

HERIOT-WATT UNIVERSITY

L A U R E A T I O N

PROFESSOR DOCTOR URSULA KELLER
BY PROFESSOR STEVE MCLAUGHLIN • MONDAY 17 JUNE 2019

Vice-Chancellor, I have the honour to present for the Honorary Degree of Doctor of Science, Professor Doctor Ursula Keller.

Heriot-Watt University is world famous for its research in Photonics and in Ultrafast Laser Physics. Throughout her dynamic career, she has been at the forefront of research in the field of ultrafast lasers. Light travels one foot in one nanosecond, i.e. one thousandth of a millionth of a second! Ultrafast Lasers are lasers with short bursts ranging in duration from one million millionth of a second to one millionth of one billionth of a second. More recently these pulses have been shortened by a further factor of a thousand (i.e. attoseconds). An attosecond is to a second what a second is to about 31.71 billion years!

Professor Keller's ultrafast laser technology for example enables the study of near-instantaneous, subatomic reactions. Her invention of the semiconductor saturable absorber mirror for generating ultrashort laser pulses has transformed complex ultrafast lasers into user-friendly devices so that they can now be used in general purpose scientific laboratory and industrial applications. Now scientists, manufacturers and surgeons alike are able to tame the instrument of greatest precision – i.e. light itself. Ursula's research creativity and versatility has enabled pioneering contributions in a wide range of topics resulting in many distinguished awards, most notably the Winner of the European Inventor Award 2018 in the category of lifetime achievements in the sector of Laser Technology.

Ursula is not the only scientist present today. It is a great pleasure to welcome her husband Doctor Kurt Weingarten, a distinguished scientist himself from Stanford University. He was the founder of a company which has brought turn-key ultrafast lasers to the industrial market combining two key technologies - diode-pumped solid-state lasers and semiconductor saturable absorber mirrors (SESAMs).

Ursula's path to her current research interest was not straightforward. Growing up in a working-class background in socially conservative rural Switzerland during the 1960s and 70s, she had to face the all-too-common prejudice against women studying and entering careers in science. Moreover, she is dyslexic. At the time, diagnosis of dyslexia was far less prevalent than it is today with the condition barely recognised.

Despite this, her determination and aptitude for mathematics and physics led her to university, where she studied physics and engineering at the Swiss Federal Institute of technology (ETH) in Zürich. While at ETH, she found out she could apply for a Fulbright fellowship. She graduated top of her class and won a full one-year fellowship and ultimately chose to study in California at Stanford University. A professor at ETH impressed with her grades suggested she improve her English before starting her PhD work in the USA! He phoned his colleague and friend at Heriot-Watt and she was accepted as a visiting student based on his recommendation and her promise to go skiing, because as she said: I really like the outdoors and skiing. She took some English classes, so she learned with a slight accent, had a great time – and yes she went skiing as well. She also got introduced to optical computing, a research area where Heriot-Watt was world-leading. During her time at Heriot-Watt in 1985-86 she published her first paper in Applied Physics Letters.

She went on to undertake her PhD work at Stanford University – she was accepted at several other US universities but went to Stanford based on the recommendation from the Heriot-Watt professors. Afterwards she started work at Bell Labs in New Jersey – and her boss was David A. B. Miller a former PhD student and Honorary Graduate of Heriot-Watt - before returning to ETH as the school's first female full professor of physics, becoming director of the Swiss National Research Centre for Ultrafast Molecular Sciences and Technologies. She founded the ETH Women Professors' Forum as a support network to help female researchers advance their careers, both in terms of their position in the university and in their research.

Following Feynman who famously said that the excitement was in the scientific discoveries rather than in Prizes she also believes “A scientist should be judged not by his or her prizes or other honours bestowed upon him or her, but the quality of the people he or she helped to produce”. Ursula has had a significant impact on her students' careers, both as a role model and as a supervisor, many of whom have assumed leadership positions in both industry and academia.

Vice-Chancellor, in the name of the University and by the authority of the Senate, in recognition of her pioneering and influential contributions to the field of Ultrafast Science and Technology and, as an ambassador in promoting the engagement of under-represented groups in science and technology, I call upon you to confer the Honorary Degree of Doctor of Science on Professor Doctor Ursula Keller.