Curriculum vitae – Prof. Dr. Ulrich Höfer

Personal Information

Name: Höfer, Ulrich
ORCID: 0000-0002-5706-1205 (ResearcherID: A-1310-2009)
Birth: 07.07.1957, Zusmarshausen/Augsburg, Germany
Nationality: German
WWW: https://www.of-marburg.de/hoefer/
Email: hoefer@physik.uni-marburg.de

Ulrich Höfer is a surface scientist who has pioneered time-resolved ARPES (angle-resolved photoemission spectroscopy) and coherent light-matter interaction at surfaces and interfaces.

University Education

1985 Diploma, Physics (Dipl. Phys.), TU München, Germany
1989 Doctoral degree (Dr. rer. nat.), TU München, advisor: Eberhard Umbach
1996 Habilitation (Dr. rer. nat habil.) Experimental Physics, TU München

Current Positions

1999- Professor for Experimental Physics, Philipps-Universität Marburg
2022- Adjunct Professor, Department of Physics, Universität Regensburg

Previous Positions

1992-99 Max-Planck-Institut für Quantenoptik (MPQ), Garching/München
Group Leader “Surface Dynamics” Laser Chemistry Department
1997-99 Lecturer/docent, Physik-Department, TU München

1990-91 IBM Watson Research Center, Yorktown Heights, New York (USA)
Postdoc with Tony F. Heinz

1988-89 Research Assistant, TU München, Physik-Department E20 (Prof. D. Menzel)

1985-87 Manager Data Processing, Central-Molkerei Augsburg eG.

Fellowships & Awards

2022 Synergy Grant of the European Research Council (ERC)
2015 Fellow of the Japanese Society for the Promotion of Science
2011 Ikerbasque Research Professor (Basque Country, Spain)
2009 Call for a chair in Experimental Physics, University of Würzburg (declined)
2006 Fellow of the American Physical Society (USA)
1995 Arnold-Sommerfeld-Prize of the Bavarian Academy of Sciences and Humanities

Supervision of Graduate Students and Postdoctoral Fellows

1996- Supervision of 34 doctoral students and 14 postdocs, 11 of them now holding academic positions in Germany, Japan, Spain or USA.
Currently supervising 5 doctoral students (3 of them female) and 2 postdocs

Teaching Activities

2000- Lectures for physics students in Marburg, Mechanics (4x), Electricity (4x), Optics (3x), Atomic Physics (7x), Solid State Physics (7x), Surface Physics (12x), Nanotechnology (2x). Supervision of 28 Diploma and Master Theses
1997-99 Physics lecture for medical students at TU München (3x)

Organization of Scientific Meetings (Selection)

2022-24 Chair of the surface science section of the condensed matter division of the German DPG, co-organizing the largest annual European conferences in the field of solid-state physics with more than 5000 participants (Dresden 2023, Berlin 2024)
2021 Co-organizer, ICII-2021 (Schloss Rheinfels)
2018 Co-organizer, ASOMEA-IX (Schluchsee, Germany)
2016 Organizer, International Conference on Internal Interfaces, ICII-2016 (Marburg)
2000- Steering committee, biannual conference series Ultrafast Surface Dynamics (USD).

Institutional Responsibilities (Selection)

2013-21 Spokesperson SFB 1083 "Structure and Dynamics of Internal Interfaces"
2007-09 Dean, Faculty of Physics, Philipps-Universität Marburg (U. Marburg)
2003-07 Managing Director, Material Sciences Center (WZMW, U. Marburg)

Reviewing Activities (Selection)

2020-22 Selection Committee (Chair), Gerhard Ertl Research Award
2021 Evaluation Panel, Physics Department, University of Konstanz
2020 Evaluation Panel, ICASEC Göttingen
2018 Co-editor, special issue on internal interfaces of J. Phys. B
2014 Selection Committee, Max Planck Research Award

2012-22 Review panel member of 6 DFG collaborative research centers (SFBs), 2 DFG priority programs, 2 DFG research units, and reviewer of numerous individual DFG grant proposals; occasional reviewer for other agencies such as NSF, DOE, GIF, AvH, Zeiss foundation, Daimler-Benz foundation, German Science Council.

Member of search panels and external reviewer for the appointment of a number of full professors and institute directors in the fields of surface physics, surface chemistry or laser spectroscopy in Germany.

Regular reviewer for the journals Science, Nature, Phys. Rev. Lett. and others

Major Collaborations (Selection)

2012-22 Host of 15+ visiting scientists, funded by the DFG through SFB 1083 or by the Alexander-von-Humboldt foundation, one of them recipient of the AvH award. Host of two Postdocs funded by the Japanese JSPS.

2020 - Collaboration on orbital tomography with Peter Puschnig's group (Graz)
2017- Collaboration on organic/metal interfaces with Stefan Tautz's group (Jülich)
2016- Collaboration on sub-cycle ARPES with Rupert Huber's group (Regensburg)

2000-17 Guest Researcher, DIPC San Sebastian (Spain) with short and long-term visits resulting in more the 20 joint publications.

2015 Guest Professor, Chemistry Department, University of Osaka, Japan
2014 Guest Researcher, Columbia University, New York, USA
2008 Adjunct Professor, Yokohama National University, Japan
2006 Guest Professor, I.S.I.R. (Sanken Institute), University of Osaka, Japan
2003 Guest Researcher, Columbia University, New York, USA
1999 Research Fellow, Institute for Chemical Research, RIKEN, Japan
1998 Adjunct Professor, Institute for Quantum Electronics, TU Vienna, Austria

Expertise / Scientific Profile

Ulrich Höfer is a surface scientist and laser spectroscopist with more than 30 years of experience. He is a pioneer of time-resolved ARPES (angle-resolved photoemission spectroscopy) and coherent light-matter interaction at surfaces and interfaces. He was first to time-resolve electron-wave-packet motion at a metal surface (1997) and to demonstrate ultrafast coherent control and contact-free detection of surface photocurrents (2007). Recently, he and Rupert Huber combined ARPES with THz-excitation and probed light-wave-driven currents with sub-cycle resolution (2018). Together with Stefan Tautz and Peter Puschnig, he extended photoemission orbital tomography to electronically excited states (2021).

Ulrich Höfer initiated the Collaborative Research Centre "Structure and Dynamics of Internal Interfaces" (SFB 1083) of the Philipps University of Marburg and has served as its spokesperson from October 2013 to June 2021. During that time the centre has published 350 papers. Presently, SFB 1083 consists of 19 scientific projects in Marburg, Gießen, Jülich, Leipzig, and Münster, led by 24 PIs. The centre has been successfully reevaluated in 2017 and 2021 and will be funded by the German DFG until June 2025 with a total budget of 32.7 Mio €.

In the coming years, a new focus of Ulrich Höfer's research will be the realization of an ultrafast wave function lab to actively shape and control molecular orbitals with light and to take slow motion videos of their dynamical behavior. For this purpose, he teamed up with his colleagues Huber, Puschnig and Tautz. Together, they have been awarded an ERC Synergy Grant to achieve this goal. Their project *Orbital cinema* with a total budget of 11.3 Mio € has been ranked second in 2022 of a total of 360 submitted and of 29 funded ERC synergy proposals in all areas of science in Europe.

Publication Metrics

Ulrich Höfer is co-author of more than 175 publications with a total number of citations of 6293, according to Web of Science (8249, according to Google Scholar). His h-Index is 46 (51).

Selected Publications

1. **U. Höfer,** *Nonlinear optical investigations of the dynamics of hydrogen interaction with silicon surfaces,* Appl. Phys. A **63**, 533 (1996). 160 citations
2. **U. Höfer**, I. L. Shumay, Ch. Reuß, U. Thomann, W. Wallauer, Th. Fauster, *Time-resolved coherent photoelectron spectroscopy of quantized electronic states on metal surfaces,* Science **277**, 1480 (1997). 538 citations
3. P. M. Echenique, R. Berndt, E. V. Chulkov, Th. Fauster, A. Goldmann, **U. Höfer**, *Decay of electronic excitations at metal surfaces,* Surface Science Reports **52,** 219 (2004). 375 citations
4. M. Dürr, **U. Höfer,** *Dissociative adsorption of molecular hydrogen on silicon surfaces,* Surf. Sci. Rep. **61**, 465 (2006). 188 citations
5. J. Güdde, M. Rohleder, T. Meier, S. W. Koch, **U. Höfer,** *Time-resolved investigation of coherently controlled electric currents at a metal surface,* Science **318**, 1287 (2007). 157 citations
6. C. H. Schwalb, S. Sachs, M. Marks, A. Schöll, F. Reinert, E. Umbach, **U. Höfer,** *Electron lifetime in a Shockley-type metal-organic interface state,* Phys. Rev. Lett. **101**, 146801 (2008). 199 citations
7. N. Armbrust, J. Güdde, P. Jakob, **U. Höfer**, *Time-resolved two-photon photoemission of unoccupied electronic states of periodically rippled graphene on Ru(0001),* Phys. Rev. Lett. **108**, 056801 (2012). 89 citations
8. C. M. Heyl, J. Güdde, A. L'Huillier, **U. Höfer**, *High-order harmonic generation with μJ laser pulses at high repetition rates,* J. Phys B **45**, 074020 (2012). – Highlight of the year. 152 citations

9. K. Kuroda, J. Reimann, J. Güdde, **U. Höfer,** *Generation of transient photocurrents in the topological surface state of Sb_2Te_3 by direct optical excitation with mid-infrared pulses,* Phys. Rev. Lett. **116**, 076801 (2016). 68 citations
10. J. Reimann, S. Schlauderer, C. P. Schmid, F. Langer, S. Baierl, K. A. Kokh, O. E. Tereshchenko, A. Kimura, C. Lange, J. Güdde, **U. Höfer,** R. Huber, *Subcycle observation of lightwave-driven Dirac currents in a topological surface band,* Nature **562**, 396 (2018). 171 citations
11. R. Wallauer, M. Raths, K. Stallberg, L. Münster, D. Brandstetter, X. Yang, J. Güdde, P. Puschnig, S. Soubatch, C. Kumpf, F. C. Bocquet, F. S. Tautz, **U. Höfer**, *Tracing orbital images on ultrafast time scales,* Science **371**, 1056 (2021). 41 citations
12. C. P. Schmid, L. Weigl, P. Grössing, V. Junk, C. Gorini, S. Schlauderer, S. Ito, M. Meierhofer, N. Hofmann, D. Afanasiev, J. Crewse, K. A. Kokh, O. E. Tereshchenko, J. Güdde, F. Evers, J. Wilhelm, K. Richter, **U. Höfer**, R. Huber, *Tuneable non-integer high-harmonic generation in a topological insulator*, Nature **593**, 385 (2021). 87 citations
13. R. Wallauer, R. Perea-Causin, L. Münster, S. Zajusch, S. Brehm, J. Güdde, K. Tanimura, K.-Q. Lin, R. Huber, E. Malic, **U. Höfer**, *Momentum-resolved observation of exciton formation dynamics in monolayer WS_2,* Nano Lett. **21**, 5867(2021). 39 citations
14. J. E Zimmermann, M. Axt, F. Mooshammer, P. Nagler, C. Schüller, T. Korn**, U. Höfer**, G. Mette, Ultrafast charge transfer in *MoS_2/WSe_2 heterostructures,* ACS nano **15**, 14725, (2021). 22 citations.
15. S. Ito, M. Schüler, M. Meierhofer, S. Schlauderer, J. Freudenstein, R. Reimann, D. Afanasiev, K. A. Kokh, O. E. Tereshchenko, J. Güdde, M. A. Sentef, **U. Höfer** and R. Huber, *Build-up and dephasing of Floquet-Bloch bands on subcyle timescales,* Nature **616**, 696 (2023). 1 citation

Selected Invited Talks at International Conferences (out of 59 since 2013)

1. Keynote talk *Structure and dynamics of internal interfaces",* Trends in Nanotechnology, TNT Japan (Tokyo, Japan, January 2014).
2. Overview Talk *Shedding light on internal interfaces* DPG Spring Meeting (Regensburg, 6 - 11 Mar 2016).
3. Keynote talk *Ultrafast dynamics of electron transfer processes at metal/organic interfaces,* ASOMEA-VIII (Okazaki, Japan, 22-26 Nov 2016).
4. Invited talk *Momentum space view of the ultrafast dynamics of surface photocurrents on topological insulators*, Photonics West (San Francisco, USA, 28 Jan – 2 Feb 2017).
5. Tutorial lecture *Time-resolved photoemission*, Summer School on Ultrafast Dynamics (Göttingen, 19-20 Sep 2018).
6. Keynote talk *Ultrafast time-resolved investigations of electron transport at surfaces and internal interfaces*, Schloss Ringberg Symposium (Tegernsee, 17-20 Feb 2019).
7. Invited talk *Subcycle time-resolved ARPES of THz-driven Dirac currents in a topological surface band*, 11th Int. Symposium on Ultrafast Surface Dynamics, USD-11 (Qiandao Lake, China, 8-14 Jun 2019).
8. Plenary talk *THz-APRES band structure movies of Dirac surface currents*, DPG Spring Meeting (Dresden, 15-20 Mar 2020, given online on 2 Apr 2020).
9. Plenary talk *Ultrafast Time-Resolved Investigations of Electron Transport at Surfaces and Internal Interfaces*, 35th European Conference on Surface Science, ECOSS-35 (Luxembourg, 29 Aug - 2 Sep 2022).
10. Invited talk *Buildup and dephasing of Floquet-Bloch bands on subcycle time scales*, The International Meeting on Non-Equilibrium Dynamics of Condensed Matter (Ma'ale Hahmisha, Israel, 16-20 April 2023).

Patents

1. S. G. Barbee, T. F. Heinz, **U. Höfer**, L. Li, V. J. Silvestri, *Method and apparatus for real-time, in-situ endpoint detection and closed loop etch process control,* US-Patent No. 5,392,124 (1995).

Research Grants (since 2013)

Project title	Funding source	Amount	Period	Role
Completet grants				
Apparatus for time-resolved photoelectron spectroscopy with high laser harmonics	DFG INST160/533	670.000 €	2012-14	PI
High-resolution 2D photoelectron spectrometer	DFG INST160/608	707.000 €	2013-15	PI
DFG/NSF Materials World Network: Electron and lattice dynamics at an atomically controlled buried interface	DFG HO 2295/8	36.200 €	2013-17	co-PI*
Ultrafast Carrier dynamics in topological insulators (SPP 1666 priority program)	DFG HO 2295/7	381.800 € 221.400 €	2013-17 2017-20	PI
Time-resolved nonlinear optical spectroscopy of buried semiconductor interfaces	DFG SFB 1083-B5	302.600 € 500.700 €	2013-17 2017-21	PI
Time-resolved 2PPE studies of interface electron and exciton dynamics	DFG SFB 1083-B6	661.700 € 520.800 €	2013-17 2017-21	PI
Central Tasks of Collaborative Research Centre SFB 1083	DFG SFB 1083-Z	1.448.500 € 1.883.700 €	2013-17 2017-21	PI
Ultrashort pulse laser system	DFG INST160/705	415.000 €	2018-20	PI
Research Training Group “Functionalization of Semiconductors”	DFG GRK 1782	207.000 € 380.000 €	2012-16 2017-22	co-PI*
Creation and ultrafast spectroscopy of electrical currents at metal and semiconductor surfaces	DFG GU 495/2	338.500 € 449.600 €	2012-17 2018-22	co-PI*
Ongoing grants				
Electronic structure and ultrafast dynamics of magnetic topological insulators	DFG HO 2295/9	252.900 €	2021-24	PI
Time-resolved 2PPE studies of interface electron and exciton dynamics	DFG SFB 1083-B6	782.900 €	2021-25	PI
Ultrafast dynamics of interface currents	DFG SFB 1083-B11	462.600 €	2021-25	PI
Synergy Grant - Photoemission Orbital Cinematography: An ultrafast wave function lab (*Orbital Cinema*)	ERC 2022-SyG 101071259	2.979.000 €	2023-29	co-PI*

* amount given is share of Ulrich Höfer as co-PI

DFG: Deutsche Forschungsgemeinschaft
ERC: European Research Council