Curriculum Vitae

Zenghu Chang

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February 8, 2018

I. NAME

Zenghu Chang

II. ADDRESS

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III. EDUCATION

Ph.D. in Optics, Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences (1985-1988).

M.Sc. in Electron Physics**,** Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences (1982-1985).

B.E. in Electrical Engineering, Xi'an Jiaotong University, China (1978-1982).

IV. PROFESSIONAL EXPERIENCE

University Trustee Chair, Pegasus and Distinguished Professor of Physics and Optics, Department of Physics and CREOL (college of optics and photonics), University of Central Florida, 2016 to present.

Director, Institute for the Frontier of Attosecond Science and Technology, University of Central Florida, 2013 to present.

Distinguished Professor of Physics and Optics, Department of Physics and CREOL (college of optics and photonics), University of Central Florida, 2010 to 2016.

Ernest & Lillian Chapin Professor, Department of Physics, Kansas State University, 2009-2010.

Professor, Department of Physics, Kansas State University, 2006-2009.

Associate Professor, Department of Physics, Kansas State University, 2001-2006.

Assistant Research Scientist, NSF Center for Ultrafast Optical Science, The University of Michigan, 1999-2001.

Research Fellow, NSF Center for Ultrafast Optical Science, The University of Michigan, 1996-1998.

Visiting Scientist /Adjunct Professor, Department of Physics, Washington State University, 1995.

Associate Director of Xi'an Institute of Optics and Precision Mechanics**,** Chinese Academy of Sciences**,** 1995.

Professor and Deputy Director of the State Key Laboratory of Transient Optics Technology at Xi'an Institute of Optics and Precision Mechanics, 1993-1995.

Visiting Scientist, Central Laser Facility, Rutherford Appleton Laboratory, UK, 1991-1993.

Associate Professor, Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, 1989-1991.
Postdoctoral Researcher, Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, 1988-1989.

V. HONOR and AWARDS

23. UCF Luminary Award, 2017.
22. UCF College of Science Dean's Distinguished Researcher Award, 2017.
21. UCF Trustee Chair Professor, 2016.
20. UCF Pegasus Professor Award, 2016.
19. UCF Millionaires Club (researchers who have received external sponsored funding of $1 million or more in the previous fiscal year), 2015.
18. UCF University Excellence in Research Award, 2015.
17. UCF Research Incentive Award, 2015.
16. UCF Millionaires Club (researchers who have received external sponsored funding of $1 million or more in the previous fiscal year), 2014.
15. Fellow of the Optical Society of America, 2013.
14. Fellow of the American Physical Society, 2008.
13. Mercator Professorship, German Science Foundation (DFG), 2007.
12. Hubert Schardin Gold Medal,
The 22nd International Congress on High Speed Photography and Photonics, 1996.
11. The First Class Award for Young Scientists,
Chinese Academy of Sciences, 1995.
10. Young Expert of the Year with Outstanding Contributions,
Ministry of Personnel, People Republic of China, 1994.
9. The Award of Science and Technology for Young Chinese,
Ministry of Personnel, People Republic of China,
The Association of Science and Technology of China, 1994.
8. The Third Class Award for the Advancement of Science and Technology,
The Science and Technology Committee, People's Republic of China, 1993.
7. The Third Class Award for the Advancement of Science and Technology,
Chinese Academy of Sciences, 1992.
6. The First Class Award for the Advancement of Science and Technology,
Chinese Academy of Sciences, 1992.
5. The Third Class Invention Award,
The Science and Technology Committee, People's Republic of China, 1992.
4. The Award for Top Ten Scientists of Shaanxi Province,
The Science and Technology Committee of Shaanxi Province Government,
The Association of Science and Technology of Shaanxi Province, 1992.
3. The Award for Chinese Ph.D with Significant Contribution,
Education Committee, People's Republic of China,
The Committee of Academic Degree of China, 1991.
2. Royal Society Fellowship,
Royal Society of United Kingdom, 1991.
1. The Second Class Award for Young Scientists,
Chinese Academy of Sciences, 1989.

VI. PROFESSIONAL SERVICE

1. Professional organizations

Group leader for Optical Attoscience in the OSA Division of Optical Interaction, 2007-2011.

The 9th editorial board of Acta Photonica Sinica.

Co-Editor, J. Phys. B Special issue to celebrate the 10th anniversary of attosecond pulse generation (2012).

Primary Guest Editor, IEEE Journal of Selected Topics in Quantum Electronics, Special issue on Attosecond Photonics (2015).

2. Conference Co-Chair

Ultrafast X-ray Detectors and Applications, Part of SPIE's International Symposium on Optical Science and Technology SPIE's 48th Annual Meeting, 3-8 August 2003, San Diego, CA.

Ultrafast X-ray Detectors and Applications II, Part of SPIE's International Symposium on Optical Science and Technology SPIE's 50th Annual Meeting, 31 July-4 August 2005, San Diego, CA.

Ultrafast X-ray Sources and Detectors, Part of SPIE's International Symposium on Optical Science and Technology Annual Meeting, 26 - 30 August 2007, San Diego, CA.

The 27th International Congress on High-Speed Photography and Photonics, 17-22 September 2006, Xi'an, China.

The 2nd International Conference on Attosecond Physics, 28 July-1 August 2009, Manhattan, Kansas.

The fifth International Symposium on Ultra-fast Phenomena and Terahertz Waves, September 12-16, 2010, Xi'an, China.

Workshop on Attosecond Science and Engineering, April 16-17, 2012, Orlando, Florida.

The sixth International Conference on Attosecond Physics, July 2-7, 2017, Xi'an, China.

3. Conference committee member

CLEO/QELS *2007*, Conference on Lasers and Electro-Optics and the Quantum Electronics and Laser Science Conference (CLEO/QELS), Joint Subcommittee on High-Field Physics and High-Intensity Lasers for the CLEO/QELS Conference to be held May 6-11, 2007 in Baltimore, Maryland.

CLEO/QELS *2008*, Conference on Lasers and Electro-Optics and the Quantum Electronics and Laser Science Conference (CLEO/QELS), Joint Subcommittee on High-Field Physics and High-Intensity Lasers, May 4-9, 2008 in San Jose, California.

CLEO/QELS *2009*, Conference on Lasers and Electro-Optics and the Quantum Electronics and Laser Science Conference (CLEO/QELS), Joint Subcommittee on High-Field Physics and High-Intensity Lasers, May 31–June 5, 2009 in Baltimore, Maryland.

The 3rd International Conference on Attosecond Physics, International committee, July 6–8, 2011, Sapporo, Japan.

LEI 2011–Light at Extreme Intensities, International scientific committee, 14–18 November 2011, Szeged, Hungary

IEEE Photonics Conference 2012, High Power & Intensity Sources sub-committee, 23–27 September 2012, Burlingame, California.

ICONO 2013 conference (International Conferences on Coherent and Nonlinear Optics). Program subcommittee on "Ultrafast Phenomena and a High Precision Measurements," June 18-22, 2013, Moscow, Russia.

FiO/LS 2013. Technical Program Committee of the 29th APS/Division of Laser Science Annual Meeting. October 6 -10, 2013, Orlando, Florida.

CLEO-PR & OECC/PS 2013, The 10th Conference on Lasers and Electro-Optics Pacific Rim(CLEO-PR 2013),The 18th OptoElectronics and Communications Conference (OECC 2013) and Photonics in Switching 2013 (PS 2013). Technical Program Committee, June 30-July 4, 2013, Kyoto, Japan.

The 4th Attosecond Physics Conference. International Scientific Committee, July 8-12, 2013, Paris, France.

International Conference on Photonics, Optics and Laser Technology - PHOTOPTICS 2014. January 7-9, 2014, Lisbon, Portugal. International Program Committee.

International workshop on Strong Field Physics and Ultrafast Phenomena (SFPUP 2014), Oct 31 to Nov 4, 2014, Zhangjiajie, China. International Advisory Committee.

CLEO-Pacific Rim, CLEO-PR2015, Aug. 24 – 28, 2015. Busan, Korea. Technical Program subcommittee for Ultrafast Phenomena and Nonlinear Optics.

Ultrafast Optics 2015, August 17-22, 2015, Beijing, China, Program Committee.

Fifth International Conference on Attosecond Physics July 6-10, 2015 in Saint-Sauveur, Québec, Canada. International Scientific Committee.

46th Annual DAMOP (Division of Atomic, Molecular and Optical Physics, American Physical Society) Meeting, June 8-12, 2015, Columbus, Ohio. Program Subcommittee for Light Source & Ultrafast Laser Science.

47th Annual DAMOP Meeting, May 23-27, 2016, Providence, Rhode Island. Program Subcommittee for Light Source & Ultrafast Laser Science.

48th Annual DAMOP Meeting, June 5-9, 2017, Sacramento, CA. Program Subcommittee for Light Source & Ultrafast Laser Science.

4. Journal Referee

Nature,
Nature Communications,
Nature Physics,
Nature Photonics,
Scientific Reports (Nature),
Science Advances,
Physical Review Letters,
Physical Review A,
Applied Physics Letters,
Applied Physics B,
Annalen der Physik,
New Journal of Physics,
Journal of Physics B (Also served as a guest editor for a special issue),
Optics Letters,
Journal of the Optical Society of America B,
Optics Express,
Applied Optics,
IEEE Journal of Quantum Electronics (Also served as a guest editor for a special issue),

Review of Scientific Instruments,
Measurement Science and Technology,
Thin Solid Films,
Photonica Sinica.

5. **Proposal and project reviewer**
National Science Foundation.
US Department of Energy.
Army Research Office.
DOE review panel (on site review of the LCLS project).
Netherlands Foundation for Fundamental Research on Matter**.**
Cooperative Grants Program, U.S. Civilian Research & Development Foundation.
UK Engineering and Physics Sciences Research Council.
Canadian NSERC Discovery Grant.
Institute of Physics, Chinese Academy of Sciences research program review.
German research foundation (DFG).
German Max Planck Society.
Japan Society for the Promotion of Science.

6. **UCF committees**
COS Research Committee.
COS Research Incentive Award Committee.
Physics Department Strategic Planning Committee (Co-Chair)
Physics Department Promotion and Tenure Committee (Chair)
Physics Department Promotion and Tenure Guidelines Committee (Chair)
CREOL-Physics AMO Faculty Search Committee (Chair)
Physics Department Condensed Matter Physics Experimentalist Faculty Search Committee
Physics Department Condensed Matter Physics Theorist Faculty Search Committee (Chair)
Physics Department Machine Shop Search Committee (Co-Chair)
Physics Department Physical Science Building Committee
Physics Department Graduate Students Admission Committee
Physics Department Machine Shop/Shared Facilities Committee
Physics Department Newsletter/Publicity Committee (Chair)

VII. TEACHING EXPERIENCE

1. **Advanced Lasers and Optics Laboratory** (Laser portion), EECS 438, The University of Michigan, 1999.
2. **Engineering Physics Studio**, PHYS 213, Kansas State University, 2001.
3. **Advanced Optics and Lasers**, PHYS 707/907, Kansas State University, Spring 2002; PHYS 707, 2003, 2005, 2008, and 2009.
4. **Introduction to Optics**, PHYS 651, Kansas State University, 2002, 2004, 2006 and 2008.
5. **Applied Optics**, PHYS 652, Kansas State University, 2003, 2005 and 2007.
6. **Introduction to Quantum Mechanics**, PHYS 662, Kansas State University, 2004.
7. **Advanced Atomic Interaction** PHYS 953, team teaching (coordinator), Kansas State University, 2003.
8. **General Physics**, Kansas State University, 2010.
9. **Attosecond Laser Physics,** PHY5937, University of Central Florida, 2011.

10. **Frontier of Ultrafast Optics,** OSE6938W, University of Central Florida, 2011.
11. **Atomic Physics,** PHZ6234, University of Central Florida, 2012, 2015.
12. **Lasers,** PHY 4445, University of Central Florida, 2013.
13. **Attosecond Optics**, OSE 6447, University of Central Florida, 2015.
14. **Attosecond Optics**, OSE 6447, University of Central Florida, 2016.

VIII. PUBLICATIONS

Citations: https://scholar.google.com/citations?user=Z_5DVuAAAAAJ&hl=en

Total number of citations: 9888 (H-index: 51)

185. Xiaoming Ren, Jie Li, Yanchun Yin, Kun Zhao, Andrew Chew, Yang Wang, Shuyuan Hu, Yan Cheng, Eric Cunningham, Yi Wu, Michael Chini and Zenghu Chang, "Attosecond light sources in the water window," Journal of Optics **20**, 023001(2018).

184. Yanchun Yin, Xiaoming Ren, Yang Wang, Fengjiang Zhuang, Jie Li, and Zenghu Chang, "Generation of high-energy narrowband 2.05 μm pulses for seeding a Ho:YLF laser," Photonics Research **6**,1 (2018).

183. Yong Sing You, Yanchun Yin, Yi Wu, Andrew Chew, Xiaoming Ren, Fengjiang Zhuang, Shima Gholam-Mirzaei, Michael Chini, Zenghu Chang & Shambhu Ghimire, "High-harmonic generation in amorphous solids," Nature Communications **8**, Article number: 724 (2017).

182. Yanchun Yin, Xiaoming Ren, Andrew Chew, Jie Li, Yang Wang, Fengjiang Zhuang, Yi Wu, & Zenghu Chang, "Generation of octave-spanning mid-infrared pulses from cascaded second-order nonlinear processes in a single crystal," Scientific Reports **7**, Article number: 11097 (2017).

181. Jie Li, Xiaoming Ren, Yanchun Yin, Kun Zhao, Andrew Chew, Yan Cheng, Eric Cunningham, Yang Wang, Shuyuan Hu, Yi W, Michael Chini, Zenghu Chang, "53-Attosecond X-ray Pulses Reach the Carbon K-edge," Nature Communications **8**, 186 (2017).

180. Yongsing You, Mengxi Wu, Yanchun Yin, Andrew Chew, Xiaoming Ren, Shima Gholam Mirzaeimoghadar, Dana Browne, Michael Chini, Zenghu Chang, Kenneth Schafer, Mette Gaarde, and Shambhu Ghimire, "Laser waveform control of extreme ultraviolet high harmonics from solids," Optics Letters **42**, 1816 (2017).

179. Yanchun Yin, Andrew Chew, Xiaoming Ren, Jie Li, Yang Wang, Yi Wu & Zenghu Chang, "Towards Terawatt Sub-Cycle Long-Wave Infrared Pulses via Chirped Optical Parametric Amplification and Indirect Pulse Shaping," Scientific Reports **8**, 45794 (2017).

178. Gao Chen, Eric Cunningham, Zenghu Chang, "Attosecond pulse generation isolated with an asymmetric polarization gating," Journal of Modern Optics **64**, 952 (2017).

177. LI Chao-ming, CHEN Xin-rong, LI Lin, YU Jian, WU Jian-hong, CHANG Zeng-hu, "Design and fabrication of a composite transmission pulse compression grating," Optics and Precision Engineering **24** (12), 2983-2987 (2016).

176. Chaoming Li, Xinrong Chen, Lin Li, Xiaoyang Li, Hang Zha, Jian Yu, Zuyuan Hu, Wenlong Zou, Jianhong Wu, Zenghu Chang, "Design and fabrication of transmission gratings with high diffraction efficiency for pulse compression," Proc. SPIE 10016, High-Power Lasers and Applications VIII, 100161D (2016); doi:10.1117/12.2244872.

175. Yanchun Yin, Jie Li, Xiaoming Ren, Yang Wang, Andrew Chew, and Zenghu Chang, "High-energy two-cycle pulses at 3.2 μm by a broadband-pumped dual-chirped optical parametric amplification," Optics Express **24**, 22, pp. 24989-24998 (2016).

174. Yan Cheng, Michael Chini, Xiaowei Wang, Alberto González-Castrillo, Alicia Palacios, Luca Argenti, Fernando Martín, and Zenghu Chang, "Probing Electronic and Nuclear Dynamics in Molecules with Attosecond Transient Absorption," Phys. Rev. A **94**, 023403 (2016)

173. Jie Li, Xiaoming Ren, Yanchun Yin, Yan Cheng, Eric Cunningham, Yi Wu, and Zenghu Chang, "Polarization Gating of High Harmonic Generation in the Water Window," Applied Physics Letters **108**, 231102 (2016).

172. Zenghu Chang, Paul. B. Corkum and Stephen R. Leone, "Attosecond optics and technology: Progress to-date and future prospects (Invited)," Journal of the Optical Society of America B **33** (6), 1081-1097 (2016).

171. Yanchun Yin, Jie Li, Xiaoming Ren, Kun Zhao, Yi Wu, Eric Cunningham, Zenghu Chang, "High-efficiency OPCPA in BiB_3O_6 for generation of 3 mJ, two-cycle, CEP-stable pulses at 1.7 μm," Optics Letters **41**, Issue 6, pp. 1142-1145 (2016).

170. [Book chapter] Qi Zhang, Kun Zhao, and Zenghu Chang, "Attosecond Extreme Ultraviolet Supercontinuum," The Supercontinuum Laser Source: The Ultimate White Light, By Robert R. Alfano, third edition, ISBN 978-1-4939-3324-2. Springer. 2016.

169. E. Cunningham, Y. Wu, and Zenghu Chang, "Carrier-envelope phase control of a 10 Hz, 25 TW laser for high-flux extreme ultraviolet quasi-continuum generation," Applied Physics Letters **107**, 201108 (2015).

168. Eric Cunningham and Zenghu Chang, "Optical Gating with Asymmetric Field Ratios for Isolated Attosecond Pulse Generation," IEEE Journal of Selected Topics in Quantum Electronics **21**, 8700806 (2015).

167. Xiaoming Yu, Zenghu Chang, P.B. Corkum, and Shuting Lei, "Fabricating nanostructures on fused silica using femtosecond infrared pulses combining with sub-nanojoule ultraviolet pulses," Optics Letters **39**, Issue 19, pp. 5638-5640 (2014).

166. Qi Zhang, Kun Zhao, and Zenghu Chang, "High resolution electron spectrometers for characterizing the contrast of isolated 25 as pulses," Journal of Electron Spectroscopy and Related Phenomena **195**, pp, 48–54 (2014).

165. Qi Zhang, Kun Zhao, Jie Li, Michael Chini, Yan Cheng, Yi Wu, Eric Cunningham, and Zenghu Chang, "Suppression of Driving Laser in High Harmonic Generation with a Microchannel Plate," Optics Letters **39**, Issue 12, pp. 3670-3673 (2014).

164. Michael Chini, Xiaowei Wang, Yan Cheng, Zenghu Chang, "Resonance Effects and Quantum Beats in Attosecond Transient Absorption of Helium," Journal of Physics B **47**, 124009 (2014).

163. Michael Chini, Xiaowei Wang, Yan Cheng, He Wang, Yi Wu, Eric Cunningham, Peng-Cheng Li, John Heslar, Dmitry A. Telnov, Shih-I Chu, and Zenghu Chang, "Coherent Phase-Matched VUV Generation by Field-Controlled Bound States," Nature Photonics **8**, 437–441(2014)

162. Stephen R. Leone, C. William McCurdy, Joachim Burgdörfer, Lorenz S. Cederbaum, Zenghu Chang, Nirit Dudovich, Johannes Feist, Chris H. Greene, Misha Ivanov, Reinhard Kienberger, Ursula Keller, Matthias F. Kling, Zhi-Heng Loh, Thomas Pfeifer, Adrian N. Pfeiffer, Robin Santra, Kenneth Schafer, Albert Stolow, Uwe Thumm & Marc J. J. Vrakking, "What will it take to observe processes in 'real time'?" Nature Photonics **8**, No 3, 162 – 166 (2014).

161. Michael Chini, Kun Zhao and Zenghu Chang, "The Generation, Characterization, and Applications of Broadband Isolated Attosecond Pulses," Nature Photonics **8**, No 3, 178 - 186 (2014).

160. Xiaoming Yu, Qiumei Bian, Zenghu Chang, Paul B. Corkum, and Shuting Lei, "Femtosecond laser nanomachining initiated by ultraviolet multiphoton ionization," Optics Express **21**, Issue 20, pp. 24185-24190 (2013).

159. Xiaowei Wang, Michael Chini, Yan Cheng, Yi Wu, Xiao-Min Tong, and Zenghu Chang, "Sub-cycle laser control and quantum interferences in attosecond photoabsorption of neon," Phys. Rev. A **87**, 063413 (2013).

158. Yi Wu, Eric Cunningham, Jie Li, Huaping Zang, Michael Chini, Xiaowei Wang,YangWang, Kun Zhao, and Zenghu Chang, "Generation of High-Flux Attosecond Extreme Ultraviolet Continuum with a 10 Terawatt Laser," Appl. Phys. Lett. **102**, 201105 (2013).

157. [Book chapter] Michael Chini, He Wang, Baozhen Zhao, Yan Cheng, Shouyuan Chen, Yi Wu, and Zenghu Chang, "Attosecond Absorption Spectroscopy," pp135-150, Progress in Ultrafast Intense Laser Science IX, by Kaoru Yamanouchi and Katsumi Midorikawa, ISBN: 9783642350511, Springer (2013).

156. X. Yu, Q. Bian, B. Zhao, Z. Chang, P.B. Corkum, and S. Lei, "Near-infrared femtosecond laser machining initiated by ultraviolet multiphoton ionization," Appl. Phys. Lett. **102**, 101111 (2013).

155. Michael Chini, Xiaowei Wang, Yan Cheng, Yi Wu, Di Zhao, Dmitry A. Telnov, Shih-I Chu, and Zenghu Chang, "Sub-cycle Oscillations in Virtual States Brought to Light," Scientific Reports **3**, 1105 (2013).

154. Xiaowei Wang, Michael Chini, Yan Cheng, Yi Wu, and Zenghu Chang, "In Situ Calibration of an Extreme Ultraviolet Spectrometer for Attosecond Transient Absorption Experiments," Applied Optics **52**, 323 (2013).

153. Qiumei Bian, Xiaoming Yu, Baozhen Zhao, Zenghu Chang, Shuting Lei, "Femtosecond laser ablation of indium tin-oxide narrow grooves for thin film solar cells," Optics and Laser Technology 45, 395 (2013).

152. Reinhard Kienberger, Zenghu Chang and Chang Hee Nam, "10th anniversary of attosecond pulses," Journal of Physics B-Atomic Molecular and Optical Physics 45, 070201 (2012).

151. Michael Chini, Baozhen Zhao, He Wang, Yan Cheng, S. X. Hu, and Zenghu Chang, "Subcycle ac Stark shift of helium excited states probed with isolated attosecond pulses," Phys. Rev. Lett. **109**, 073601 (2012).

150. Xiaowei Wang, Michael Chini, Qi Zhang, Kun Zhao, Yi Wu, Dmitry A. Telnov, Shih-I Chu, and Zenghu Chang, "Mechanism of quasi-phase-matching in a dual-gas multijet array," Physical Review A **86**, 021802 (2012).

149. Kun Zhao, Qi Zhang, Michael Chini, Yi Wu, Xiaowei Wang, and Zenghu Chang, "Tailoring a 67 attosecond pulse through advantageous phase-mismatch," Optics Letters **37**, 3891 (2012).

148. Max Möller, Yan Cheng, Sabih D. Khan, Baozhen Zhao, Kun Zhao, Michael Chini, Gerhard G. Paulus, and Zenghu Chang, "Dependence of high-order-harmonic-generation yield on driving-laser ellipticity," Phys. Rev. A **86**, 011401 (2012).

147. [Book chapter] K. Zhao, Q. Zhang, M. Chini, and Z. Chang, Chapter 19, "Route to One Atomic Unit of Time – Development of a Broadband Attosecond Streak Camera," Multiphoton Processes and Attosecond Physics, Proceedings of the 12th International Conference on Multiphoton Processes (ICOMP12) and the 3rd International Conference on Attosecond Physics (ATTO3), Yamanouchi, Kaoru; Midorikawa, Katsumi (Eds.) Series: Springer Proceedings in Physics, Vol. **125**, Part 2, 109 (2012). ISBN 978-3-642-28947-7

146. Yoann Pertot, Shouyuan Chen, Sabih D Khan, Luc Bertrand Elouga Bom, Tsuneyuki Ozaki and Zenghu Chang, "Generation of continuum high-order harmonics from carbon plasma using double optical gating," J. Phys. B: At. Mol. Opt. Phys. **45,** 074017 (2012).

145. Bin Zeng, Wei Chu, Guihua Li, Jinping Yao, Jielei Ni, Haisu Zhang,Ya Cheng, Zhizhan Xu, Yi Wu, and Zenghu Chang, "Direct generation of intense extreme-ultraviolet supercontinuum with 35-fs, 11-mJ pulses from a femtosecond laser amplifier," Physical Review A **85**, 033839 (2012).

144. Sabih D. Khan, Yan Cheng, Max Möller, Kun Zhao, Baozhen Zhao, Michael Chini, Gerhard G. Paulus , and Zenghu Chang, "Ellipticity dependence of 400 nm-driven high harmonic generation," Appl. Phys. Lett. **99**, 161106 (2011).

143. Qiumei Bian, Shouyuan Chen, Byung-Tai Kim, Nicholas Leventis, Hongbing Lu, Zenghu Chang, Shuting Lei, "Micromachining of polyurea aerogel using femtosecond laser pulses," J. Non-Crystalline Solids **357**, 186 (2011).

142. M. Möller, A. M. Sayler, T. Rathje, M. Chini, Zenghu Chang, and G. G. Paulus, "Precise, real-time, single-shot carrier-envelope phase measurement in the multi-cycle regime," Appl. Phys. Lett. **99**, 121108 (2011).

141. (Book chapter) Shouyuan Chen, Steve Gilbertson, He wang, Michael Chini, Kun Zhao, Sabih Khan, Yi Wu, and Zenghu Chang, "Attosecond pulse generation, characterization and application," Advances in Multi-Photon Processes and spectroscopy, Vol. 20, pp. 127-174, S.H. Lin, A.A. Villaeys, and Y. Fujimura, World Scientific Publishing Company; 1 edition (May 2011), ISBN-10: 9814343986.

140. Ulrich, Birte; Vredenborg, Arno; Malakzadeh, Abdollah; Schmidt, Lothar; Havermeier, Tilo; Meckel, Moritz; Cole, Kyra; Smolarski, Mathias; Chang, Zenghu; Jahnke, Till; Doerner, Reinhard, "Imaging of the Structure of the Argon and Neon Dimer, Trimer and Tetramer," The Journal of Physical Chemistry **115**, 6936 (2011).

139. (BOOK) Zenghu Chang, *Fundamentals of Attosecond Optics*, CRC Press; 1 edition (February 16, 2011) ISBN-10: 1420089374

138. (Book chapter) Ximao Feng, Steve Gilbertson, Hiroki Mashiko, Sabih Khan, He Wang, Michael Chini, Yi Wu, and Zenghu Chang, "Chapter 5, Single Isolated Attosecond Pulses Generation with Double Optical Gating," *Progress in Ultrafast Intense Laser Science VI*, pp. 89-112. Series: Springer Series in Chemical Physics, Vol. 99, Yamanouchi, Kaoru; Gerber, Gustav; Bandrauk, Andre D. (Eds.), 1st Edition., 2010, XVI, 237 p., ISBN: 978-3-642-15053-1.

137. Steve Gilbertson, Michael Chini, Ximao Feng, Sabih Khan, Yi Wu, and Zenghu Chang, "Monitoring and Controlling the Electron Dynamics in Helium with Isolated Attosecond Pulses," Phys. Rev. Lett. **105**, 263003 (2010).

136. Zenghu Chang and P. Corkum, "Attosecond photon sources: the first decade and beyond [Invited]," J. Opt. Soc. Am. B **27**, B9-B17 (2010).

135. He Wang, Michael Chini, Shouyuan Chen, Chang-Hua Zhang, Feng He, Yan Cheng, Yi Wu, Uwe Thumm, and Zenghu Chang, "Attosecond Time-Resolved Autoionization of Argon," Phys. Rev. Lett. **105**, 143002 (2010).

134. Steve Gilbertson, Sabih D. Khan, Yi Wu, Michael Chini, Zenghu Chang "Isolated attosecond pulse generation without the need to stabilize the carrier-envelope phase of driving lasers," Phys. Rev. Lett. **105**, 093902 (2010).

133. Qi Zhang, Kun Zhao, and Zenghu Chang, "Determining time resolution of microchannel plate detectors for electron time-of-flight spectrometer," Rev. Sci. Instrum. **81**, 073112 (2010).

132. B. Ulrich, A. Vredenborg, A. Malakzadeh, M. Meckel, K. Cole, M. Smolarski, Z. Chang, T. Jahnke, and R. Dörner, "Double ionization mechanisms of the argon dimer in intense laser fields," Phys. Rev. A **82**, 013412 (2010).

131. Michael Chini, Steve Gilbertson, Sabih D. Khan, and Zenghu Chang, "Characterizing ultrabroadband attosecond lasers," Opt. Express **18**, 13006 (2010).

130. Steve Gilbertson, Yi Wu, Sabih D. Khan, Michael Chini, Kun Zhao, Ximao Feng, and Zenghu Chang, "Isolated attosecond pulse generation using multicycle pulses directly from a laser amplifier," Phys. Rev. A **81**, 043810 (2010).

129. He Wang, Michael Chini, Yi Wu, Eric Moon, Hiroki Mashiko and Zenghu Chang, "Carrier-envelope phase stabilization of 5 fs, 0.5 mJ, pulses from adaptive phase modulators," Applied Physics B **98**, 291-294 (2010).

128. Ximao Feng, Steve Gilbertson, Sabih D. Khan, Michael Chini, Yi Wu, Kevin Carnes, and Zenghu Chang, "Calibration of electron spectrometer resolution in attosecond streak camera," Optics Express **18**, 1316 - 1322 (2010).

127. (Book chapter) Zenghu Chang, "Chapter 21: Attosecond Optics," *Handbook of Optics* Vol. II, sponsored by Optical Society of America, Edition 3, 2009, McGraw Hill. ISBN: 9780071498906.

126. Michael Chini, Hiroki Mashiko, He Wang, Shouyuan Chen, Chenxia Yun, Shane Scott, Steve Gilbertson, and Zenghu Chang, "Delay control in attosecond pump-probe experiments," Opt. Express **17**, 21459-21464 (2009).

125. Ximao Feng, Steve Gilbertson, Hiroki Mashiko, He Wang, Sabih D. Khan, Michael Chini, Yi Wu, Kun Zhao, and Zenghu Chang, "Generation of isolated attosecond pulses with 20 to 28 femtosecond lasers," Phys**.** Rev. Lett. **103,** 183901 (2009).

124. Shouyuan Chen, Michael Chini, He Wang, Chenxia Yun, Hiroki Mashiko, Yi Wu and Zenghu Chang, "Carrier-envelope phase stabilization and control of 1KHz, 6 mJ, 30 fs laser pulses from a Ti:sapphire regenerative amplifier," APPL. OPT. **48**, 5692-5695 (2009).

123. Hiroki Mashiko, Steve Gilbertson, Ximao Feng, Chenxia Yun, Sabih D. Khan, He Wang, Michael Chini, Chen Shouyuan, and Zenghu Chang, "XUV supercontinua supporting pulse durations of less than one atomic unit of time," Optics Letters **34**, 3337–3339 (2009).

122. Chenxia Yun, Shouyuan Chen, He Wang, Machael Chini and Zenghu Chang "Temperature feedback control for long-term carrier-envelope phase locking," Applied Optics **48**, 5127-5130 (2009).

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IX. INVITED PRESENTATIONS

181. Zenghu Chang, "Attosecond transient absorption near the water window," Workshop on CXFEL, Arizona State University, Tempe, AZ, Feb. 5-6, 2018,

180. Zenghu Chang, "Isolated attosecond X-ray pulses reaches the water window," Conference on high intensity lasers and attosecond science in Israel, Tel-Aviv, Dec. 11-13, 2017.

179. Zenghu Chang, "Attosecond science: Progress to date and future prospects," Northwest University, Jianzhong Yang seminar, Dec. 4, 2017.

178. Zenghu Chang, "53-as X-rays reach carbon K-edge," Joint MURI review meeting, Nov. 16 to 17, 2017, Columbus, OH.

177. Zenghu Chang, "Probing electron dynamics with Water Window X-rays," Joint MURI review meeting, Nov. 16 to 17, 2017, Columbus, OH.

176. Zenghu Chang (plenary), "MIR driven attosecond sources and other new developments in attosecond research," Ultrafast Optics XI, Jackson Hole, WY, October 8-13, 2017.

175. Zenghu Chang, "High-energy CEP-stable Few-cycle Mid-IR Pulses for Generating Attosecond Sub-keV X-ray," IEEE Photonics Conference, Oct. 1-5, 2017, Lake Buena Vista, Florida.

174. Zenghu Chang, "Attosecond X-rays generated with intense, few-cycle MIR lasers (Plenary Presentation)," SPIE Laser Damage, September 24 – 27, 2017, Boulder, CO.

173. Zenghu Chang, "New Generation Attosecond X-ray Light Sources," The 2017 Frontiers in Optics + Laser Science (FIO + LS) conference, Sept. 17-21, 2017, Washington DC.

172. Zenghu Chang, "Attosecond Soft X-rays in the Water Window," The 30th International Conference on Photonic, Electronic and Atomic Collisions (ICPEAC XXX), July 26-Aug. 1, 2017, Cairns, Australia.

171. Zenghu Chang, "Intense XUV pulse generation with CEP stable 10 Hz lasers," Intense field- Short Wavelength Atomic and Molecular Processes (ISWAMP)-4, July 22-24, 2017, Brisbane, Australia.

170. Yanchun Yin, "Infrared Driving Lasers for Generating 53 as X-rays," The sixth International Conference on Attosecond Physics, July 2-7, 2017, Xi'an, China.

169. Zenghu Chang, "New Generation Attosecond Light Sources," 48th DAMOP (APS Division of Atomic, Molecular and Optical Physics), Sacramento, CA, June 5-9 2017.

168. Zenghu Chang, "SC439: Attosecond Optics," short course, CLEO (Conference on Lasers and Electro-Optics), San Jose, California, May 14 – 19, 2017.

167. Xiaoming Ren, "53-Attosecond X-ray Pulses Glancing Through the Water Window," CLEO (Conference on Lasers and Electro-Optics), San Jose, California, May 14 – 19, 2017.

165. Zenghu Chang, "Generation of below and above threshold high harmonics with MIR lasers," Annual Review Meeting for MURI program "Fundamental Strong-Field Interaction with Ultrafast, Mid-Infrared Lasers," Columbus, OH, April 18-19, 2017.

164. Zenghu Chang, "Principles of attosecond technology: generation and metrology," The Frontiers of Attosecond and Ultrafast X-ray Science, Erice, Sicily, Italy, March 19-28, 2017.

163. Zenghu Chang, "Isolated attosecond pulses in the water window," American Physical Society March Meeting, New Orleans, Louisiana, March 17, 2017.

162. Zenghu Chang, "Soft X-ray shines on new attosecond horizon through water window," University of Ottawa, Canada, March 9, 2017.

161. Zenghu Chang, "New generation attosecond light sources," Friedrich-Schiller-Universität Jena, Germany, March 2, 2017.

160. Zenghu Chang (colloquium), "Soft X-ray shines on new attosecond horizon through water window," International Focus Workshop with Annual Meeting of the DFG Priority Program QUTIF17, Dresden, Germany, Feb. 26 - March 1, 2017.

159. Zenghu Chang, Paul Corkum, Steve Leone, Dan Neumark, "μJ isolated attosecond pulses for atto pump-atto probe," DARPA PULSE quarterly review, Arlington Virginia. Jan 27, 2017.

158. Zenghu Chang, "Attosecond X-rays in the Water Window," Southeast Ultrafast Conference, Clemson, South Carolina, Jan. 18-19, 2017.

157. Zenghu Chang, "Generation and Characterization of Isolated Attosecond Pulses Driven by MIR Lasers," 2016 Joint-Attosecond-MURI Annual Meeting University of Arizona, Tucson, AZ, November 14 and 15, 2016.

156. Zenghu Chang, "Soft X-ray Light Sources for Attosecond Transient Absorption in the Water Window," 2016 Joint-Attosecond-MURI Annual Meeting University of Arizona, Tucson, AZ, November 14 and 15, 2016.

155. Zenghu Chang, "Attosecond Light Sources in the Water Window," Frontiers in Optics 2016 Rochester, New York United States, 17–21 October 2016.

154. Z. Chang, P. Corkum, S. Leone, D. Neumark, "Microjoule isolated attosecond pulses for atto pump-atto probe," DARPA PULSE Program Review Meeting, September 28-29, 2016. Berkeley California.

153. Zenghu Chang, "Studying Ultrafast Electron Dynamics in Condensed Matter with Next Generation Attosecond X-ray Sources," MURI Review Meeting, August 22 -23, 2016, Arlington.

152. Zenghu Chang, "Attosecond Optics," Short Course, CLEO (Conference on Lasers and Electro-Optics), June 5-10, 2016. San Jose, CA.

151. Zenghu Chang, "Advances in Attosecond Optics Frontier," Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, May 24, 2016. Xi'an, China.

150. Zenghu Chang, "Advances in Attosecond Optics Frontier," Xi'an Jiaotong University, May 23, 2016. Xi'an, China.

149. Zenghu Chang, Paul Corkum, Steve Leone and Daniel Neumark, "μJ isolated attosecond pulses for atto pump-atto probe," DARPA PULSE Program Review Meeting, March 21-22, 20156. Orlando, Florida.

148. Yan Cheng, "Probing Electron and Nuclear Dynamics with Tabletop Attosecond Sources," Coherent Inc., March 17, 2016. Santa Clara, CA.

147. Jie Li, "Mid-IR OPCPA Laser for Generating Isolated Attosecond Pulse in the Water Window," CREOL Industrial Affiliates Day 2016, March 10-11, 2016. Orlando, Florida.

146. Yan Cheng, "Probing Electron and Nuclear Dynamics with Attosecond Transient Absorption Spectroscopy," Cymer Inc., March 2, 2016. San Diego, CA.

145. Zenghu Chang, "Below and above threshold high harmonic generation with Two-cycle MIR Lasers," MURI 15 Kickoff-Strong Field Laser Matter Interaction at MIR-Infrared Wavelength, Jan. 21-22, 2016, Arlington VA.

144. Michael Chini, "Reconstruction of molecular wave packet dynamics with attosecond transient absorption spectroscopy," Annual review meeting of ARO MURI on Light Filamentation Science, University of Central Florida, Jan. 21-22, 2016, Orlando, FL.

143. Zenghu Chang, "Next generation attosecond light sources," The 19th Annual Southeast Ultrafast Conference, North Carolina State University, Jan. 14-15, 2016, Raleigh, North Carolina.

142. Michael Chini, Colloquium, "Probing and Controlling Ultrafast Electron Motion with Attosecond Transient Absorption Spectroscopy," University of Central Florida, 2015.

141. Michael Chini, Colloquium, "Probing and Controlling Ultrafast Electron Motion with Attosecond Transient Absorption Spectroscopy," University of Connecticut, 2015.

140. Michael Chini, Colloquium, "Probing and Controlling Ultrafast Electron Motion with Attosecond Transient Absorption Spectroscopy," California State University, Long Beach, 2015.

139. Michael Chini, Colloquium, "Probing and Controlling Ultrafast Electron Motion with Attosecond Transient Absorption Spectroscopy," Auburn University, 2015.

138. Michael Chini, Colloquium, "Probing and Controlling Ultrafast Electron Motion with Attosecond Transient Absorption Spectroscopy," Mississippi State University, 2015.

137. Eric Cunningham, "Towards High-Flux Isolated Attosecond Pulses with a 200 TW CPA," SLAC National Accelerator Lab, December 16, 2015, Menlo Park, CA.

136. Zenghu Chang, "Next Generation Attosecond Light Sources," Information Photonics Technology, December 5-6, 2015. Xi'an, China.

135. Zenghu Chang, Physics Colloquium, "The Attosecond Frontier: Studying Electronic Motion by Absorption," November 24, 2015. The Ohio State University, Columbus, Ohio.

134. Zenghu Chang, "MIR OPCPA Lasers for Driving Next Generation Attosecond X-ray Sources," 2015 Joint-Attosecond-MURI Annual Meeting, November 12-13, 2015, University of Central Florida, Orlando, FL.

133. Zenghu Chang, "Real-time Observation of Wavepackets in Atoms of Molecules," 2015 Joint-Attosecond-MURI Annual Meeting, November 12-13, 2015, University of Central Florida, Orlando, FL.

132. Zenghu Chang, Paul Corkum, Steve Leone and Daniel Neumark, "μJ isolated attosecond pulses for atto pump-atto probe," DARPA PULSE Program Review Meeting, September 28-29, 2015. Boulder, Colorado.

131. Zenghu Chang, "Attosecond photonics, new frontier in AMO research," Introduction to Research at CREOL, University of Central Florida, September 25, 2015. Orlando, Florida.

130. Zenghu Chang, "Intense isolated attosecond pulse generation with a CEP locked 10 Hz laser," the International Workshop on Intense-field Short-wavelength Atomic and Molecular Processes, ISWAMP-3, July 18-20, 2015, Hamburg, Germany.

129. Zenghu Chang, "High Power Isolated Attosecond Pulse Generation with a 200 TW Laser," the 5th International conference on Attosecond Physics, July 6-10, 2015, Saint-Sauveur, Québec, Canada.

128. Zenghu Chang, "Attosecond Transient Absorption Spectroscopy," the 27th International Conference on Photochemistry (ICP 2015), June 28 to July 3, 2015, Jeju Island, Korea.

127. Zenghu Chang, "Driving Lasers for Next Generation Attosecond Sources," Institute of Physics, Chinese Academy of Sciences, June 13, 2015, Beijing, China.

126. Zenghu Chang, "Fundamentals of Theory for Attosecond Optics Research," State Key Laboratory of Transient Optics and Photonics, Xi'an Institute of Optics & Precision Mechanics, June 8, 2015, Xi'an, China.

125. Eric Cunningham, "Development of a 10 Hz, CEP-stable 200 TW Ti:sapphire laser for high-flux isolated attosecond pulse production," ALLS Workshop 2015, June 4 and 5, 2015, Saint-Sauveur, Qc, Canada.

124. Xiaoming Yu, Zenghu Chang, P. B. Corkum, and Shuting Lei, "Damage formation on fused silica illuminated with ultraviolet-infrared femtosecond pulse pairs," SPIE Optics + Optoelectronics 2015, April 13-16 2015, Prague, Czech Republic.

123. Zenghu Chang, "High Energy Isolated Attosecond Pulses," Center for Ultrafast Optics, University of Michigan, February 13, 2015, Ann Arbor, Michigan.

122. Zenghu Chang, Paul Corkum, Froncois Legare, Steve Leone, Daniel Neumark, "Microjoule isolated attosecond pulses for atto pump-atto probe," DARPA PULSE Review Meeting, January 14-16, 2015, Arlington, VA.

121. Michael Chini, "Attosecond Time-Resolved Spectroscopy with Few-Cycle Lasers," National University of Defense Technology, Changsha, China, 2014.

120. Zenghu Chang, "Attosecond bound state dynamics," International Workshop on atomic physics, November 24 – 28, 2014, Dresden, Germany.

119. Zenghu Chang, "Isolated attosecond pulses generated with MIR lasers," MURI (Multidisciplinary University Research Initiative), studying ultrafast electron dynamics in condensed matter with next generation attosecond x-ray sources, kickoff meeting, Nov. 17-18, 2014, Berkeley, California.

118. Zenghu Chang, "Overview of studying ultrafast electron dynamics in condensed matter with next generation attosecond x-ray sources," MURI, studying ultrafast electron dynamics in condensed matter with next generation attosecond x-ray sources, kickoff meeting, Nov. 17-18, 2014, Berkeley, California.

117. Zenghu Chang, "Electron dynamics in atoms and small molecules," MURI, Post-Born-Oppenheimer dynamics using isolated attosecond pulses, kickoff meeting, Nov. 17-18, 2014, Berkeley, California.

116. Zenghu Chang, "Broadband high power isolated attosecond pulses for transient absorption spectroscopy," International Symposium on Ultrafast Intense Laser Science, October 5-10, 2014, Jodhpur, India.

115. Yan Cheng, "Attosecond transient absorption experiments in atoms and molecules," OSA Graduate Research Symposium, CREOL, University of Central Florida, Sept. 24, 2014, Orlando, USA.

114. Kun Zhao, "Broadband isolated attosecond pulse generation and characterization," Center for Free-Electron Laser Science, Sept. 4, 2014, Hamburg, Germany.

113. Zenghu Chang, "High flux attosecond pulses," Institute of Physics, Chinese Academy of Sciences, Sept. 15, 2014, Beijing, China.

112. Zenghu Chang, "Attosecond transient absorption spectroscopy," Chinese Physical Society 2104 Fall Meeting (Plenary presentation), Sept. 12-14, 2014, Harbin, China.

111. Zenghu Chang, "Attosecond transient absorption spectroscopy," Sept. 10, 2014, Jilin University, Changchun, China.

110. Zenghu Chang, "Broadband isolated attosecond pulses for transient absorption spectroscopy," KITP Frontiers of Intense Laser Physics workshop, July 29, 2014, University of Santa Barbara, USA.

109. Zenghu Chang, "Latest Development of Attosecond Transient Absorption Spectroscopy," State Key Laboratory of Transient Optics and Photonics, Institute of Modern Physics, Chinese Academy of Sciences, July 15, 2014, Lanzhou, China.

108. Zenghu Chang, "Generation, Characterization and Applications of Broadband Isolated Attosecond Pulses," State Key Laboratory of Transient Optics and Photonics, Xi'an Institute of Optics & Precision Mechanics, June 30, 2014, Xi'an, China.

107. Zenghu Chang, "Broadband Isolated Attosecond Pulses for Transient Absorption Spectroscopy," Multiphoton Processes Gordon Research Conference, June 15-20, 2014, Bentley University, USA.

106. Zenghu Chang, tutorial, "Approaching the Atomic Unit of Time with Isolated Attosecond Pulses," CLEO, June 9-13, 2014, San Jose, USA.

105. Zenghu Chang, "Broadband High Flux Isolated Attosecond Pulses," Photonics North, May 28-30, 2014, Montreal, Canada.

104. Kun Zhao, "Broadband Isolated Attosecond Pulse Generation and Characterization," Institute of Physics, Chinese Academy of Sciences, April 28, 2014, Beijing, China.

103. Kun Zhao, "Broadband Isolated Attosecond Pulse Generation and Characterization," Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences, April 25, 2014, Shanghai, China.

102. Qi Zhang, "Ultrabroadband Coherent Light for Generating Shortest Attosecond Pulse," March 18, 2014. University of California Berkeley.

101. Qi Zhang, "Generating and Characterizing the Shortest Attosecond Pulse," March 21, 2014. Stanford University.

100. Zenghu Chang, Paul Corkum Steve Leone, and Daniel Neumark, "Microjoule-level isolated attosecond pulses for atto pump-atto probe," DARPA winter meeting, Feb 24-25, 2014. Austin, Texas.

99. Michael Chini, "Absorption Spectroscopy with Ultrabroadband Attosecond Pulses," Department of Physics, Kansas State University, January 29, 2014, Manhattan, Kansas.

98. Zenghu Chang, "Attosecond Optics," XIV Swieca Summer School on Quantum and Nonlinear Optics, Jan 27 to Feb 7, 2014. Recife, Brazil.

97. Zenghu Chang, "Electron and Nuclear Dynamics Study by Attosecond Transient Absorption," ARO, MURI on Light Filamentation Science 2nd Year Review, Nov. 18, 2013. Silver Spring, Maryland.

96. Michael Chini, Xiaowei Wang, Yan Cheng, Yi Wu, Kun Zhao, Qi Zhang, Eric Cunningham , Zenghu Chang, Di Zhao, Dmitry A. Telnov, Shih-I Chu and Xiao-Min Tong, "Sub-cycle Electron Dynamics Probed by Isolated Attosecond Pulses," Frontier in Optics and Laser Science (OSA Annual meeting), Oct. 6 to 10, 2013, Orlando, Florida.

95. Zenghu Chang, "Attosecond Light Switches," Tutorial, Frontier in Optics and Laser Science (OSA Annual meeting), Oct. 6 to 10, 2013, Orlando, Florida.

94. Zenghu Chang, Paul Corkum, Steve Leone and Daniel Neumark, "μJ-level isolated attosecond pulses for atto pump-atto probe," DARPA PULSE Kickoff Meeting, July 7-8, 2013, George Mason University, Arlington, VA.

93. Zenghu Chang, "Attosecond Optics- from Genesis to Revelation," Tutorial, CLEO-PR & OECC/PS 2013, June 30- July 4, 2013, Kyoto, Japan.

92. Zenghu Chang, "High flux isolated attosecond pulse generation with Generalized Double Optical Gating," International workshop for as science & 3rd MPC-AS workshop, June 27-18, 2013, Beijing, China.

91. Zenghu Chang, "Latest progress on attosecond optics research," The Distinguished Alumni Lecture Series, Xi'an Institute of Optics & Precision Mechanics, June 24, 2013, Xi'an, China.

90. Zenghu Chang, "Broadband high flux isolated attosecond pulses," State Key Laboratory of Transient Optics and Photonics, Xi'an Institute of Optics & Precision Mechanics, June 19, 2013, Xi'an, China.

89. Zenghu Chang, "Probing sub-cycle electron dynamics with broadband isolated attosecond pulses," Graduate Symposium, DAMOP 2013, June 3, 2013, Quebec City, Canada.

88. Zenghu Chang, "Attosecond transient absorption with broadband isolated XUV pulses," DoE attosecond workshop, March 25-26, 2013, Washington D. C., USA.

87. Zenghu Chang, "Sub-cycle bound state electron dynamics revealed by broadband attosecond pulses," Townes Winter Symposium, March 11-15, 2013, Orlando, USA.

86. Zenghu Chang, "Observing sub-cycle oscillations in virtual states with attosecond transient absorption." ATTOFEL Winter school, Jan. 27 to Feb 2, 2013, Bormio, Italy.

85. Zenghu Chang, "Probing electron dynamics with attosecond transient absorption," Jan. 9, 2013. Wayne State University.

84. Zenghu Chang, "Probing excited-state electron dynamics with attosecond pulses," Dec. 7, 2012. Texas A & M University.

83. Zenghu Chang, "Probing excited-state electron dynamics in atoms with attosecond pulses," Nov. 28, 2012. University of Ottawa, Canada.

82. Zenghu Chang, "Observing bound and auto-ionizing state dynamics with attosecond transient absorption," Townes Symposium on Ultrafast Science, Nov. 7, 2012. Orlando, Florida

81. Zenghu Chang, "HHG "Novel attosecond and intense Source", The 11th International symposium on Ultrafast Intense Laser Science, Oct 21 to 26, 2012, Jeju, Korea

80. Zenghu Chang, "Generation of Single Isolated 67-Attosecond Pulses," Frontier in Optics 2012 and Laser Science XXVIII, October 14-18, 2012, Rochester, USA

79. Zenghu Chang, "Probing excited state dynamics with isolated attosecond pulses," ARO MURI annual meeting, Oct. 5, 2012, Santa Fe, New Mexico

78. Michael Chini, "Probing Attosecond Electron Dynamics in Atoms," IEEE Photonics conference, September 13-27, 2012, Burlingame, California

77. Zenghu Chang, "Characterization of isolated 67 attosecond pulses with an advanced PROOF method," Workshop on Super Intense Laser-atom Physics 2012, September 23-26, 2012, Suzhou, China

76. Jean-Claude Diels, Alejandro Aceves, Ladan Arissian, Matthieu Baudelet, Eric Johnson, Zenghu Chang, Natalia Litchinitser, Tamar Seideman, Xie-Cheng Zhang, Richard Hammond, "The ARO Martin Richardson MURI Program on Air Filamentation Science After One Year, "10th annual ultrashort pulse laser workshop, Directed Energy Professional Society; June 12, 2012, Broomfield, CO.

75. Zenghu Chang, "Time-dependent ac-Stark shift," the 43rd Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, June 4–8, 2012, Orange County, California.

74. Zenghu Chang, "Generation of isolated 67-as pulses," Zhong-Guan-Cun forum on condensed matter physics, May 23, 2012, Institute of Physics, Chinese Academy of Sciences, Beijing, China.

73. Zenghu Chang, "Attosecond electron dynamics in atoms," Korean Physical Society meeting, April 25-27, 2012, Daejon, Korea.

72. Zenghu Chang, "En route to high flux attosecond source," Workshop on attosecond science and Engineering, April 16-17, 2012, Orlando, Florida.

71. Zenghu Chang, "Broadband isolated attosecond pulses," CREOL@25, March 15-16, 2012, University of Central Florida.

70. Zenghu Chang, "The attosecond laser, a new solution seeking problems," Physics and Astronomy Colloquium, Feb 2, 2012, Vanderbilt University.

69. Zenghu Chang, "En Route to High Flux Isolated Attosecond Pulses," The 15th Annual Southeast Ultrafast Conference (SEUFC)," January 12th and 13th, 2012, University of Central Florida.

68. Zenghu Chang, **"**Tackle the challenges of attosecond flux with Generalized Double Optical Gating," The 3rd CQSE International Workshop on Atomic, Molecular, and Ultrafast Science and Technology, Plenary talk, Jan. 7-8, 2012, National Taiwan University (NTU).

67. Zenghu Chang, "En Route to High Flux Attosecond Pulses," 2011 Attosecond MURI Review, December 12, 2011, Army Research Lab, USA.

66. Zenghu Chang, "Generation of high flux attosecond pulses with phase-matched double optical gating," 2011 IEEE Photonics Conference (IPC), Oct 9 – 13, 2011, Arlington, VA, USA.

65. Zenghu Chang, "Sub-cycle AC Stark shift," 2011 DOE AMO Principal Investigators' meeting, Sept. 6 to 9, 2011, Warrenton, Virginia, USA.

64. Zenghu Chang, "Probing sub-cycle excitation dynamics with isolated attosecond pulses," 2011 IQEC/CLEO Pacific rim, Aug. 28 to Sept. 1, 2011, Sydney, Australia.

63. Steve Gilbertson, Michael Chini, Sabih Khan, Yi Wu, Ximao Feng, Zenghu Chang, "Attosecond observation and control of autoionization in Helium," Int'l Symposium on (e,2e), Double Photo-ionization & Related Topics & Int'l Symposium on Polarization & Correlation in Electronic & Atomic Collisions, August 4-6, 2011. Dublin, Ireland.

62. Zenghu Chang, "Characterization of broadband sub-100 attosecond pulses with PROOF," The 3rd International Conference on Attosecond Physics (ATTO3), Hokkaido University, Sapporo, Japan, July 6-8, 2011.

61. Zenghu Chang, "Bound-state dynamics probed by transient absorption with isolated attosecond pulses," Workshop on "Attosecond Science - Exploring and Controlling Matter on Its Natural Time Scale," Kavli Institute for Theoretical Physics China at the Chinese Academy of Sciences, Beijing, China, May 9-27, 2011.

60. Zenghu Chang, "New challenges in attosecond research," Peking University, Beijing, China, May 25, 2011.

59. Zenghu Chang, "Electron dynamics probed by isolated attosecond pulses," Institute of Applied Physics and Computational Mathematics, Beijing, China, May 25, 2011.

58. Zenghu Chang, "Generalized double optical gating, a route to high power isolated attosecond sources," High Intensity Laser and High Field Phenomena (HILAS), Feb. 16-19, 2011, Istanbul, Turkey.

57. Zenghu Chang, "Probing correlated electron dynamics with attosecond pulses," SPIE Photonics West, January 22-27, 2011, San Francisco, USA.

56. Zenghu Chang, "The attosecond lasers- a solution seeking problems," (Physics colloquium) January 13, 2011, University of Nebraska Lincoln, USA.

55. Zenghu Chang, "Attosecond MURI Program Overview," 2010 Attosecond MURI Review, December 7, 2010, Orlando, USA.

54. Zenghu Chang, **"**XUV Time-Domain Spectroscopy Using Isolated Attosecond Pulses from Double Optical Gating," Frontiers in Optics (FiO), October 24-28, 2010, Rochester, USA.

53. Zenghu Chang, "Generalized Double Optical Gating for generating isolated attosecond pulses," The 5th International symposium on ultrafast phenomena and terahertz waves, September 12-16, 2010. Xi'an, China.

52. Zenghu Chang, "Probing correlated electron dynamics with isolated attosecond pulses," WE-Heraeus Seminar on "Ultra fast Atomic Physics - Towards the Zeptosecond Regime," August 19-22, 2010, the Physikzentrum Bad Honnef, Germany.

51. Zenghu Chang, "Probing autoionization using isolated attosecond Pulses Generated with DOG," X-ray Science in the 21st Century: August 02, 2010 to August 06, 2010, Santa Barbara, USA.

50. Zenghu Chang, "Generalized Double Optical Gating: an attosecond generation method for all," Canadian Association of Physicists Congress, June 7, 2010 - June 11, 2010. University of Toronto, Canada.

49. Zenghu Chang, "Probing two-electron dynamics in helium with isolated attosecond pulses," DAMOP, May 25-29, 2010, Houston, Texas.

48. Zenghu Chang, "Attosecond Optics," CREOL Industrial Affiliates Day 2010, April 9, 2010, University of Central Florida.

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