



Curriculum Vitae Professor Dr. Stuart Parkin



Name: Stuart Parkin
Born: 9 December 1955

Image: Marco Warmuth | Max-Planck-Institut für Mikrostrukturphysik

Research priorities: Spintronics, nanotechnology, giant magnetoresistance (GMR effect), storage media, computer drives, racetrack memory

Stuart Parkin is a British physicist whose focus is the field of spintronics. By researching the interactions of thin material layers, he discovered that the giant magnetoresistance (GMR effect) in many materials had practical applications. Parkin used this discovery to develop innovative read heads for computer hard disc drives and thereby made high capacity computers storages possible.

Academic and Professional Career

- 2016 - 2020 Managing Director, Max Planck Institute of Microstructure Physics, Halle (Saale), Germany
- until 2015 Head, Magneto-electronics group, International Business Machines Corporation (IBM) Almaden Research Center, San Jose, USA
- until 2015 Director, Spintronic Science and Applications Center (SpinAps), Stanford, USA
- since 2014 Director and Scientific Member, Max Planck Institute of Microstructure Physics, Halle (Saale), Germany
- since 2014 Alexander von Humboldt Professor, Martin-Luther-Universität Halle-Wittenberg, Halle (Saale), Germany
Consulting Professor, Stanford University, Stanford, USA
- 2009 Distinguished Visiting Professor, Korea Advanced Institute of Science & Technology (KAIST), Daejeon, South Korea
- 2008 Distinguished Visiting Professor, Eindhoven University of Technology (TU/e), Eindhoven, Netherlands

- 2007 Distinguished Visiting Professor, National University of Singapore (NUS), Singapore, Singapore
- 2007 Research Professor, National Yunlin University of Science and Technology, Douliu, Taiwan
- 2007 Visiting Professor, National Taiwan University, Taipei, Taiwan
- 2004 - 2006 Research, Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen, Aachen, Germany
- 1982 - 2014 Scientist, IBM Almaden Research Center, San José, USA
- 1980 - 1981 Royal Society European Exchange Fellow, Laboratory of Solid-State Physics (LPS), University of Paris-Saclay, Paris, France, French National Centre for Scientific Research (CNRS), France
- 1980 PhD, Cavendish Laboratory, University of Cambridge, Cambridge, UK
- 1979 Research Fellow, Trinity College, University of Cambridge, Cambridge, UK
- 1977 BSc in Physics and Theoretical Physics, Cambridge University, Cambridge, UK
Studies in Physics, Cambridge University, Cambridge, UK

Project Coordination, Membership in Collaborative Research Projects

- since 2022 Advanced Grant “SUPERMINT – Interplay between Chirality, Spin Textures and Superconductivity at Manufactured Interfaces”, European Research Council (ERC)
- since 2022 Head, Subproject “Ultrafast control of Berry-curvature-driven transport via spin-torque excitation of chiral magnets”, CRC/Transregio (TRR) 227, German Research Foundation (DFG), Germany
- since 2022 Applicant, Project “Atomic layer deposition of ternary oxides of platinum group elements”, DFG, Germany
- since 2021 Applicant, Project “2D MagNETic meMOries: Scalable growth and hYbrid electrical operation”, DFG, Germany
- since 2020 Applicant, Subproject “Artificial multiferroic van der Waals heterostructures”, Priority Programmes (SPP) 2244, DFG, Germany
- since 2018 Applicant, Subproject “Current-induced motion of antiskyrmions in Heusler thin films”, SPP 2137, DFG, Germany
- 2018 - 2023 Cooperation Partner, Subproject “Detection of skyrmion phases in spintronic materials using neutron scattering”, SPP 2137, DFG, Germany
- 2016 - 2020 Applicant, Subproject “Topological Weyl Semimetals for Spintronic Devices”, SPP 1666, DFG, Germany

- 2016 - 2019 Head, Subproject “Engineered chiral spin textures and their dynamics in oxide thin films”, Collaborative Research Centres (SFB) 762, DFG, Germany
- 2016 - 2019 Head, Subproject “Finite size effects in atomically thin REO₃ single crystalline films”, SFB 762, DFG, Germany
- 2011 - 2012 Host, Project “Tuning the electrical properties of of complex oxides by field effect gating using ionic gels”, DFG, Germany

Honours and Awarded Memberships

- 2024 Charles Stark Draper Prize for Engineering, National Academy of Engineering (NAE), USA
- 2024 APS Medal for Exceptional Achievement in Research, American Physical Society (APS), USA
- 2023 Clarivate Citation Laureate, London, UK
- 2021 King Faisal International Prize (KFP) in Science, King Faisal Foundation (KFF), Riad, Saudi-Arabia
- 2019 Elected Member, Royal Academy of Engineering, London, UK
- since 2015 Member, German National Academy of Sciences Leopoldina, Germany
- 2014 Millennium Technology Prize, Technology Academy Finland, Helsinki, Finland
- 2013 Honorary Doctorate, Technische Universität Kaiserslautern, Kaiserslautern, Germany
- 2013 Swan Medal, Institute of Physics, London, UK
- 2012 Honorary Fellow, Indian Academy of Sciences, India
- 2012 Fellow, World Academy of Sciences
- 2012 Von Hippel Award, Materials Research Society (MRS), Warrendale, USA
- 2012 David Adler Lectureship Award, APS, USA
- 2011 Honorary Doctorate, University of Regensburg, Regensburg, Germany
- 2011 Fellow, Gutenberg-Forschungskolleg, Johannes Gutenberg-Universität Mainz, Mainz, Germany
- 2009 IUPAP Magnetism Prize and Louis Néel Medal, International Union of Pure and Applied Physics, CNRS, France, Institut Néel, Grenoble, France
- 2009 Dresden Barkhausen Award, Materialforschungsverbund Dresden (MFD), Technische Universität (TU) Dresden, Dresden, Germany, and European Center for Micro- and Nanoreliability (ECEMAN)
- 2009 Fellow, American Academy of Arts and Sciences, USA

2009	Honorary Professor, University College London, London, UK
2008	Daniel E. Noble Award, Institute of Electrical and Electronics Engineers (IEEE), New York City, USA
2008	Gutenberg Research Award, Johannes Gutenberg University Mainz, Mainz, Germany
2008	Honorary Doctorate, TU/e, Eindhoven, Netherlands
since 2008	Member, National Academy of Sciences, USA
2007	Honorary Doctorate, RWTH Aachen, Aachen, Germany
2004	Humboldt Research Award, Alexander von Humboldt Foundation, Berlin, Germany
2000	Fellow, Royal Society, UK
1999 - 2000	Prize for Industrial Applications of Physics, American Institute of Physics (AIP), USA
since 1999	Fellow, IBM, IBM Almaden Research Center, San José, USA
1997	Europhysics Prize for Outstanding Achievement in Solid State Physics, European Physical Society (EPS)
1994	International Prize for New Materials, APS, USA
1991	Charles Vernon Boys Prize, Institute of Physics, London, UK
1991	MRS Outstanding Young Investigator Award, MRS, Warrendale, USA
1982	IBM World Trade Fellow, IBM San José Research Laboratory, San José, USA

Research Priorities

Stuart Parkin is a British physicist whose focus is the field of spintronics. By researching the interactions of thin material layers, he discovered that the giant magnetoresistance (GMR effect) in many materials had practical applications. Parkin used this discovery to develop innovative read heads for computer hard disc drives and thereby made high-capacity computer storages possible.

Stuart Parkin investigated extremely thin material layers like, for example, those used in computer chips to establish their storage capacity potential. He showed how the GMR effect (giant magnetoresistance) could be used in practical applications. Parkin utilized the spin of electrons in his work. Spintronics uses this tiny magnetic field that is present in every electron for processing and coding information. The GMR effect occurs in structures that consist of alternating layers of magnetic and non-magnetic material whereby an external magnetic field can influence the direction of electrons' spins and in this way change the electrical resistance of the stacked layers.

Parkin employed this effect in a sensor and developed a new type of read head for computer disc drives. Digital data can also be stored on hard drives in the form of microscopically small fields with different magnetisation directions. The read head has a sensor that, with the help of the

magnetoresistance, can detect the direction of magnetisation. A read head with GMR effect can convert minute magnetic changes into sufficiently measurable distinctions in electrical resistance. Stuart Parkin's read head allowed the storage capacity of hard drives to be increased considerably. Nowadays practically every computer utilizes the giant magnetoresistance effect.

Parkin is currently involved in research focusing on energy-saving storage for the technologies of the future. He developed the "Racetrack Memory", a three-dimensional storage medium based on spintronics with an even higher degree of storage density. There are no longer any moving parts in this storage system. The data bits are stored on nanometer thin wires made of a magnetic material. The magnetic "domains" (structuring) are "pushed" back and forth within nanowire. In the future, Stuart Parkin also wants to develop switching circuits that function like the human brain, where the circuits become stronger the more they are used.