



Curriculum Vitae Dr Heike Riel



Image: Markus Scholz | Leopoldina

Name: Heike Riel

Born: 1971

Research Priorities: semiconductor physics, nanotechnology, device concepts for future nanoelectronics, optoelectronics, organic light-emitting diodes (OLEDs), quantum computing

Heike Riel is a physicist. The focus of her research is semiconductor physics. She has advanced the development of semiconducting nanowires. They are the basis for a new generation of computer processors. She helped develop high-contrast organic light-emitting diodes (OLEDs). Today, OLED displays are used in many smartphones and tablet computers. She is also a leader in the development of quantum computers.

Academic and Professional Career

- since 2017 IBM Fellow, Executive Director, IBM Research Frontiers Institute, Director IoT Technology & Solutions, IBM Research - Zurich, Zurich, Switzerland
- 2015 - 2017 IBM Fellow, Director, Physical Sciences, Zurich, Switzerland
- since 2013 IBM Fellow, Zurich, Switzerland
- 2011 MBA, Henley Business School, Henley-on-Thames, UK
- 2008-2014 Principal Investigator, Nanoscale Electronics Group, IBM Research Center Rüschlikon, Rüschlikon, Switzerland
- 2003 - 2008 Research Associate, IBM Research Laboratory Rüschlikon, Rüschlikon, Switzerland
- 2003 PhD in physics, University of Bayreuth, Bayreuth, Germany
- 1998 PhD Student, IBM Research Laboratory Rüschlikon, Rüschlikon, Switzerland
Internship, Hewlett Packard Research Laboratory, Palo Alto, USA
Degree in physics, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Nürnberg, Germany, and Universität Bayreuth, Bayreuth, Germany

Functions in Scientific Societies and Committees

- since 2019 Member, Foresight Group, London, UK
- since 2015 Member, Industry Board und Policy Subcommittee, American Physical Society (APS), USA
- 2015 - 2017 Member, Scientific Advisory Board, Leibniz Institute for High Performance Microelectronics (IHP), Frankfurt (Oder), Germany
- since 2013 Chair, Scientific Advisory Board, Forschungszentrum Jülich, Jülich, Germany
- Member, Supervisory Board, Forschungszentrum Jülich, Jülich, Germany
- Member, Scientific Advisory Board, Paul-Drude-Institut für Festkörperelektronik (PDI), Berlin, Germany
- Member, Scientific Advisory Board, Wilhelm and Else Heraeus Foundation, Hanau, Germany
- Member, Award Committee, Heinrich Rohrer Medal, Surface Science Society of Japan (SSSJ), Japan
- Member, JuPrix Award Committee, Forschungszentrum Jülich, Jülich, Germany
- Member, technical programme committees, various international conferences
- Member, expert and evaluation committees, advisory boards, various faculties and universities
- Expert, scientific and technical projects and applications, various funding organisations

Honours and Awarded Memberships

- since 2023 Member, acatech – National Academy of Science and Engineering
- 2020 Member, American Physical Society (APS), USA
- 2017 David Adler Lectureship Award, APS, USA
- 2015 Rudolf-Diesel-Fellowship, Institute for Advanced Study, Technical University of Munich (TUM), Munich, Germany
- 2015 Applied Physics Award, Swiss Physical Society (SPS), Switzerland
- 2015 Honorary Doctorate, Lund University, Lund, Sweden
- since 2015 Member, German National Academy of Sciences Leopoldina, Germany
- 2014 Member, Swiss Academy of Engineering Sciences (SATW), Switzerland

- 2013 Call for Alexander von Humboldt Professorship (declined), Alexander von Humboldt Foundation, Germany
- 2012 Technical Innovation Award, Swiss Association of Women Engineers (SVIN), Switzerland
- 2005 Applied Physics Award, Swiss Physical Society (SPS), Switzerland
- 2003 TR100 – Top 100 Young Innovators Award, Technology Review, Massachusetts Institute of Technology (MIT), Cambridge, USA

Research Priorities

Heike Riel is a physicist. The focus of her research is semiconductor physics. She has advanced the development of semiconducting nanowires. They are the basis for a new generation of computer processors. She helped develop high-contrast organic light-emitting diodes (OLEDs). Today, OLED displays are used in many smartphones and tablet computers. She is also a leader in the development of quantum computers.

Heike Riel researches at the interface between basic research and technology. With her working group, she investigates energy-efficient transistors made of semiconductor nanowires called tunnelling field effect transistors (TFETs). TFETs are made of silicon or silicon-germanium compounds. The gates are arranged around a nanotube where the tunnel effect takes place. TFETs can be used in optoelectronics and molecular electronics for switches and memory applications. They are also an important basis for a new generation of computer processors. This could replace silicon-based chip technology, which is reaching its physical limits as devices become increasingly smaller in size. Heike Riel and her working group are also examining how the properties of nanowires change when they are stretched or compressed.

It is also a key participant in the development of quantum computers. Quantum computers use the laws of quantum physics. They are intended to perform highly complex calculations in the future, which would not be possible to be processed with conventional technology. Heike Riel develops quantum computers intending to render them easily usable for applications in industry, science and business.

In her early work, Heike Riel laid the foundation for developing high-contrast AMOLED screens (Active Matrix Organic Light Emitting Diode). She co-developed a 20-inch screen with an active matrix of amorphous silicon thin-film transistors (a-Si-TFT). Compared to LCD flat screens, OLED screens consume less energy and are cheaper to manufacture. In addition, OLED displays reproduce a broader range of colours and are more flexible. They allow screens to be built in three-dimensional shapes, such as curved or rollable displays.