Professor Alexei A ABRIKOSOV

Citation

Alexei Abrikosov has dedicated much of his life to researching the structure and behavior of solids and liquids, or "condensed-matter physics". This is no abstract field. His work has myriad applications, from magnetic resonance imaging to better conduct medical examinations, to particle accelerators in physics.

For over half a century his work has been carried out at top research institutes, both in his homeland of Russia and then in the United States, where he has lived for the last 14 years. It brought him a Nobel Prize for Physics in 2003, the praise of his peers and recognition from the world's top scientific bodies.

Among his many achievements, Prof Abrikosov was responsible for a breakthrough in the microworld of electrons and atoms via his theories about matter's bizarre behavior at extremely low temperatures. This occurs through what is termed "superfluidity" as well as "superconductivity".

His discovery of Type II superconductors and an associated magnetic property which carries his name — the *Abrikosov vortex lattice* — are considered to be among his seminal achievements. Superconductors are known for their ability to carry current without resistance and for expelling magnetic field. Prof Abrikosov showed how magnetic field can find its way back into superconductors by creating small bundles of magnetic flux lines surrounded by vortex currents. This means that magnetic field can return, in a very localized way, without driving the superconductivity away. A lattice is then formed, in much the same way that atoms do in the crystal framework of a solid.

Prof Abrikosov, Distinguished Argonne Scientist at the US Department of Energy's Argonne National Laboratory, was elected to the prestigious Royal Society in the UK in 2001, one year after receiving a similar high honor from the National Academy of Sciences in the US. He is also a Fellow of the American Physical Society. In Russia, he has won numerous awards, including the Lenin Prize in 1966 and is a member of the Russian Academy of Sciences. He also holds the International Fritz London Award and the International John Bardeen Award.

Alexei Abrikosov was born in Moscow in 1928 to parents who were both physicians. He graduated from Moscow State University in 1948 and was awarded his first doctorate for the theory of thermal diffusion of plasmas by the city's Institute for Physical Problems in 1951 and a second, for a thesis on quantum electrodynamics at high energies, in 1955.

Work followed on the microscopic theory of superconductivity for which he would later win acclaim, although a wide-ranging career has included research in astrophysics, the theory of semi-metals and plasma physics.

In 1965, he became Head of the Department of the Theory of Solids at Russia's Landau Institute for Theoretical Physics, a position he held until 1988. He subsequently became Director of the Institute for High-Pressure Physics at the Academy of Sciences in Moscow.

Three years later there was another turning point in Prof Abrikosov's life, in the form of an offer from the Argonne National Laboratory in Illinois. He accepted the position of Distinguished

Scientist at the Condensed Matter Theory Group in its Materials Science Division and moved permanently to the US, where he is now a citizen.

His Nobel Prize was greeted with delight at Argonne. "Alex's insights and discoveries have launched 50 years of studies into the fundamental nature of superconductivity," said Thomas Rosenbaum, Vice President for Research for the University of Chicago and Argonne National Laboratory.

Mr Chancellor, I have the honor to present to you, on behalf of the University, Prof Alexei A Abrikosov, distinguished scientist and 2003 Nobel Prize winner, for the degree of Doctor of Science *honoris causa*.