

Wolf Foundation Honors Brout, Englert, and Higgs for Physics, Gray for Chemistry

At a ceremony at the Knesset in Jerusalem on 9 May, **Robert Brout**, **François Englert**, and **Peter W. Higgs** will jointly receive the Wolf Prize in Physics and **Harry B. Gray**, the Wolf Prize in Chemistry. These prizes, together with awards in agriculture, the arts, and medicine, will be conferred by Moshe Katsav, president of Israel. Each Wolf Prize is worth \$100 000. The three physicists will share the cash award and Gray will receive the entire amount.

Brout, professor emeritus at the Free University of Brussels (ULB), Englert, professor emeritus at ULB and senior professor at Tel Aviv University, and Higgs, professor emeritus at Edinburgh University, are being recognized for their "pioneering work that has led to the insight of mass generation, whenever a local gauge symmetry is realized asymmetrically in the world of subatomic particles," according to the citation. In 1964, Brout and Englert explained how gauge bosons associated with broken symmetries acquire mass. That same year, Higgs offered an independent explanation.

The trio's work, says the Wolf Foundation, which sponsors the prize, "has deeply shaped the understanding of the fundamental interactions." Moreover, mass generation was an "essential" element in the work of Gerard 't Hooft and Martinus Veltman, which led to the proof that theories like the Glashow, Salam, and Weinberg electroweak theory are well defined, their massive gauge bosons notwithstanding. Calculations based on the electroweak theory have been verified in the lab and cul-

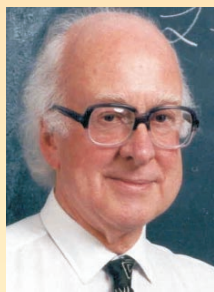
minated with the experimental discovery of the massive W and Z gauge bosons. Adds the foundation, "Mass generation has been the cornerstone of many key theoretical results, including cosmology at high temperature and density, grand unified theories, and the possible realization of the Dirac monopole."



Brout



Englert



Higgs



Gray

Chemistry prize

The Wolf Foundation is recognizing Gray, Arnold O. Beckman Professor of Chemistry at Caltech, for his "pioneering work in bio-inorganic chemistry." Specifically, he is being acknowledged for his contributions to "unraveling novel principles of structure and long-range electron transfer in proteins."

After arriving at Caltech in the mid-1960s, Gray and his colleagues enlisted the help of physicist Jim Mercereau to measure the magnetic properties of metals in proteins. Eventually, the group used magnetic and color properties to help them figure out the structures of bioinorganic molecules. Gray knew that proteins with metal atoms like iron or copper could transfer electrons, but he and other inorganic chemists believed that atoms had to be physically close for the reaction to occur. The question appeared to be how the atoms could get close enough to allow for the exchange.

In 1982, Gray and his colleagues demonstrated that electrons can jump from one metal atom through a protein to another metal atom—at much greater distances than originally thought—in a process called electron tunneling. "His ingenious chemistry, meticulously executed," says the Wolf

Foundation, "has given us real understanding, for the first time, of biological processes of great significance for life."

Wolf Prizes are presented not only in the arts, but in four out of five scientific fields, which rotate annually: agriculture, chemistry, mathematics, medicine, and physics. Since they were established in 1978, Wolf Prizes have been awarded to 214 scientists to date.

NAS Bestows Awards This Month

On 19 April, 16 individuals are being recognized by the National Academy of Sciences for their achievements in science. They, including the following seven scientists who work in physics or a related field, are receiving their awards in a ceremony during the academy's annual meeting in Washington, DC.

Klaus Wyrski receives the Alexander Agassiz Medal, which NAS awards every three years. Professor emeritus in the department of oceanography at the University of Hawaii in Honolulu, Wyrski is cited for his "fundamental contributions to the understanding of the oceanic general circulation of abyssal and thermocline waters and for providing the intellectual underpinning of our understanding of ENSO (El Niño)." He takes away a medal and a cash prize of \$15 000.

The Comstock Prize in Physics, awarded approximately every five years and worth \$20 000, is going to **John N. Bahcall**, Richard Black Professor of Natural Science at the Institute for Advanced Study in Princeton, New Jersey. Bahcall is acknowledged for his "many contributions to astrophysics, especially his definitive work on solar models and his crucial role in identifying and resolving the solar neutrino problem."

Carlos Bustamante garners the Alexander Hollaender Award in Biophysics, which NAS hands out every three years, for his "ingenious use of atomic force microscopy and laser tweezers to study the biophysical properties of proteins, DNA, and RNA, one molecule at a time." Bustamante has joint appointments as an investigator with the Howard Hughes Medical Institute and professor of molecular and cell biology, physics, and chemistry at the University of