (2001), Wolf Prize in Chemistry (1998), Helmholtz Medal from the Berlin-Brandenburg Academy of Sciences and Humanities (2020), Irving Langmuir Award in Chemical Physics from the American Physical Society (2007), and Von Hippel Award of the Materials Research Society (1997). The American Chemical Society has recognized Somorjai with several awards including the Priestley Medal (2008), Award for Creative Research in Homogeneous and Heterogeneous Catalysis (2000), Arthur W. Adamson Award in Surface Chemistry (1994), Peter Debye Award in Physical Chemistry (1989), William H. Nichols Medal (2015), and Linus Pauling Award (2000).

Somorjai holds 10 honorary degrees from universities around the world, has educated about 400 graduate students and postdoctoral fellows, and is the author of more than 1,200 scientific publications and four books.



THE LIFE OF ENRICO FERMI

Established in 1956, the Enrico Fermi Award aims to perpetuate the memory of this brilliant scientist, honor exceptional researchers and engineers of his kind, and inspire others by his example. The award recognizes outstanding achievements in the development, use, or control of energy (including nuclear, atomic, molecular, and particle interactions and effects). The award is given to people with international reputations and careers marked by continued, outstanding achievements in the field of energy and is not restricted to U.S. citizens.

Born in Rome in 1901, Enrico Fermi was a self-taught scientific child prodigy. By age 17, not only had he acquired what contemporaries considered an advanced graduate-level education in classical physics, but he was also quite proficient at building electric motors. This passion for both the theoretical and the practical characterized Fermi's entire career and distinguished him from most other scientists.

Fermi received his doctorate from the University of Pisa in 1922. From 1923 to 1924, he studied in Göttingen, Germany, with Max Born and in Leiden, the Netherlands, with Paul Ehrenfest. From 1924 to 1926, Fermi lectured in mathematical physics and mechanics at the University of Florence. Based on his already numerous contributions to general theories of relativity, and especially his statistics of particles obeying the exclusion principle, Fermi was awarded the coveted first chair of theoretical physics at the University of Rome, where he taught for 12 years. By 1927, he was already a leading theoretician in the international scientific community.

In the 1930s, Fermi made a series of monumental contributions in physics. He developed the theory of beta decay based on Wolfgang Pauli's hypothesis of the neutrino. As part of his theory, Fermi introduced a new fundamental constant of nature, the Fermi constant, which plays a role analogous to that of an electron charge in electromagnetism. Soon thereafter, other researchers discovered artificial radioactivity, which provided the experimental activity Fermi pursued for the rest of his career.

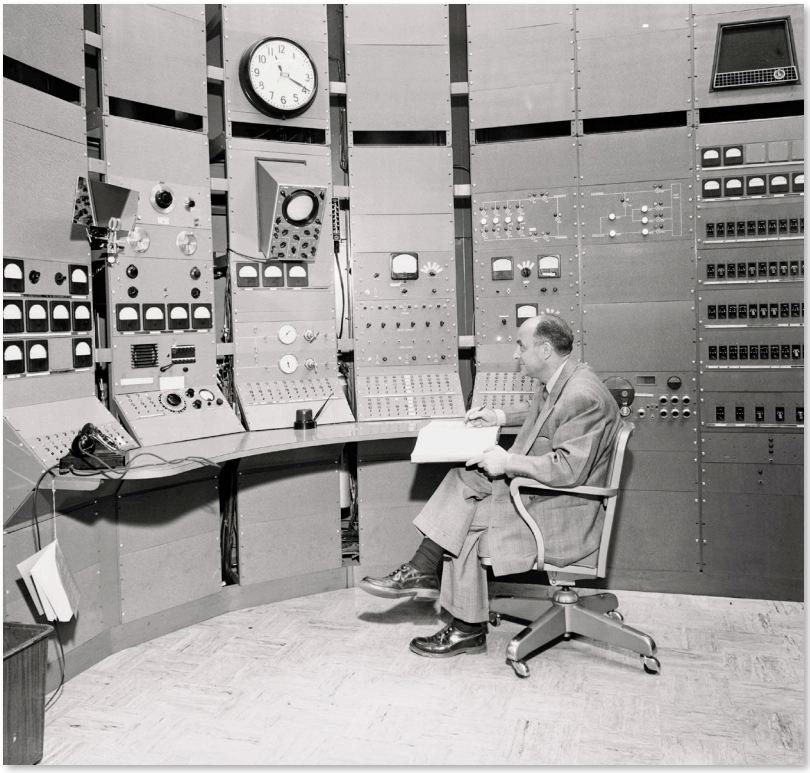
Like many other Europeans, Fermi's life was affected by the changing political dynamics of the 1930s. Although he remained silent, Fermi deeply resented the Fascist racial laws instituted in 1938 and their implications for his wife Laura, who was Jewish. When he learned that he was to receive the Nobel Prize for Physics in 1938, he decided to use the occasion to flee. Fermi and his family sailed directly from the ceremony in Stockholm to New York City. His Nobel Prize citation read, "To Professor Enrico Fermi of Rome for his identification of new radioactive elements produced by neutron bombardment and his discovery, made in connection with this work, of nuclear reactions affected by slow neutrons." In his wife's words, "Four years of patient researches; the broken and the unbroken tubes full of beryllium powder and radon; the strenuous races along the hall of the physics building to rush element after element to the Geiger counters; the efforts to understand nuclear processes, and the many tests to prove the theories . . . these had won the Nobel Prize for Enrico."*

** Laura Fermi, Atoms in the Family, University of Chicago Press, Chicago, 1954, p. 123.*

Fermi took a teaching position at Columbia University in 1939. Soon after, Otto Hahn and Fritz Strassmann discovered fission. Fermi and others grasped the significance of secondary neutrons and perhaps a chain reaction, and thus Fermi immediately focused his experiments on causing such a reaction.

When the Manhattan Project was established in 1942, Fermi led the chain reaction and plutonium research. From 1942 to 1944, he worked at the Metallurgical Laboratory of the University of Chicago. There, in a makeshift laboratory under Stagg Field stadium, his team of scientists designed and built the first nuclear reactor. On December 2, 1942, Fermi led the epochal experiment that demonstrated the first self-sustained chain reaction. More than any individual, Enrico Fermi was responsible for the controlled release of nuclear energy. His achievement allowed the United States to produce the atomic bomb that helped end World War II.

Fermi became a U.S. citizen in 1944. From 1944 to 1945, he served as Associate Director of Los Alamos National Laboratory in New Mexico. In 1946, he returned to the University of Chicago as a professor at the Institute of Nuclear Studies, which now bears his name. Fermi resumed his fundamental research interests in nuclear and elementary particle physics and, beginning in 1950, served as one of the first members of the General Advisory Committee of the Atomic Energy Commission.



On November 16, 1954, President Dwight Eisenhower and the Atomic Energy Commission gave Fermi a special award for his lifetime of accomplishments in physics and, in particular, for the development of atomic energy. Fermi's other research included development of Fermi-Dirac particle statistics, the theory of beta decay, the Thomas-Fermi model of the atom, and a theory of the origin of cosmic rays. Fermi died of cancer on November 28, 1954.

Today—more than 80 years after Fermi harnessed the atom and opened the door to a new scientific realm—nuclear energy provides a significant portion of the world's electrical power and radioactive materials are used in hundreds of medical, agricultural, and industrial applications. These uses range from cancer therapy to food preservation to integrity tests of welds in pipelines and bridges to thickness measurements of coatings applied to paper.

THE ENRICO FERMI AWARD

As a Presidential award, the Enrico Fermi Award is one of the oldest and most prestigious science and technology honors given by the U.S. Government. It recognizes scientists of international stature for their lifetimes of exceptional achievement in the development, use, control, or production of energy (broadly defined to include the science and technology of nuclear, atomic, molecular, and particle interactions and their effects on mankind and the environment).

On November 16, 1954, President Dwight Eisenhower and the Atomic Energy Commission honored Enrico Fermi with a special award for his lifetime of accomplishments in physics and, in particular, for the development of atomic energy. Twelve days later, the Italian-born naturalized American citizen died of cancer at age 53.

The Enrico Fermi Award was established in 1956 as a memorial to the 1938 Nobel Laureate in physics who initiated the atomic age by achieving the first nuclear chain reaction in December 1942. The first Fermi Award recipients included physicists John von Neumann, Ernest O. Lawrence, Hans Bethe, and Edward Teller.

The award encourages excellence in energy science and technology and demonstrates appreciation to scientists, engineers, and science policy-makers who have given unstintingly over their lifetimes to benefit mankind through energy science and technology. It aims to inspire people of all ages through the examples of Enrico Fermi, whose achievements opened new scientific and technological realms, and the Fermi Award laureates who continue in his tradition.

ENRICO FERMI AWARD LAUREATES

2023
Darleane C. Hoffman
Gabor A. Somorjai

2014
Claudio Pellegrini
Charles V. Shank

2013
Allen J. Bard
Andrew Sessler

2010
Mildred S. Dresselhaus
Burton Richter

2009
John B. Goodenough
Siegfried S. Hecker

2005
Arthur H. Rosenfeld

2003
John N. Bahcall
Raymond Davis, Jr.
Seymour Sack

2000
Sheldon Datz
Sidney D. Drell
Herbert F. York

1998
Maurice Goldhaber
Michael E. Phelps

1996
Mortimer M. Elkind
Richard L. Garwin
H. Rodney Withers

1995
Ugo Fano
Martin D. Kamen

1993
Freeman J. Dyson
Liane B. Russell

1992
Harold Brown
John S. Foster, Jr.
Leon M. Lederman

1990
George A. Cowan
Robley D. Evans

1988
Richard B. Setlow
Victor F. Weisskopf

1987
Luis Alvarez
Gerald F. Tape

1986
Ernest D. Courant
M. Stanley Livingston

1985
Norman Rasmussen
Marshall Rosenbluth

1984
Georges Vendryés
Robert R. Wilson

1983
Alexander Hollaender
John H. Lawrence

1982
Herbert Anderson
Seth Neddermeyer

1981
W. Bennett Lewis

1980
Rudolf E. Peierls
Alvin M. Weinberg

1978
Wolfgang K.H. Panofsky
Harold M. Agnew

1976
William L. Russell

ENRICO FERMI AWARD LAUREATES

1972
Manson Benedict

1971
Shields Warren
Stafford L. Warren

1970
Norris E. Bradbury

1969
Walter H. Zinn

1968
John A. Wheeler

1966
Otto Hahn
Lise Meitner
Fritz Strassmann

1964
H.G. Rickover

1963
J.R. Oppenheimer

1962
Edward Teller

1961
Hans A. Bethe

1959
Glenn T. Seaborg

1958
Eugene P. Wigner

1957
Ernest O. Lawrence

1956
John von Neumann


ENRICO · FERMI
SCIENTIA
PROGRESSUS
1901 ~

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