

Dr. Eleftherios Goulielmakis

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Date and place of birth: 18/05/1975 Heraklion, Greece
Marital status: Married (Stella Daskalaki), 1 daughter (Elpida)
Nationality: Greek

EDUCATION

- 2005 **Ph.D. (Dr. Rer. Nat.) Physics**, Physics Department, Ludwigs Maximilian University of Munich, Germany
- 2002 **M. Sc. Optoelectronics**, Physics Department, University of Crete, Greece
- 2000 **B. Sc. Physics**, Physics Department, University of Crete, Greece

ACADEMIC CAREER

- Since December 2010 Leader of the ERC research group “**Attoselectronics**” hosted by the Max Planck Institute of Quantum Optics, Garching, Germany
- Since August 2010 Coordinator of the Max Planck Center of Attosecond Science
- Since March 2010 Adjunct Prof. Physics, Pohang Institute of Technology, Korea
- August 2005-
November 2010 Team leader/ Postdoctoral Researcher, Max Planck Institute of Quantum Optics, Germany
- 2002-2005 PhD study, Physics Department, University of Munich, Germany

RESEARCH FOCUS

Synthesis, metrology and attosecond control of light fields, generation of attosecond soft-x ray pulses, Real time control and measurement of electronic processes.

HONORS

ERC Starting Grant (2010)

IUPAP Young Scientist Prize 2009 in Optics (2010)

G. Foteinos prize in experimental physics, Academy of Athens (2007)

Marie-Curie Reintegration Grant (2007)

Marie-Curie Intra European Fellowship (2005)

SCIENTIFIC ACCOMPLISHMENTS

- *Demonstrated synthesis of light fields* (generation & metrology) with sub-optical cycle resolution and attosecond precision. *Science* 334, 195 (2011).
- *First real-time observation of valence electron motion in atoms*, *Nature* 466, 739 (2010) opening the way for chemical control on the electronic time scale.
- *Demonstrated sub-100 attosecond soft-x-ray pulse generation* *Science* 320, 1614 (2008). These pulses comprise the shortest flashes of light generated to date.
- *Demonstrated reproducible generation of isolated attosecond XUV bursts* as well as, the highest temporal resolution ~ 100 attoseconds at that time - *Nature* 427, 817 (2004). This publication has been identified as a hot paper in Physics in July 2005 by the essential science indicators (ESI) and the web of science.
- *First direct measurement of the instantaneous value of the field of light waves* over an entire few-cycle laser pulse, *Science* 305, 1267 (2004) research that opens the way for lightwave electronics *Science* 317, 769 (2007) that is the control of electron motion with the waveform of light.
- *Extension of few cycle light generation and metrology in the in the deep ultraviolet* for the first time enabling control of molecular electron dynamics on their natural time scale. (*Optics Express* 16,18956 (2008), *Optics letters* 35, 2248 (2010), *PRL* 105, 243902 (2010))

PUBLICATIONS IN BRIEF

Total number (first/ last author): 36 (6/4)

Total Number of citations: ~3000

Invited talks >20

Number of high profile (impact factor> 5) publications: 14

In detail: 5 publications in *Science* (3 as leading author 1 as senior author), 3 publication in *Nature* (in 1 as leading author) and 6 in *Physical Review Letters* (1 as senior author).

Eight (8) papers including *Science* 305, 1267 (2004), *Nature* 427, 817 (2004) and *Science* 320, 1614 (2008) are identified as highly cited papers in physics. Author/ or co-author of five (5) out of the 27 core papers in the field of attosecond science. (Source: Essential science indicators).

PEER REVIEW PUBLICATIONS (36)

1. A. Wirth, M. Hassan, I. Grguras, J. Gagnon, A. Moulet, T.T. Luu, S. Pabst, R. Santra, Z. Alahmed, A.M. Azzeer, V.S. Yakovlev, V. Pervak, F. Krausz and E. Goulielmakis, “**Synthesized Light Transients**”, *Science* **334**, 195 (2011).
2. M. Schultze, A. Wirth, I. Grguras, M. Uiberacker, T. Uphues, A. J. Verhoef, J. Gagnon, M. Hofstetter, U. Kleineberg, E. Goulielmakis and F. Krausz, “**State-of-the-art attosecond**

- metrology**". *J. Electron. Spectrosc. Relat. Phenom.* **184**, 68 (2011)
3. M. Hofstetter, A. Aquila, M. Schultze, A. Guggenmos, S. Yang, E. Gullikson, M. Huth, B. Nickel, J. Gagnon, V. S. Yakovlev, E. Goulielmakis, F. Krausz and U. Kleineberg, „**Lanthanum-molybdenum multilayer mirrors for attosecond pulses between 80 and 130 eV**“, *New Journal of Physics* **13**, 063038 (2011).
 4. M. Hofstetter, M. Schultze, M. Fiess, B. Dennhardt, A. Guggenmos, J. Gagnon, V. S. Yakovlev, E. Goulielmakis, R. Kienberger, E. M. Gullikson, F. Krausz, and U. Kleineberg, **Attosecond dispersion control by extreme ultraviolet multilayer mirrors**, *Opt. Express* **19**, 1767 (2011).
 5. F. Reiter, U. Graf, E. E. Serebryannikov, W. Schweinberger, M. Fiess, M. Schultze, A. M. Azzeer, R. Kienberger, F. Krausz, A. M. Zheltikov, and E. Goulielmakis, **Route to Attosecond Nonlinear Spectroscopy**, *Phys. Rev. Lett.* **105**, 243902 (2010).
 6. M. Fiess, M. Schultze, E. Goulielmakis, B. Dennhardt, J. Gagnon, M. Hofstetter, R. Kienberger, and F. Krausz, **Versatile apparatus for attosecond metrology and spectroscopy**, *Rev. Sci. Instrum.* **81**, 093103 (2010).
 7. Eleftherios Goulielmakis, Zhi-Heng Loh, Adrian Wirth, Robin Santra, Nina Rohringer, Vladislav S. Yakovlev, Sergey Zharebtsov, Thomas Pfeifer, Abdallah M. Azzeer, Matthias F. Kling, Stephen R. Leone und Ferenc Krausz, **Real time observation of valence electron motion**, *Nature* **466**,739 (2010)
 8. M. Schultze, M. Fiess, N. Karpowicz, J. Gagnon, M. Korbman, M. Hofstetter, S. Neppl, A. L. Cavalieri, Y. Komninos, T. Mercouris, C. A. Nicolaides, R. Pazourek, S. Nagele, J. Feist, J. Burgdorfer, A. M. Azzeer, R. Ernstorfer, R. Kienberger, U. Kleineberg, E. Goulielmakis, F. Krausz, and V. S. Yakovlev, **Delay in Photoemission**, *Science* **328**, 1658 (2010).
 9. F. Reiter, U. Graf, M. Schultze, W. Schweinberger, H. Schroder, N. Karpowicz, A. M. Azzeer, R. Kienberger, F. Krausz, and E. Goulielmakis, **Generation of sub-3 fs pulses in the deep ultraviolet**, *Optics Letters* **35**, 2242 (2010).
 10. R. Gopal, K. Simeonidis, R. Moshhammer, T. Ergler, M. Durr, M. Kurka, K.U. Kuhnel, S. Tschuch, C.D. Schroter, D. Bauer, J. Ullrich, A. Rudenko, O. Herrwerth, T. Uphues, M. Schultze, E. Goulielmakis, M. Uiberacker, M. Lezius and M.F. Kling, **Three-Dimensional Momentum Imaging of Electron Wave Packet Interference in Few-Cycle Laser Pulses**. *Phys. Rev. Lett.* **103**, 053001 (2009)
 11. U. Graf, M. Fiess, M. Schultze, R. Kienberger, F. Krausz and E. Goulielmakis “**Intense few-cycle pulses in the deep ultraviolet**” *Opt. Express* **16**, 18956 (2008)
 12. E. E. Serebryannikov, E. Goulielmakis and A. M. Zheltikov, **Supercontinuum compressible to single-cycle pulse widths from an ionizing gas**, *New J. Phys.* 10 (2008) 093001
 13. E. Goulielmakis, S. Koehler, B. Reiter, M. Schultze, A. J. Verhoef, E. Serebryannikov, A. M. Zheltikov and F. Krausz, **Ultra broadband, coherent light source based on self- channeling of few-cycle pulses in He**. *Opt. Lett.* **33**, 1407 (2008)
 14. E. Goulielmakis, M. Schultze, M. Hofstetter, V. S. Yakovlev, J. Gagnon, M. Uiberacker, A. L. Aquila, E. M. Gullikson, D. T. Attwood, R. Kienberger, F. Krausz, U. Kleineberg. **Single Cycle Nonlinear Optics**, *Science* **320**, 1614 (2008)

15. J. Gagnon, E. Goulielmakis, V.S. Yakovlev, **Advances toward the accurate FROG characterization of attosecond pulses from streaking measurements.** *App. Phys. B* **92**, 25 (2008)
16. J. Schmidt, E. Goulielmakis, V. S. Yakovlev, **Modeling attosecond pump-probe attosecond measurements on non-aligned molecules** *J. Phys. B: At. Mol. Opt. Phys.* **41**, 115602 (2008)
17. E. Goulielmakis, V.S. Yakovlev, A. L. Cavalieri, M. Uiberacker, V. Pervak, A. Apolonski, R. Kienberger, U. Kleineberg, F. Krausz, **Attosecond control and measurement: Lightwave electronics.** *Science* **317**, 769 (2007) (**Invited**)
18. A. L. Cavalieri, E. Goulielmakis, B. Horvath, W. Helml, M. Schultze, M. Fiess, V. Pervak, L. Veisz, V.S. Yakovlev, M. Uiberacker, A. Apolonski, F. Krausz R. Kienberger, **Intense 1.5-cycle near infrared laser waveforms and their use for the generation of ultra-broadband soft-x-ray harmonic continua.** *New. J. Phys* **9**, 242 (2007)
19. M. Schultze, E. Goulielmakis, M. Uiberacker, M. Hofstetter, J. Kim, D. Kim, F. Krausz, U. Kleineberg, **Powerful 170-attosecond XUV pulses generated with few-cycle laser pulses and broadband multilayer optics.** *New. J. Phys* **9**, 243 (2007)
20. N. Akoezbek, S.A. Trushin, A. Baltuska, W. Fuss, E. Goulielmakis, K. Kosma, F. Krausz, S. Panja, M. Uiberacker, W. E. Schmidt, A. Becker, M. Scalora, M. N. Bloemer, **Extending the supercontinuum spectrum down to 200 nm with few-cycle pulses.** *New J. Phys* **8**, 177 (2006)
21. H. Rottke, X. Liu, E. Eremina, W. Sandner, E. Goulielmakis, K. O. Keeffe, M. Lezius, F. Krausz, F. Lindner, M. G. Schatzel, G. G. Paulus, H. Walther, **Non-sequential double ionization in a few-cycle laser pulse: the influence of the carrier-envelope phase.** *J. Mod. Opt.* **53**, 149 (2006)
22. F. Lindner, M. G. Schatzel, H. Walther, A. Baltuška, E. Goulielmakis, F. Krausz, D. B. Milosevic, D. Bauer, W. Becker, G. G. Paulus, **Attosecond double-slit experiment,** *Phys. Rev. Lett.* **95**, 040040 (2005)
23. R. Kienberger, M. Uiberacker, E. Goulielmakis, A. Baltuška, M. Drescher, F. Krausz, **Single Sub-fs Soft-X-ray Pulses: Generation and Measurement with the Atomic Transient Recorder.** *J. Mod. Opt.* **52**, 261 (2005)
24. M. Uiberacker, E. Goulielmakis, R. Kienberger, A. Baltuška, T. Westerwalbesloh, U. Kleineberg, U. Heinzmann, M. Drescher, F. Krausz **Attosecond metrology with controlled light waveforms.** *Laser Phys.* **15**, 195 (2005)
25. E. Goulielmakis, M. Uiberacker, R. Kienberger, A. Baltuška, V.S. Yakovlev, A. Scrinzi, Th. Westerwalbesloh, U. Kleineberg, U. Heinzmann, M. Drescher, F. Krausz, **Direct Measurement of Light Waves.** *Science* **305**, 1267 (2004)
26. X. Liu, H. Rottke, E. Eremina, W. Sandner, E. Goulielmakis, K.O. Keeffe, M. Lezius, F. Krausz, F. Lindner, M.G. Schatzel, G.G. Paulus, H. Walther, **Nonsequential double ionization at the single-optical-cycle limit.** *Phys. Rev. Lett.* **93**, 26 (2004)
27. M. G. Schatzel, F. Lindner, G. G. Paulus, H. Walther, E. Goulielmakis, A. Baltuška, M. Lezius, F. Krausz, **Long-term stabilization of the carrier-envelope phase of few-cycle laser pulses.** *Appl. Phys. B* **79**, 1021 (2004)
28. R. Kienberger, E. Goulielmakis, M. Uiberacker, A. Baltuška, V. Yakovlev, F. Bammer, A. Scrinzi, T. Westerwalbesloh, U. Kleineberg, U. Heinzmann, M. Drescher, F. Krausz, **Atomic Transient Recorder.** *Nature* **427**, 817 (2004)

29. F. Lindner, G. Paulus, H. Walther, A. Baltuška, E. Goulielmakis, M. Lezius, F. Krausz, **The Gouy effect for few-cycle laser pulses.** *Phys. Rev. Lett.* **92**, 11 (2004)
30. G. G. Paulus, F. Lindner, H. Walther, A. Baltuška, E. Goulielmakis, M. Lezius, F. Krausz, **Measurement of the phase of few-cycle laser pulses.** *Phys. Rev. Lett.* **91**, 25 (2003)
31. Baltuška, M. Uiberacker, E. Goulielmakis, R. Kienberger, V.S. Yakovlev, T. Udem, T.W. Hänsch, F. Krausz, **Phase-controlled amplification of few-cycle laser pulses.** *IEEE J. Sel. Topics Quantum Electron.* **9**, 972 (2003) (**Invited**)
32. A. Baltuška, T. Udem, M. Uiberacker, M. Hentschel, E. Goulielmakis, C. Gohle, R. Holzwarth, V.S. Yakovlev, A. Scrinzi, T.W. Hänsch, F. Krausz, **Attosecond control of electronic processes by intense light fields.** *Nature* **422**, 189 (2003)
33. D.Charalambidis, N.A. Papadogiannis, E. Goulielmakis, G. Nersisyan, G. D. Tsakiris and K. Witte, **A transmission grating interferometer for the temporal characterization of harmonics.** *J. Mod. Opt.* **50**, 387 (2003)
34. N. A. Papadogiannis, G.Nersisyan, E. Goulielmakis T. P. Rakitzis, E. Hertz and D. Charalambidis G.D. Tsakiris, K. Witte, **Temporal characterization of short pulse third-harmonic generation in an atomic gas by a transmission grating interferometer.** *Opt. Lett.* **27**, 1561 (2002)
35. E. Goulielmakis, G. Nersisyan, N. A. Papadogiannis, D. Charalambidis G.D. Tsakiris, K. Witte, **A dispersionless Michelson interferometer for the characterization of attosecond pulses.** *App. Phys. B* **74**, 197 (2002)
36. N. A. Papadogiannis, C. Kalpouzos, E. Goulielmakis, G. Nersisyan, and D.Charalambidis, F. Augé, F. Weihe, and Ph. Balcou, **Kilohertz extreme-ultraviolet light-source based on femtosecond high order harmonic generation from noble gases.** *Appl. Phys. B* **73**, 687 (2001)

POPULAR ARTICLES

Eleftherios Goulielmakis and Ferenc Krausz, *LichtWelle in Zeitlupe*, **Spectrum der Wissenschaft** (German edition of Scientific American), p 18, Oct. 2005

Eleftherios Goulielmakis, *Attophysics: capturing light waves and electrons in motion* (Αττοφυσική: Φωτογραφίζοντας κύματα φωτός και ηλεκτρόνια σε κίνηση). **Scientific American (Greek edition)** 6, 64 (2008)

SELECTED CONFERENCE CONTRIBUTIONS

- **Gordon Conference on Multiphoton Processes** “Light control of electronic processes” Massachusetts, USA June 2012 (**invited**) (planned)
- **EMMI Workshop**, Darmstadt, Germany “Attosecond control of light and Matter” November 2011 (**invited**) (planned)
- **Light at Extreme Intensities** Szeged Hungary “Attosecond physics with Synthesized Light Field

Transients” November 2011 (**invited**) (planned)

- **Symposium on Attoscience and Ultrafast Quantum Control**, London, United Kingdom “Taming Light Waves: Sub-Optical cycle Control of Light and Matter” September 2011 (**Invited**)
- **International commission of Optics 2011** “Taming Light Waves: Attosecond control of light and Matter” Puebla Mexico, August 2011 (**Plenary-IUPAP Award presentation**).
- **ATTO3** Hokkaido, Japan “Sub-optical-cycle waveform light synthesis: Attosecond triggering and clocking electron dynamics”, July 2011
- **Laser Physics** Sarajevo, Bosnia and Herzegovina 'Sub-optical-cycle waveform light synthesis: Steering and tracing ionization and electron dynamics in real-time', July 2011 (**Invited**)
- **Frontiers in Optics** Rochester, USA “Attosecond Physics: Real-Time Tracking of Valence Electron Motion in Atoms”, October 2010 (**Invited**)
- **ULTRAFAST PHENOMENA XVII** Snowmass Village, CA, USA Attosecond transient absorption spectroscopy for real-time observation of valence electron motion', July 2010, (**Highest-ranked contribution**)
- **Atomic Physics Workshop ATOM09** “Intra-atomic attosecond electron motion”, Dresden, Germany, November 2009 (**invited**)
- **LEI conference** “Attosecond Physics: Tracing the motion of electrons in real time”, Brasov, Romania October 2009 (**invited/Plenary**)
- **LEOS IEEE, Conference** Antalya Turkey “En route to the generation and attosecond control of intense single-cycle light pulses”, September 2009 (**invited**)
- **Advanced Laser Technologies ALT** Antalya, Turkey “Nonlinear optics at the single optical cycle limit” September 2009 (**invited**)
- **Laser Physics** Barcelona, Spain “Attosecond Transient Absorption Spectroscopy” July 2009 (**invited**)
- **CLEO Europe** Munich, Germany “Extremely short high-energy UV pulses from a high pressure gas”, June 2009.
- **Nonlinear Optics in Guided Geometries** Berlin, Germany “Supercontinuum generation at the single optical cycle limit: New routes to lightwave electronics” May 2009. (**Invited**)
- **ADLIS Workshop** Munich Germany “Attosecond pulse generation and spectroscopy”, March 2009 (**Invited**)
- **Laser Physics** Trondheim, Norway “Sub-100 attosecond pulses in the extreme ultraviolet”, July 2008 (**Invited**)
- **ULTRAFAST PHENOMENA XVI** Stresa, Italy “Sub-100 attosecond soft-x-ray pulses” June 2008 (**invited**)
- **Workshop Attosecond Physics** Crete, Greece “Advanced light sources for attosecond metrology”, October 2007 (**invited**)
- **International conference of optics and optical Materials Belgrade**, Serbia “Attoscience: The tools for observing and controlling the electronic motion in atoms and molecules”, September, 2007 (**invited**)

- **Marie-Curie conference** Belgrade Serbia “Attoscience: The tools for observing and controlling the electronic motion in atoms and molecules”, September 2006 (**Best contribution award**)
- **ICONO-LAT** St. Petersburg, Russia “Isolated Attosecond pulses: Metrology and applications”, May 2005 (**Invited**).
- **Photonics West** San Jose, California, USA “Generation and metrology of isolated attosecond pulses” January 2006 (**Invited**)

INVITED SEMINARS (SELECTED)

- **Max Planck Institute fur KernPhysik, Bothekolloquium** Heidelberg, Germany “Attosecond Physics with Field-Synthesized light” June 2011 (Host: R. Moshhammer)
- **MLL-Kolloquium fuer Kern und TeilchenPhysik** LMU Garching Germany “Attosecond control of Light and Matter”, June 2011 (Host: P. Thirolf)
- **Martin Luther University**, Halle-Wittenberg, Germany “Attosecond Physics” March 2011 (Host: J. Berakdar)
- **Texas AM, Physics Department College Station**, USA “Attosecond Physics: Tracking electronic Processes with sub-100 attosecond resolution”, May 2008 (Host: A. Sokolov)
- **Kansas State University Physics Department**, Kansas, USA “Attosecond Physics: Tracking electronic Processes with sub-100 attosecond resolution”, March 2008 (Host: Z. Chang)
- **POSTECH, Physics Department** Pohang, South Korea “Attosecond technology” October 2007 (Host: D.E. Kim)
- **Lawrence Berkeley National Laboratory**, Berkeley, USA “Attophysics: Tracking and controlling electronic processes on an atomic time scale”, LBNL Berkeley, April 2006 (Host: S.R. Leone)
- **Imperial college Blackett laboratory-Physics department**, London UK “Direct measurement of light waves using attosecond pulses”, October 2005 (Host: J. Marangos)

TEACHING

- Photonics I Physics Department, Ludwigs Maximilian Universitaet (Winter Semester 2010-2011)
- Attosecond Physics, Tools and techniques”, Visiting Professor at the Asia Pacific Centre for theoretical Physics (APCTP), Pohang, South Korea, A course for graduate and advanced undergraduates in ultrafast optics and attosecond physics (2007).
- Physics Department, University of Crete, Greece (2000-2002) Instructor

PROFFESIONAL SERVICE

Remote reviewer for the European research council –ERC- panel: Physics,
Peer reviewer: Nature Physics, Nature Photonics, Physical Review Letters, Optics Letters, Optics Express, Journal of physics B, New Journal of Physics, Applied Physics B, Journal of Optics A.

ECHO/ SCIENTIFIC MEDIA-NEWSPAPERS (SELECTED)

Cover Stories/Journals



Science 2007

Nature 2010

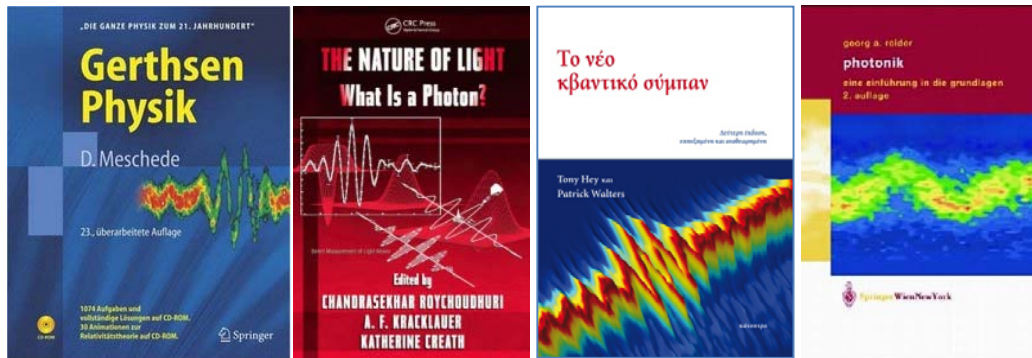
Science 2008

Opt. letters 2010

Science 2010

Science 2011

Cover Stories/Books



Gerthsen Physik
Springer 2006

The Nature of Light
CRC Press 2008

Quantum Universe
Katoptro 2009

Photonik
SpringerWien 2005

Press: Articles/interviews (selected)

- “Attosecond Photonics: Sub-femtosecond sculpted light transients probe the atom” John Wallace , **Laser Focus World**, 29 September (2011)
-
- “Light Pulses Get Shorter” Jyllian Kemsley **Chemical and Engineering News** 89,11 (2011)
- “Lichtblitze bändigen Elektronen“ Marc Hasse, **Hamburger Abendblatt** 10 September (2011)
- “Spectral broadening advances quest for single-cycle pulses” Jeff Hecht, **Laser Focus World**, 01 August (2011)
- “Exciting electrons” Jan Piotrowski, **The Economist**, 22 November (2010)
- “Snapshots of electrons in motion” Armand Niederberger, **Optics and Photonics Focus** 10, 7 (2010)
- “Watching ions wobble“ Ralf Strobel, **Nature Middle East**, 19 August 2010
- „Attosecond pulses see an atom's electrons move in real-time “John Wallace **Laser Focus World**, 05 August 2010
- “Spectroscopy: Attosecond prints of electrons”, Olga Smirnova, **Nature** 466, 700 (2010)

- “2.8 fs deep-UV pulses are spectroscopist's tool” John Wallace, **Laser Focus World**, 01 August 2010
- “Ultraviolet pulses close in on 1 fs regime” Jacqueline Hewett, **Optics.org** 27 Nov 2008
- “Ultrashort pulses create ultrabroad source“ Jacqueline Hewett, **Optics.org** 10 July 2008
- “Weniger als 0,0000000000000001” Sekunden Christian Heinich, **SueddeutscheZeitung** 26 July 2008
- “As short as it Gets” Thorsten Naeser, **Max Planck Research** 4/2008
- “Fastest flashgun captures image of light wave” Colin Barras, **New Scientist** 19 June 2008
- Der schnellste Lichtblitz aller Zeiten“ **Hamburger Abendblatt** 23 July (2008)
- “Light to reveal electrons interacting within atoms” John Wallace, **Laser Focus World** 01 August 2008
- “Electrons caught moving on the edge” Edwin Cartlidge, **Physics world.com** 12 August 2010
- “Oscilloscope rendering of light is achieved” **Laser Focus World** 01 November 2004
- “Looking inside a laser pulse” **Physics world.com** 27 August 2004
- “Scientists measure oscillations in visible light pulses” Neil Savage, **OE Magazine** Dec 2004