



Curriculum Vitae Professor Dr Ferenc Krausz

Name: Ferenc Krausz
Born: 17 May 1962



Image: Peter Seidel

Research Priorities: Attosecond physics, high-field physics, real-time observation of fundamental electron processes, development of laser systems, petawatt field synthesizers (PFS)

Ferenc Krausz is a Hungarian-Austrian physicist. He is considered the father of attosecond physics, which monitors and studies ultra speed motions of electrons. Based on his research, numerous fields of study were founded – such as the high-resolution microscopy of living organisms. Furthermore, he developed lasers that aid in the diagnosis of cancer and ophthalmic diseases.

Academic and Professional Career

- since 2019 Director, Center for Molecular Fingerprinting Research (CMF), Budapest, Hungary
- since 2015 Founding Director, Centre for Advanced Laser Applications (CALA), Ludwig-Maximilians-Universität (LMU) München Munich, Germany
- since 2012 Director, Laboratory for Extreme Photonics (LEX-Photonics), Munich, Germany
- 2010 - 2016 Visiting Professor, Pohang University of Science and Technology (POSTECH), Pohang, South Korea
- 2010 - 2019 Director, Munich Centre for Advanced Photonics (MAP), Munich, Germany
- 2006 - 2009 Co-Founder and Founding Director, Munich Centre for Advanced Photonics (MAP), Munich, Germany
- since 2004 Director, Max Planck Institut of Quantum Optics (MPQ), Garching, Germany
- since 2004 Full Professor and Chair, Experimental Physics – Laser Physics, LMU München. Munich, Germany
- 1999 - 2004 Professor of Electrical Engineering, TU Wien, Vienna, Austria

- 1996 - 1998 Assistant Professor of Electrical Engineering, TU Wien, Vienna, Austria
- 1993 Habilitation in Laser Physics, TU Wien, Vienna, Austria
- 1991 - 1993 Postdoctoral Student, TU Wien, Vienna, Austria
- 1991 PhD in Laser Physics, TU Wien, Vienna, Austria
- 1988 - 1991 Research Associate, TU Wien, Vienna, Austria
- 1985 - 1987 Research Associate, Budapest University of Technology and Economics, Budapest, Hungary
- 1985 Diploma in Electrical Engineering, Budapest University of Technology and Economics, Budapest, Hungary
- 1981 - 1985 Studies in Theoretical Physics, Eötvös Loránd University, Budapest, Hungary and
Studies in Electrical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

Functions in Scientific Societies and Committees

- 2012 Co-Founder, Dennis Gabor Gesellschaft, Berlin, Germany
- 2010 - 2014 Strategic Council to the President, Hungarian Academy of Sciences (MTA), Hungary
- since 2009 Initiating and Coordinating, Laboratory of Extreme Photonics (Lex-Photonics), LMU München, Munich, Germany
- since 2009 Initiating and Coordinating, Center for Advanced Laser Applications (CALA), Garching, Germany
- since 2008 Establishing and Directing, Research Cooperation, Max Planck Institute for Quantum Optics (MPQ), Garching, Germany and King Saud University, Riad, Saudi-Arabia
- 2007 - 2009 Executive Director, Max Planck Institute for Quantum Optics, Garching, Germany
- since 2007 Strategic Council to the President, LMU München, Munich, Germany
- since 2006 Establishing and Directing, International Max Planck Research School of Advanced Photon Science, Munich, Germany

Project Coordination and Membership in Collaborative Research Projects

- 2010 - 2014 Initiating and Coordinating, Collaborative Research Activity of five Max Planck Society research institutes and five institutes from the pacific rim, Laboratory for Attosecond Physics (LAP), Max-Planck Institute for Quantum Optics, Garching, Germany
- 2009 Investigator, Advanced Grant, European Research Council (ERC)

- 2008 - 2013 Project "International Collaboration in Chemistry: Control of Ultrafast EUV-induced Chemical Reactions", German Research Council (DFG), Germany
- since 2006 Spokesperson, Clusters of Excellence (EXC) 158 "Munich-Centre for Advanced Photonics (MAP)", DFG, Germany
- since 2006 Director, International Max Planck Research School of Advanced Photon Science (IMPRS-APS), DFG, Germany

Honours and Awarded Memberships

- 2023 Nobel Prize in Physics 2023, together with Pierre Agostini und Anne L'Huillier
- 2023 BBVA Foundation Frontiers of Knowledge Award, Banco Bilbao Vizcaya Argentaria (BBVA) Foundation, Bilbao, Spain
- 2022 Einstein Lecture, Frei Universität (FU) Berlin, Berlin, Germany
- 2022 Wolf Prize in Physics, Wolf Foundation, Herzlia Pituach, Israel
- 2019 Vladilen Letokhov Medal, European Physical Society and Russian Academy of Sciences, Russia
- 2018 Janos Arany Award for Outstanding Scientific Performance, MTA, Hungary
- since 2016 Member, German National Academy of Sciences Leopoldina, Germany
- 2015 Citation Laureate in Physics, Thomson Reuters, Toronto, Canada
- 2014 Listed, The World's Most Influential Scientific Minds, Thomson Reuters, USA
- 2013 Otto Hahn Award, DPG, German Chemical Society (GDCh), Germany and City of Frankfurt, Germany
- 2013 King Faisal Prize for Science, King Faisal Foundation, Riyadh, Saudi-Arabia
- since 2012 Member, Academia Europaea
- since 2012 Member, European Academy of Sciences (EURASC), Belgium
- 2012 Knight's Cross of the Order of Merit of Hungary, Hungary
- 2011 Cross of the Order of Merit, Federal Republic of Germany
- since 2011 Member, Russian Academy of Sciences, Russia
- 2011 Falling Walls Lecturer, Falling Walls Conference, Berlin, Germany
- 2010 Honorary Professor, Shanghai Institute of Optics and Fine Mechanics, Shanghai, China
- 2010 Visiting Professor, King Saud University, Riyadh, Saudi-Arabia 2009 Honorary Professor, Xian Institute of Optics, Chinese Academy of Science (CAS), China

- 2009 Fellow, Optical Society of America, USA
- 2007 Member, European Academy of Sciences and Arts
- since 2007 Member, MTA, Hungary
- 2006 Gottfried Wilhelm Leibniz Award, DFG, Germany
- 2006 Prize of the City of Vienna for Natural and Technical Sciences, Vienna, Austria
- 2006 Progress Medal, Royal Photographic Society, UK
- 2006 James Frank Memorial Lecture, Israel Academy of Sciences and Humanities, Israel
- 2006 Max von Laue Memorial Lecture, Physikalische Gesellschaft zu Berlin, Berlin, Germany
- 2006 Manne Siegbahn Memorial Lecture, Royal Swedish Academy of Sciences, Sweden
- 2006 Quantum Electronics Award, Laser and Electro-Optics Society, Institute of Electrical and Electronics Engineers (IEEE), New York City, USA
- 2005 Honorary Professorship, TU Wien, Vienna, Austria
- 2005 Honorary Doctorate, Budapest University of Technology and Economics, Budapest, Hungary
- since 2003 Member, Austrian Academy of Sciences, Austria
- 2003 Julius Springer Prize, Springer-Verlag GmbH, Heidelberg, Germany
- 2002 Wittgenstein Award, Federal Ministry of Education, Science and Research (BMBWF), Austria
- 1998 Carl Zeiss Research Award, Ernst Abbe Fonds, Jena, Germany
- 1996 START Award, Federal Ministry of Science and Education, Austria
- 1994 Fritz Kohlrausch Award, Austrian Physical Society, Austria

Research Priorities

Ferenc Krausz is a Hungarian-Austrian physicist. He is considered the father of attosecond physics, which monitors and studies ultra speed motions of electrons. Based on his research, numerous fields of study have been founded – such as the high-resolution microscopy of living organisms. Furthermore, he developed lasers that aid in the diagnosis of cancer and ophthalmic diseases.

Together with his team, Ferenc Krausz was the first to produce and measure an attosecond light pulse, with an attosecond being one billionth of a billionth of a second (0.000,000,000,000,000,001 Seconds). Ferenc Krausz can monitor an electron’s movement within an atom in real time with the help of these attosecond light pulses. He and his team also developed the laser systems and components that enable them to do so. Electrons move with a speed of about one thousand

kilometres per second. The attosecond flash functions not unlike an extremely rapid photo flash that freezes motion at a given point in time. Thus, the researchers around Ferenc Krausz were able to measure that an electron needs between seven and twenty attoseconds to traverse the atom envelope. The specific velocity depends on the extent that the atoms interact with each other and the nucleus.

With a sufficiently high intensity, the attosecond light pulse can sever electrons from their atomic bonding and accelerate them close to light speed. This opens the door to high-field attosecond physics. Ferenc Krausz aims to develop a petawatt field synthesizer (PFS) by combining different lasers to produce light pulses of one quadrillion watt (Petawatt). This would enable him and his team to visualise these processes with even more detail.

With the help of the tools developed by him, Ferenc Krausz was able to observe fundamental processes of electrons such as charge transport, tunnelling, and the photoelectric effect in real time. These technologies can be used in the development of quantum computers and supra conductors. But they can also be applied in medicine with the early diagnosis and treatment of malignant tumors. These laser-based techniques are not only more gentle than radiotherapy but also more precise.