Professor Karl Alexander MÜLLER

Citation

To dream the impossible dream... to run where the brave dare not go. These words from the popular ballad "The Impossible Dream" perhaps provide the best introduction to the scientist we honor today, Professor Karl Alexander MÜLLER, one of the pioneers in the search for high-temperature superconductors and 1987 Nobel Laureate in Physics.

Professor Müller is an eminent Swiss scientist who, with his partner at the IBM Zurich Research Laboratory, Dr Johannes Georg Bednorz, was awarded the 1987 Nobel Prize for Physics for their joint discovery of the superconductive properties of certain oxides at temperatures higher than had previously been thought possible.

A specialist in the ceramic compounds known as oxides, Professor Müller began his quest in the early 1980s for substances that would act as superconductors (i.e., conduct electricity with no resistance) at higher temperatures than had hitherto been observed. The highest transition temperature (the temperature below which a material loses all electrical resistance) attainable at the time was about 23 degrees Kelvin, equivalent to -250° C or -418° F. In 1983, Professor Müller recruited Dr Bednorz to help him systematically test various oxides, materials that they believed might be suitable as superconductors. Initially thought to be impossible by many, they succeeded in 1986 by finding superconductivity in barium-lanthanum-copper oxide at a temperature of 35 K (-238° C or -396° F), 12 K higher than had previously been achieved. This discovery was extremely significant because that class of materials, usually insulators or bad conductors, had never been even remotely associated with superconductivity, not to mention superconductivity with high transition temperatures. Indeed, Professor Müller and Dr Bednorz have achieved the impossible dream, and their finding stimulated a surge of interest in superconductivity world-wide. Within a short period of time, transition temperatures approaching 100 K (-173°C or -280°F) had been achieved.

The intense interest generated by Professor Müller's and Dr Bednorz's discovery raised the hope that superconductivity could be achieved at temperatures high enough for the generation and transmission of electric power, a feat that would have a major economic impact. Other suggested uses for superconducting materials include medical magnetic-imaging devices, magnetic energy-storage systems, motors, generators, transformers, computer parts and very sensitive devices for measuring magnetic fields, voltages or currents. Developments in superconductivity are now being tracked closely by industry and the research community.

Professor Müller was born in Basle, Switzerland, on 20 April 1927. After his basic military training in the Swiss army, he enrolled in the Physics and Mathematics Department of the Swiss Federal Institute of Technology (ETH) in Zurich, where he received his doctorate on the subject of paramagnetic resonance (EPR) in 1958. On graduation, he joined the staff of the Battelle Memorial Institute in Geneva. There he

soon became the manager of a magnetic resonance group, and his mentor impressed upon him the motto: "One should look for the extraordinary."

While in Geneva, Professor Müller became a lecturer, then professor, at the University of Zurich, through which connection he was subsequently offered the position of research staff member at the IBM Zurich Research Laboratory. Beginning in 1963, he performed research in solid-state physics, heading the physics department there for several years and becoming an IBM Fellow in 1982, a status that allowed him in 1985 to step aside as a manager to concentrate exclusively on his own outstandingly successful work on superconductivity.

Mr Pro-Chancellor, I have the honor to present to you, on behalf of the University, Professor Karl Alexander Müller, one of the pioneers in the search for high-temperature superconductors and 1987 Nobel Laureate in Physics, for the degree of Doctor of Science *honoris causa*.