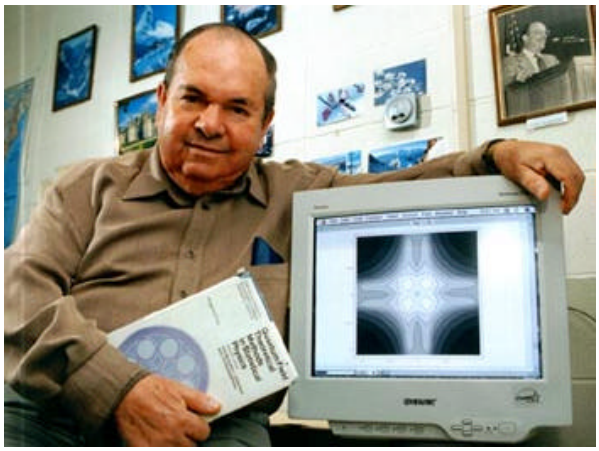
Argonne scientist wins 2003 Nobel Prize for Physics



ARGONNE, Ill. (Oct. 7, 2003) — Alexei Abrikosov of the U.S. Department of Energy's Argonne National Laboratory today shares the Nobel Prize in physics with two colleagues for theories about how matter can show bizarre behavior at extremely low temperatures.

The Royal Swedish Academy of Sciences cited Abrikosov, 75, Anthony J. Leggett, 65, and Vitaly L. Ginzburg, 87, for their work concerning two phenomena called superconductivity and superfluidity.

Abrikosov's research centers on condensed-matter physics (the structure and behavior of solids and liquids), and concentrates on superconductivity, the ability of some materials to carry electrical current without resistance. He was the first to propose the concept of "type-II superconductors" in 1952 and constructed the theory of their magnetic properties, known as the Abrikosov vortex lattice.

His wide-ranging career has also included research in quantum electrodynamics (the theory of elemental particle interactions) and astrophysics, in which he studied the properties of hydrogen planets. He has also worked on the theory of semimetals and plasma physics, the behavior of materials under high pressures and the theory of quantum liquids.

Ginzburg is a Russian based at the P.N. Lebedev Physical Institute in Moscow; and Leggett is a British and American citizen based at the University of Illinois at Urbana-Champaign.

The $1.3 million prize money will be shared equally among the three winners.

Abrikosov said that he was not surprised, because he had been nominated several times before, but this year the Nobel committee notified him that he was a candidate. "And since this had never happened before, I saw this as a good sign," he said.

"I feel now relief," he said. "I had lost hope of winning ... But I thought my life is good even without [the Nobel Prize]. I have interesting work. I am happy. I love my family."

The two phenomena the researchers studied are linked, in that superconductivity arises from how pairs of electrons behave, while superfluidity comes about from pairings of atoms. Superconductivity is the ability of some materials to conduct electricity without resistance when they are chilled to extremely low temperatures. Superconducting magnets are used to produce powerful magnetic fields for the standard body scanning technique called magnetic resonance imaging, or MRI.

Researchers hope to harness superconductivity for such uses as power lines that can conduct current without waste to resistance and high-speed trains that float above the tracks.

Abrikosov is Argonne Distinguished Scientist at the Condensed Matter Theory Group in Argonne's Materials Science Division. He received his Ph.D. in 1951 from the Institute for Physical Problems in Moscow for the theory of thermal diffusion in plasmas and then the next degree, Doctor of Physical and Mathematical Sciences, in 1955 from the same institute for a thesis on quantum electrodynamics at high energies.

Abrikosov joined Argonne's Materials Science Division in 1991. His recent research has focused on the origins of magnetoresistance, a property of some materials that change their resistance to electrical flow under the influence of a magnetic field.

Before joining Argonne, Abrikosov was director of the Institute for High-Pressure Physics of the Academy of Sciences, Moscow. He was chairman of theoretical physics at the Moscow Institute for Steel and Alloys from 1976-1991, and was head of the condensed matter theory division of Russia's Landau Institute for Theoretical Physics from 1966-1988.

For his work in superconductivity research, Abrikosov received the Soviet Union's highest honor for scientific achievement, the Lenin Prize, in 1966, and the Sony Corporation's John Bardeen Award in 1991. He is also a member of the Royal Academy of London, one of the world's most prestigious scientific organizations.

He also received the International Fritz London Award in 1972 for his work in low-temperature physics, and the Soviet Union's State Prize in 1982 for his research on semimetals and semiconductors.

Abrikosov was named a full member of the Russian Academy of Sciences in 1987. He received the Landau Prize from the Academy of Sciences, Russia, in 1989 for a textbook on quantum theory methods used in statistical physics that is now a standard in the field.

Abrikosov has published two other books and written more than 190 journal articles.

He was elected to the National Academy of Sciences, one of the highest honors that can be accorded a U.S. scientist or engineer, in 2000. Abrikosov is a fellow of the American Physical Society, an honor limited to one percent of the society's membership.

The nation’s first national laboratory, Argonne National Laboratory conducts basic and applied scientific research across a wide spectrum of disciplines, ranging from high-energy physics to climatology and biotechnology. Since 1990, Argonne has worked with more than 600 companies and numerous federal agencies and other organizations to help advance America's scientific leadership and prepare the nation for the future. Argonne is operated by the University of Chicago for the U.S. Department of Energy's Office of Science.