

Aart J. Verhoef

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Department of Soil and Crop Sciences, Texas A&M University
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Education

- 2002–2006 **Ph.D.** in Experimental Physics (March 22, 2007)
Ludwig Maximilians Universität München, Germany
and Max-Planck-Institute of Quantum Optics, Garching, Germany
Thesis: ‘*Absolute phase control of intense few-cycle pulses and steering the atomic-scale motion of electrons*’. Advisor Prof. Dr. Ferenc Krausz.
1998–2002 **M.Sc.** in Physics and Astronomy (Nov. 26, 2002)
Vrije Universiteit Amsterdam, the Netherlands
Thesis: ‘*Speccs Software Documentation*’. Advisor Prof. Dr. Wim Ubachs.

Employment – Professional experience

- 2019– Assistant Professor, Department of Soil and Crop Sciences,
Texas A&M University, College Station, Texas, USA
2018–2019 Senior R&D Engineer, Trilite Technologies, Vienna, Austria
2017–2018 Visiting Professor at Universidad de Panamá,
Centro Regional Universitario de Coclé
2015–2017 Assistant Professor at Medical University of Vienna,
Center for Medical Physics and Biomedical Engineering
2012 Co-founder of AmpLight KG
2009–2015 Senior research associate at TU Vienna, Photonics Institute
2006–2009 Research associate at TU Vienna (Baltuška lab)
2004–2006 Research assistant at MPQ Garching (Krausz group), Germany
2002–2004 Research assistant at TU Vienna (Krausz group), Austria
2001–2002 Medical Natural Sciences Laboratory teacher at VU Amsterdam,
the Netherlands

Teaching

- VU Amsterdam** First year laboratory for Medical Natural Sciences
TU Wien Undergraduate photonics – fundamental laser theory; Student laboratory
Medical University Vienna Optical Coherence Tomography lecture module; Medical physics laboratory; Vision optics laboratory
Texas A&M Optics and Photonics for Agriculture; Analytic tools for Agriculture; L^AT_EX technical (thesis) writing workshop

Memberships, Awards, Reviewing activities, Publication metrics

- Member of Optical Society of America and American Society of Agronomy
- Max-Planck-Scholarship (2004–2005); High school graduation first place in Physics (1998)
- Reviewer for: Optica, Optics Letters, Optics Express, Biomedical Optics Express, JOSA B, Applied Physics Letters, Laser Physics Letters, Chemical Physics, New Journal of Physics, Applied Physics B, Physical Review Letters, Scientific Reports, IEEE Journal of Selected Topics in Quantum Electronics.
- 38 published peer-reviewed articles (8 first author; 1 shared first author; 14 corresponding author);
H-index 21; > 3800 total citations (Google scholar)

Scientific interests

Multiphoton imaging and microscopy; Functional multiphoton imaging; Raman Spectroscopy and Microscopy; Coherent Raman microscopy; Optical Coherence Tomography; Plant imaging; Insect neuroscience; Remote sensing; Molecular dynamics; Generation and amplification of ultrashort pulses; Measurement and control of the absolute phase of few-cycle pulses; Attosecond pulse generation; Coherent XUV and X-ray generation; Sub-femtosecond time resolved spectroscopy.

Funding

- FS2: Reactome Knowledge Graph to Phenomes of Major Staple Crops for Food System Threat Detection
co-PI; 2023–2024; DARPA; \$ 1,000,000
- Rare Earth Genomics Hop Latent and Hop Stunt Project
co-PI; 2022–2024; Rare Earth Genomics; \$ 260,533
- Identifying the Neuronal Basis for Magnetosensation and Orientation in Insects
co-PI; 2020–2022; Texas A&M University; \$ 323,562
- Defining active, relaxed, and closed states of thick filaments in sarcomeres
co-PI (with W. Teizer and C. Tong [PI]); 2020; Texas A&M University; \$ 32,000
- Coherent Attosecond Photoelectron Spectroscopy
PI: 2012–2016; FWF–Austrian Science Fund; € 331,663.50
- Development of a completely monolithic fiber chirped pulse amplifier system
co-PI; 2011–2013; Industry sponsors: NKT Photonics, OFS Denmark; € 15,000
- All-normal dispersion Yb-fiber oscillator
co-PI; 2011–2012; Industry sponsor: Quanta Systems S.p.A; € 100,000
- Optical and THz pulse parametric generation in waveguides
Co-Investigator; 2010–2012; FWF; € 131,300
- Fiber based dispersion compensation
co-PI; 2010–2015; Industry sponsor: OFS Denmark; € 28,000
- Austrian SFB 16 (ADLIS), project 19 (Phase-controlled multi-color drive laser)
Task leader (attosecond pulse generation); 2006–2011; FWF; € 569,400
- Towards nonlinear time-resolved spectroscopy with attosecond x-ray pulses
Task leader (HHG and ionization dynamics); 2006–2010; FWF; € 980,000

List of Publications

Patents

- **Patent:** Method and device for carrier envelope phase stabilisation, US/Japan/EU patent Nr.: WO/2008/064710
- **Patent:** Anordnung zur optischen Verstärkung von Lichtpulsen (SIMPL) – Method for optical amplification of light pulses (Sagnac Interferometric MultiPass Loop), Austrian patent Nr.: A696/2008
- **Patent:** High-fidelity, high-energy ultrashort pulses from a net normal-dispersion Yb-fiber laser with an anomalous dispersion higher-order-mode fiber, *filed with OFS Denmark*, US patent Nr.: 14/362,791
- **Patent application:** Laser scanning microscope arrangement, Austrian patent application Nr. A51155/2018, PCT/EP2019/085895
- **Patent application:** Projector and method of projecting an image, EU patent application Nr. 20167744.0-1209

Peer Reviewed Journal Articles

38. **Non-destructive direct pericarp thickness measurement of sorghum kernels using an extended-focus optical coherence microscopy**,
D. Sen, A. Fernández, D. Crozier, B. Henrich, A.V. Sokolov, M.O. Scully, W.R. Rooney and A.J. Verhoef,
Sensors **23**, 707 (2023)
37. **Extended focal depth Fourier domain optical coherence microscopy with a Bessel-beam - LP₀₂ mode - from a higher order mode fiber**,
D. Sen, A. Classen, A. Fernández, L. Grüner-Nielsen, H.C. Gibbs, S. Esmaeili, P. Hemmer, A. Baltuška, A.V. Sokolov, R.A. Leitgeb, and A.J. Verhoef,
Biomed Opt Express **12**, 7327 (2021)
36. **Dynamic real-time subtraction of stray-light and background for multiphoton imaging**,
A. Fernandez, A. Straw, M. Distel, R. Leitgeb, A. Baltuska, and A.J. Verhoef,
Biomed. Opt. Express **12**, 288, (2021)
35. **A Fiber Optic Platform for Detection of Antibodies and Viral Particles of COVID-19**,
N. Rajil, A. Sokolov, Z. Yi, L. Adams, G. Agarwal, V. Belousov, R. Brick, K. Chapin, J.D. Cirillo, V. Deckert, S. Delfan, S. Esmaeili, A. Fernández-González, E. Fry, Z. Han Z, P. Hemmer, G. Kattawar, M. Kim, M. Lee, J. Leibowitz, C. Lu, T. Peng, V. Poor, S. Scully, S. Suckewer, A. Svidzinsky, A. Verhoef, D. Wang, K. Wang, L. Yang, A. Zheltikov, S. Zubairy, and M.O. Scully,
Nanophotonics **10** 235 (2020), DOI: 10.1515/nanoph-2020-0357
34. **Epi-detecting label-free multimodal imaging platform using a compact diode-pumped femtosecond solid-state laser**,
M. Andreana, T. Le, A.K. Hansen, A.J. Verhoef, O.B. Jensen, P.E. Andersen, P. Slezak, W. Drexler, A. Fernández, and A. Unterhuber,
J. Biomed. Opt. **22** 091517 (2017)

33. **Optimizing pulse compressibility in completely all-fibered ytterbium chirped pulse amplifiers for in vivo two photon laser scanning microscopy,**
A. Fernández, L. Grüner-Nielsen, M. Andreana, M. Stadler, S. Kirchberger, C. Sturtzel, M. Distel, L. Zhu, W. Kautek, R. Leitgeb, A. Baltuška, K. Jespersen and A.J. Verhoef,
Biomed. Opt. Express **8**, 3526 (2017)
32. **Fast volumetric calcium imaging across multiple cortical layers using sculpted light,**
R. Prevedel, A.J. Verhoef, A.J. Pernia-Andrade, S. Weisenburger, B. Huang, T. Nöbauer, A. Fernández, J.E. Delcour, P. Golshani, A. Baltuška, and A. Vaziri,
Nature Methods **13**, 1021 (2016)
31. **Sub-100-fs pulses from an all-polarization maintaining Yb-fiber oscillator with anomalous dispersion higher-order-mode fiber,**
A.J. Verhoef, L. Zhu, S. Møller Israelsen, L. Grüner-Nielsen, K. Rottwitt, A. Baltuška, and A. Fernández,
Opt. Express **23**, 26139 (2015)
30. **High peak-power monolithic femtosecond ytterbium fiber chirped pulse amplifier with a spliced-on hollow core fiber compressor,**
A.J. Verhoef, K. Jespersen, T.V. Andersen, L. Grüner-Nielsen, T. Flöry, L. Zhu, A. Baltuška, and A. Fernández,
Opt. Express **22**, 16759 (2014)
29. **High energy and average power femtosecond laser for driving mid-IR OPAs,**
P. Malevich, G. Andriukaitis, T. Flöry, A.J. Verhoef, A. Fernández, S. Ališauskas, A. Pugžlys, A. Baltuška, L.H. Tan, C.F. Chua, and P.B. Phua,
Opt. Lett. **38**, 2746 (2013)
28. **Generation of high fidelity 62-fs, 7-nJ pulses at 1035 nm from a net normal-dispersion Yb-fiber laser with anomalous dispersion higher-order-mode fiber,**
L. Zhu, A.J. Verhoef, K.G. Jespersen, V.L. Kalashnikov, L. Grüner-Nielsen, D. Lorenc, A. Baltuška, and A. Fernández,
Opt. Express **21**, 16255 (2013)
27. **Optical and THz signatures of sub-cycle tunneling dynamics,**
T. Balciunas, A.J. Verhoef, A.V. Mitrofanov, G. Fan, E.E. Serebryannikov, M.Y. Ivanov, A.M. Zheltikov, and A. Baltuška,
Chem. Phys. **414**, 92 (2013)
26. **Intrasweep phase-sensitive optical coherence tomography for noncontact optical photoacoustic imaging,**
C. Blatter, B. Grajciar, P. Zou, W. Wieser, A.J. Verhoef, R. Huber, and R.A. Leitgeb,
Opt. Lett. **37**, 4368 (2012)
25. **Sagnac interferometric multipass loop amplifier,**
S. Roither, A.J. Verhoef, O.D. Mücke, G.A. Reider, A. Pugžlys, and A. Baltuška,
Opt. Express **20**, 25121 (2012)

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24. **High-fidelity, 160 fs, 5 μ J pulses from an integrated Yb-fiber laser system with a fiber stretcher matching a simple grating compressor,**
A. Fernández, K. Jespersen, L. Zhu, L. Grüner-Nielsen, A. Baltuška, A. Galvanauskas, and A.J. Verhoef,
Opt. Lett. **37**, 927 (2012)
 23. **Time-and-energy-resolved measurement of Auger cascades following Kr 3d excitation by attosecond pulses,**
A.J. Verhoef, A.V. Mitrofanov, X.T. Nguyen, M. Krikunova, S. Fritzsche, N.M. Kabachnik, M. Drescher, and A. Baltuška,
New J. Phys. **13**, 113003 (2011)
 22. **State-of-the-art attosecond metrology,**
M. Schultze, A. Wirth, I. Grguras, M. Uiberacker, T. Uphues, A.J. Verhoef, J. Gagnon, M. Hofstetter, U. Kleineberg, E. Goulielmakis and F. Krausz,
J. Electron Spectrosc. Relat. Phenom. **184**, 68 (2011)
 21. **Pulse Fidelity Control in a 20- μ J Sub-200-fs Monolithic Yb-fiber Amplifier,**
A. Fernández, L. Zhu, A.J. Verhoef, D. Sidorov-Biryukov, A. Pugžlys, A. Galvanauskas, F.Ö. Ilday and A. Baltuška,
Laser Physics **21**, 1329 (2011)
 20. **Time-and-Energy Resolved Measurement of the Cascaded Auger Decay in Krypton,**
A.J. Verhoef, A.V. Mitrofanov, X.T. Nguyen, M. Krikunova, S. Fritzsche, N.M. Kabachnik, M. Drescher, and A. Baltuška,
Laser Physics **21**, 1270 (2011)
 19. **Optical detection of sub-cycle ionization dynamics in transparent dielectrics,**
A.V. Mitrofanov, A.J. Verhoef, E.E. Serebryannikov, J. Lumeau, L. Glebov, A.M. Zheltikov, and A. Baltuška,
Phys. Rev. Lett. **106**, 147401 (2011)
 18. **Efficient 4-fold self-compression of millijoule pulses from a 1.5- μ m optical parametric chirped-pulse amplifier,**
S. Ališauskas, V. Smilgevičius, A.P. Piskarskas, O.D. Mücke, A.J. Verhoef, A. Pugžlys, A. Baltuška, J. Pocius, L. Giniunas, R. Danielius, and N. Forget,
Lithuanian J. Phys **50**, 111 (2010)
 17. **Optical detection of tunneling ionization,**
A.J. Verhoef, A. Mitrofanov, E.E. Serebryannikov, D.V. Kartashov, A.M. Zheltikov, and A. Baltuška,
Phys. Rev. Lett. **104**, 163904 (2010)
 16. **Signatures of attosecond electron tunneling dynamics in the evolution of intense few-cycle light pulses,**
E.E. Serebryannikov, A.J. Verhoef, A. Mitrofanov, A. Baltuška, and A.M. Zheltikov,
Phys. Rev. A **80**, 053809 (2009)

15. **Self-compression of millijoule $1.5\mu\text{m}$ pulses,**
O.D. Mücke, S. Alisauskas, A.J. Verhoef, A. Pugžlys, A. Baltuška, V. Smilgevičius, J. Pocius, R. Giniunas, R. Danielius, and N. Forget,
Opt. Lett. **34**, 2498 (2009)
14. **Broadly tunable carrier envelope phase stable optical parametric amplifier pumped by a monolithic ytterbium fiber amplifier,**
A. Fernández, L. Zhu, A.J. Verhoef, D. Sidorov-Biryukov, A. Pugžlys, A. Baltuška, K.-H. Liao, Ch.-H. Liu, A. Galvanauskas, S. Kane, R. Holzwarth, and F.Ö. Ilday
Opt. Lett. **34**, 2799 (2009)
13. **Plasma-blueshift spectral shear interferometry for characterization of ultimately short optical pulses,**
A.J. Verhoef, A. Mitrofanov, A. Zheltikov, and A. Baltuška,
Opt. Lett. **34**, 82 (2009)
12. **Strong-field control of electron localisation during molecular dissociation,**
M.F. Kling, Ch. Siedschlag, I. Znakovskaya, A.J. Verhoef, S. Zherebtsov, F. Krausz, M. Lezius, and M.J.J. Vrakking,
Mol. Phys. **106**, 455 (2008)
11. **Ultrabroadband, coherent light source based on self-channeling of few-cycle pulses in helium,**
E. Goulielmakis, S. Koehler, B. Reiter, M. Schultze, A.J. Verhoef, E.E. Serebryannikov, A.M. Zheltikov, and F. Krausz,
Opt. Lett. **33**, 1407 (2008)
10. **Solitonic dynamics of ultrashort pulses in a highly nonlinear photonic-crystal fiber visualized by spectral interferometry,**
D.A. Sidorov-Biryukov, A. Fernández, L. Zhu, A.J. Verhoef, P. Dombi, A. Pugžlys, E.E. Serebryannikov, A.M. Zheltikov, J.C. Knight, and A. Baltuška,
Opt. Lett. **33**, 446 (2008)
9. **Imaging of carrier-envelope phase effects in above-threshold ionization with intense few-cycle laser fields,**
M.F. Kling, J. Rauschenberger, A.J. Verhoef, E. Hasovic, T. Uphues, D.B. Milosevic, H.G. Muller, and M.J.J. Vrakking,
New J. Phys. **10**, 025024 (2008)
8. **Interference in strong-field ionization of a two-centre atomic system,**
Z. Ansari, M. Böttcher, B. Manschwetus, H. Rottke, W. Sandner, A.J. Verhoef, M. Lezius, G.G. Paulus, A. Saenz, and D.B. Milosevic,
New J. Phys. **10**, 093027 (2008)
7. **Generation of 60-nJ sub-40-fs pulses at 70 MHz repetition rate from a Ti:sapphire chirped pulse-oscillator,**
A. Fernández, A.J. Verhoef, V. Pervak, G. Lermann, F. Krausz and A. Apolonski,
Appl. Phys. B **87**, 395 (2007)

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6. **Attosecond real-time observation of electron tunnelling in atoms,**
M. Uiberacker, Th. Uphues, M. Schultze, A.J. Verhoef, V. Yakovlev, M. Kling,
J. Rauschenberger, N.M. Kabachnik, H. Schröder, M. Lezius, M. Vrakking,
S. Hendel, U. Kleineberg, U. Heinzmann, M. Drescher and F. Krausz,
Nature **446**, 627 (2007)
 5. **Few-cycle carrier envelope phase-dependent stereo detection of electrons,**
A.J. Verhoef, A. Fernández, M. Lezius, K. O’Keeffe, M. Uiberacker, and
F. Krausz,
Opt. Lett. **31**, 3520 (2006)
 4. **Control of Electron Localization in Molecular Dissociation,**
M.F. Kling, Ch. Siedschlag, A.J. Verhoef, J.I. Khan, M. Schultze, Th. Uphues,
Y. Ni, M. Uiberacker, M. Drescher, F. Krausz, and M.J.J. Vrakking,
Science **312**, 246 (2006)
 3. **Compression of the pulses of a Ti:sapphire laser system to 5 femtoseconds at 0.2 terawatt level,**
A.J. Verhoef, J. Seres, K. Schmid, Y. Nomura, G. Tempea, L. Veisz, and
F. Krausz,
Appl. Phys. B **82**, 513 (2006)
 2. **Carrier-envelope phase-stabilized amplifier system,**
J. Rauschenberger, T. Fuji, M. Hentschel, A.J. Verhoef, T. Udem, C. Gohle,
T.W. Hänsch, and F. Krausz,
Laser Phys. Lett. **3**, 37 (2006)
 1. **Source of Coherent kiloelectronvolt X-rays,**
J. Seres, E. Seres, A.J. Verhoef, G. Tempea, C. Streli, P. Wobrauschek,
V. Yakovlev, A. Scrinzi, C. Spielmann, and F. Krausz,
Nature **433**, 596 (2005)