

Professor Leo ESAKI

Citation

Great breakthroughs in science come from dedicated and creative individuals who challenge the unknown, and make the impossible possible. To honor Professor Leo ESAKI for outstanding achievements in physics covering more than half a century, is to acknowledge a man for whom creative work is essential to life itself.

Professor Esaki was born in Osaka in 1925, and received his Bachelor's degree and PhD from the University of Tokyo, both in science. He began his career with a large company, spending nine years there, but left to join a small, unknown organization that would later become a household name as the Sony Corporation. While acknowledging the risk of such a career move, he found the ambitious company far more interesting and challenging than a stable environment.

Success at Sony culminated in his discovery of the first quantum electronic device, and it carries his name: the Esaki Tunnel Diode. It was the first observation of the quantum-mechanical tunneling phenomenon in a solid state system, a discovery that, combined with other significant research, would earn him international acclaim.

After four years at Sony, Professor Esaki spent 32 highly productive years at IBM's prestigious Thomas J Watson Research Center in New York. At IBM he worked with colleagues to pioneer "designed semiconductor quantum structures" such as quantum wells and man-made superlattices, which led to the development of nanostructures, a field that generates much scientific attention today. One of his colleagues

then was Professor Leroy CHANG, now University Professor Emeritus of HKUST. This work triggered a wide spectrum of experimental and theoretical investigations, resulting in not only the observation of a number of intriguing phenomena, but also the emergence of a new class of transport and optoelectronic devices.

It was while he was at IBM that Professor Esaki was awarded the Nobel Prize in Physics in 1973, in recognition of his breakthrough discovery of tunneling in semiconductors, a quantum-mechanical effect in which an electron passes through a potential barrier, even though classical theory predicted that it could not. What he achieved was, by his own high standards, "a simple and inexpensive experiment, but important. It was probably the least expensive Nobel Prize-winning experiment ever conducted."

Professor Esaki's dedication to science is matched by his commitment to giving something back to his homeland, powerfully expressed through his role as educator. In 1992, he assumed the presidency at the University of Tsukuba, which is considered Japan's most technologically advanced university. During his six-year tenure there, he made great contributions to the reform and internationalization of the Japanese education system. He was chosen Chair of the country's National Commission on Educational Reform, making him a driving force behind this important catalyst for change. He became President of the Shibaura Institute of Technology in April 2000.

Professor Esaki has an impressive list of accolades. In addition to his Nobel Prize, he received the American Physical Society International Prize for New Materials in 1985, the Institute of Electrical and Electronics Engineers Medal of Honor in 1991, and the 1998 Japan Prize, among others. He is a Fellow of the American Physical Society, the Institute of Electrical and Electronics Engineers and the American Academy of Arts and Sciences; a Member of the Physical Society of Japan, the Max-Planck-Gesellschaft, the American Philosophical Society, and the Italian National Academy of Science; a Foreign Associate of the US National Academy of Sciences and the US National Academy of Engineering; and a Foreign Member of the Russian Academy of Sciences. He is Chairman of the Science and Technology Promotion Foundation of Ibaraki.

For anyone wanting to realize their creative potential, Professor Esaki has “five golden rules” to offer:

- Don't allow yourself to be trapped by the constraints of your past experience.
- Don't become overly attached to any authority in your field.
- Don't hold on to what you don't need.
- Don't avoid confrontation.

And finally—

- Don't forget your spirit of childhood curiosity, a vital component of the human imagination.

Professor Esaki himself is a living example of these golden rules. Indeed, creativity and a pioneering spirit have been the guiding light in his work as both scientific

researcher and educator, and the recurring themes in the messages he communicates to people over the world.

Mr Pro-Chancellor, I have the honor to present to you, on behalf of the University, Professor Leo Esaki, President of the Shibaura Institute of Technology and Nobel Laureate in Physics, for the degree of Doctor of Science *honoris causa*.