

Aart J. Verhoef

Assistant Professor, Biophotonics

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Education

2002–2006 **Ph.D.** in Experimental Physics

TU Vienna, Photonics Institute, Austria (2002–2004)

LMU Munich & MPQ Garching, Germany (2004–2006)

Degree received from Ludwig Maximilians Universität München in 2007; thesis entitled '*Absolute phase control of intense few-cycle pulses and steering the atomic-scale motion of electrons*'. Thesis advisor Prof. Dr. Ferenc Krausz.

1998–2002 **M.Sc.** in Physics and Astronomy

Vrije Universiteit Amsterdam, section for Atomic Physics,

Laser Centre Vrije Universiteit Amsterdam

Thesis entitled '*Speccs Software Documentation*'. Thesis 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

2015–2019 Invited researcher at TU Vienna (Photonics Institute)
advanced nonlinear optical imaging development

2017 Visiting Professor at Universidad de Panamá,
Centro Regional Universitario de Coclé

Consultancy on various academic issues, teaching and research

2015–2017 Assistant Professor at Medical University of Vienna,
Center for Medical Physics and Biomedical Engineering
directing advanced nonlinear optical imaging development

2009–2015 Senior research associate at TU Vienna, Photonics Institute
directing attosecond ionization dynamics and spectroscopy research

2006–2009 Research associate at TU Vienna
establishing attosecond physics research

2004–2006 Research assistant at MPQ Garching, Germany

2002–2004 Research assistant at TU Vienna

2001–2002 Medical Natural Sciences Laboratory teacher at VU Amsterdam,
the Netherlands

Commercial activities

- **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
- **Co-founder of AmpLight KG**, a TU-Wien spin-off founded in 2012 specialized in Yb-based femtosecond lasers and fs-OP(CP)A

Memberships, Awards, Reviewing activities, Publication metrics

- Member of Optical Society of America and European Physical Society
- Max-Planck-Scholarship (2004–2005); Highschool graduation first place in Physics (1998)
- Reviewer for: Optics Letters, Optics Express, JOSA B, Applied Physics Letters, Chemical Physics, New Journal of Physics, Applied Physics B, Physical Review Letters.
- 34 published peer-reviewed articles (8 first author; 1 shared first author; 11 corresponding author); > 80 conference contributions; > 2700 total citations; H-index 18 (Google scholar)

Teaching and supervision

Undergraduate Photonics course – fundamental laser theory

Student laboratory courses

Optical Coherence Tomography course

Day-to-day supervision of 2 Ph.D. students, 2 post-docs, 2 master-thesis students, 2 master-project students, 1 bachelor-thesis student

Scientific interests

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; Molecular dynamics; Multiphoton imaging and microscopy; Functional multiphoton imaging; Coherent Raman microscopy; Insect neuroscience.

Computer Skills

Operating systems	Mac OS, Microsoft Windows, Linux
General	MS Office, Open Office, Corel Draw, Illustrator, Photoshop, Acrobat
Scientific/Programming	L ^A T _E X, Origin, Igor Pro, C/C++, LabVIEW, Mathematica, Matlab
Software development	for instrument control, data-acquisition and data-analysis

Funding

- Towards nonlinear time-resolved spectroscopy with attosecond x-ray pulses
Task leader (HHG and ionization dynamics); 2006–2010; FWF; € 980,000
- Austrian SFB 16 (ADLIS), project 19 (Phase-controlled multi-color drive laser)
Task leader (attosecond pulse generation); 2006–2011; FWF; € 569,400
- Fiber based dispersion compensation
co-PI; 2010–2015; Industry sponsor: OFS Denmark; € 28,000
- Optical and THz pulse parametric generation ion waveguides
joint project with Moscow State University, A. Zheltikov
Task leader (optical field ionization of dielectrics); 2010–2012; FWF; € 131,300
- All-normal dispersion Yb-fiber oscillator
co-PI; 2011–2012; Industry sponsor: Quanta Systems S.p.A; € 100,000
- Development of a completely monolithic fiber chirped pulse amplifier system
co-PI; 2011–2013; Industry sponsors: NKT Photonics, OFS Denmark; € 15,000
- Coherent Attosecond Photoelectron Spectroscopy
PI: 2012–2016; FWF–Austrian Science Fund; € 331,663.50

International collaborations

C. Larsen, OFS, Denmark;
L. Grüner-Nielsen, Danish Optical Fiber Innovations;
T. Andersen/K. Jespersen, NKT Photonics, Denmark;
M. Drescher, DESY/Universität Hamburg, Germany;
K. Rottwitt, Technical University of Denmark, Denmark;
A. Zheltikov, Texas A&M University, USA, and Moscow State University, Russia;
A. Vaziri, Rockefeller University, USA;
W. Wcislo, Smithsonian Tropical Research Institute, Panamá;
A. Straw, University of Freiburg, Germany

Language knowledge

Dutch (native); English, German (fluent); Spanish (advanced)

List of Publications

Peer Reviewed Journal Articles

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)

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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)
 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 μ m pulses,**
O.D. Mücke, S. Alisauskas, A.J. Verhoef, A. Pugžlys, A. Baltuška, V. Smilgevi-
cius, J. Pocius, R. Giniunas, R. Danielius, and N. Forget,
Opt. Lett. **34**, 2498 (2009)
14. **Broadly tunable carrier envelope phase stable optical parametric am-
plifier 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 dissoci-
ation,**
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. Sere-
bryannikov, 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 ioniza-
tion with intense few-cycle laser fields,**
M.F. Kling, J. Rauschenberger, A.J. Verhoef, E. Hasovic, T. Uphues, D.B. Milo-
sevic, H.G. Muller, and M.J.J. Vrakking,
New. J. Phys. **10**, 025024 (2008)

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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. Apolon-
ski,
Appl. Phys. B **87**, 395 (2007)
 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 elec-
trons,**
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 femtosec-
onds 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)