VÄISÄLÄ PRIZE

Tero Heikkilä

PROFESSOR TERO HEIKKILÄ, who received a Väisälä Prize from the Finnish Academy of Science and Letters in 2018 studied at Helsinki University of Technology and gained his doctorate from there in 2003. During his career he has worked at the Karlsruhe Institute of Technology in Germany, the University of Basel in Switzerland, Delft University of Technology in the Netherlands and as a visiting researcher at the University of Lancaster in Britain and Stony Brook and the University of Maryland in the USA. As he sees it, "I have been able to visit several universities in different parts of Europe and the United States for a few months at a time, mostly during the 10-year period when I was doing research at the Low Temperature Laboratory in Helsinki."

"I was the first theoretician to work in nanophysics at that laboratory, and I gained a great deal from cooperating with experimental physicists. It was exciting to see how the theoretical predictions could be corroborated in practice. It still seems rather amazing at times."

Heikkilä has been professor of theoretical physics, and more specifically nanophysics, at the University of Jyväskylä since August 2013, having previously worked at the Aalto University as a research fellow of the Academy of Finland. During that time he acted as a team leader in two Academy of Finland centres of excellence and was awarded an ERC Starting Grant in 2009. "Getting that funding meant a lot to me, as it awarded financial support for my research team, amounting to 1.4 million euros over a period of five years. The aim was that the grant should be sufficiently large that the recipient could concentrate entirely on research for that length of time."

"Winning the competition for that grant did much to boost my self-confidence, and that was reflected in the way I carried out my research and in the results that I obtained. I wrote a number of papers in 2010 and 2011 that opened up prospects for new scientific discoveries," he continues.

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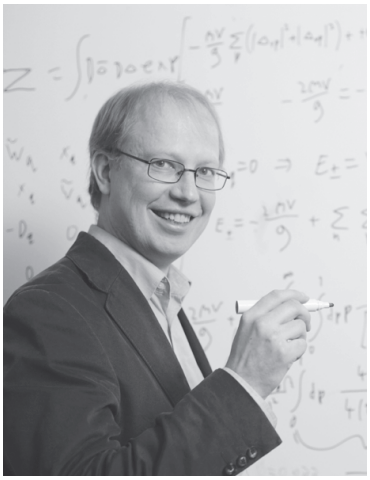

Heikkilä was invited to the membership of the Finnish Academy of Science and Letters in 2016 and has been the scientific director of the Nanoscience Centre at the University of Jyväskylä since 2018.

Tero Heikkilä's research has been concerned primarily with nano-scale physical phenomena, particularly their electrical and thermal conduction properties, but he has also studied the nonequilibrium properties of superconductors, new types of topological materials, the quantum mechanics of micromechanical oscillators and the predicted superconductivity of graphene-based materials at extremely high temperatures. He has also acted as a coordinator for initiatives such as the four-year European Commission-funded project to demonstrate and develop a new kind of superconductor-based ultra-sensitive electromagnetic radiation detectors for purposes such as biological imaging.

"Last year we succeeded in getting FET Open project to finance our research. That is, if anything, still more competitive than the ERC Starting Grants and is intended to support research networking within the EU. We are now engaged in collaboration with research groups in San Sebastian, Pisa and Grenoble," Heikkilä adds. "My own field, theoretical condensed matter physics is a very small one in Finland but of considerable importance elsewhere in the world, while we are world leaders in research into superconductor-ferromagnetic systems."

"Our FET Open project, known as SUPERTED, is aimed at developing a new type of superconducting electromagnetic radiation detector based on a thermoelectric phenomenon that we have discovered and an invention of ours which arose out of this." Finland has a long tradition in the development of superconductive detectors, and a number of commercial applications have been produced. Such devices can be used to detect heat radiation from human beings, for example, and to record even very minute variations in this. Part of the idea is that a device could be developed for surveying large crowds of people and rec-

ognizing anyone who has an object concealed under their clothing that may have a different surface temperature from human skin. The crucial feature here is that measurements can be made of a whole crowd of people, which can greatly improve security at mass meetings, for example.

Another application of superconductor detector technology that has been implemented in Finland is the precise analysis of the element content of materials.

Tero Heikkilä has published over 100 scientific papers, including many in leading journals such as Reviews of Modern Physics and Nature, and he has also written a textbook entitled The Physics of Nanoelectronics which was published by Oxford University Press in 2013. Alongside this, he has been active as a blogist, a channel through which he is always ready to express his opinions on scientific matters.

Väisälä Prize is awarded annually to 1–3 already distinguished scientists in the active parts of their careers.