

# Allan Johnson

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## Curriculum Vitae

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### Employment History

- Nov. 2017 - **PROBIST Postdoctoral Fellow**, *ICFO - The Institute of Photonic Sciences*.  
Present Fellowship examining ultrafast dynamics of quantum materials. Primary focuses polarization-dependent harmonic-generation spectroscopy of phase-change materials and the development of fibre-based ultrafast sources across the visible and near-infrared for materials science studies.
- Oct. 2013 - **Marie Curie Early Stage Researcher**, *Imperial College London*.  
May 2017 Research position (PhD) in attosecond physics. Developed few-cycle mid-IR sources and diagnostics (Opt. Express 2016), undertook high harmonic generation spectroscopy experiments (Faraday Discuss. 2016, Rev. Sci. Instrum. 2017, Sci. Rep. 2018), and built a water window X-ray attosecond laser (Struct. Dyn. 2016, Sci. Adv. 2018). Participated in beamtimes at X-FEL lasers SACLA (IJMS 2017, J. Appl. Phys 2017) and LCLS (Nat. Commun. 2017, J. Phys. B 2015).
- June 2013 - **Visiting Researcher**, *University of Ottawa/National Research Council JASLab*.  
Sept. 2013 Research position working in attosecond and strong field optics. Examined non-sequential double ionization and quantum-classical correspondence in strong fields (CJP 2014).
- Sept. 2012 - **Research Assistant**, *University of Ottawa - Krich Lab*.  
June 2013 Research position in theoretical physics performing simulations of ultrafast quantum effects in photosynthetic energy transfer (J. Chem. Phys. 2014, IOP Publishing 2014).
- May 2012 - **Visiting Researcher**, *University of Frankfurt Institute for Nuclear Physics - Atomic Physics Laboratory*.  
Aug. 2012 Research position working on COLTRIMS (COLd Target Recoil Ion Momentum Spectroscopy) experiments. Performed Coulomb explosion imaging experiments of chiral molecules (Science 2013, ChemPhysChem 2016).
- Sept. 2011 - **Honours Student**, *University of Ottawa - Nonlinear Quantum Optics Laboratory*.  
May 2012 Undergraduate laboratory placement. Experimental demonstration of eigenmode super-resolution in systems with analytic solutions (Opt. Express 2012) and numerical generalization of the method to other systems (J. Mod. Opt. 2014). Measured the polarization state of photons using quantum weak measurement (Nat. Photonics 2013).
- Jan. 2011 - **Visiting Researcher**, *University of Ottawa/National Research Council JASLab*.  
Aug. 2011 Research position working in attosecond and strong field optics. Lead experiments on non-sequential double ionization in argon below the recollision threshold, participated in experiments on time-resolved measurement of bromine photo-dissociation reaction and Coulomb effects in electron tunnelling (Phys. Rev. Lett. 2013).
- May 2010 - **Research Assistant**, *University of Ottawa SUNLab*.  
Dec. 2010 Research position developing a remote data acquisition system for solar concentrators.

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### Education

- 2013-2017 **Doctor of Philosophy (Physics)**, *Imperial College London, London, UK*.  
Degree awarded June 1st 2017, with thesis entitled *Long and Short Wavelength Optical Sources for Attosecond Science*

- 2008-2013 **Honours BSc. Physics-Mathematics with Co-op**, *University of Ottawa*, Ottawa, Canada.  
GPA 9.3; Summa Cum Laude
- 2004-2008 **Ontario High School Diploma**, *Canterbury High School*, Ottawa, Canada.  
OCDSB Silver Medal and Fine Arts Certificate with Distinction

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## Awards

- 2018 **Barcelona Institute of Science and Technology PROBIST Postdoctoral Fellowship.**
- 2013-2016 **Marie Curie Early Stage Researcher Fellowship.**
- 2016 **Imperial College London Physics Department Postgraduate Research Symposium.**  
Best Presentation.
- 2013-2016 **Marie Curie Early Stage Researcher Fellowship.**
- 2013-2016 **NSERC Alexander Graham Bell Graduate Scholarship.**
- 2013 **Imperial College PhD Scholarship**, Declined.
- 2013 **Scottish University Physics Alliance Prize Scholarship**, Declined.
- 2013 **Ontario Graduate Scholarship**, Declined.
- 2013 **University of Ottawa Excellence Scholarship**, Declined.
- 2013 **Canadian Association of Physicists Prize Exam.**  
2nd place University of Ottawa
- 2008-2013 **University of Ottawa Admission Scholarship.**
- 2008-2013 **University of Ottawa Dean's Honour List.**
- 2012 **DAAD Research Internship in Science and Engineering**, Declined.
- 2012 **University of Ottawa International Mobility Scholarship.**
- 2012 **Ottawa Undergraduate Research Poster Competition.**  
First place Physical-Mathematical-Earth Sciences Category
- 2010 **Canadian Undergraduate Physics Conference.**  
Best Talk Materials Physics (2nd place)
- 2010 **University of Ottawa Undergraduate Research Opportunity Scholarship.**
- 2004 **Chief Scout's Award.**

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## Other Relevant Experience

- 2015 **Industry Placement**, *Coherent Scotland*.  
Six weeks at Coherent Scotland in the Engineering Department under Director Mike Mason.
- 2015 **Outstanding Reviewer Status**, *Optics Communications*.  
Top tenth percentile for number of reviews completed
- 2013-2016 **Cohort Representative**, *Marie Curie Innovative Doctoral Program - the Frontiers of Quantum Technology*.
- 2013-2014 **Organizing Committee**, *International Summer School on Quantum Information, Computing and Control*.  
Summer School organized by members of the Center for Doctoral Training in Controlled Quantum Dynamics and members of the Marie Curie Innovative Doctoral Program on the Frontiers of Quantum Technology.

- 2011-2013 **Science Columnist**, *The Fulcrum*.  
University of Ottawa Student Newspaper. Volunteer Position.
- 2010-2011 **Arts and Culture Writer**, *The Fulcrum*.  
University of Ottawa Student Newspaper. Volunteer Position.

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## Books

Joel Yuen-Zhou, Jacob J. Krich, Ivan Kassal, **Allan S. Johnson**, Alán Aspuru-Guzik (2014). *Ultrafast Spectroscopy: Quantum information and wavepackets*, IOP Publishing Ltd, Sept. 2014. Online ISBN: 978-0-750-31062-8.

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## Publications in Refereed Journals

**Allan S. Johnson**, Dane R. Austin, David A. Wood, Christian Brahm, Andrew Gregory, Konstantin B. Holzner, Sebastian Jarosch, Esben W. Larsen, Susan Parker, Christian S. Strüber, Peng Ye, John W. G. Tisch, Jon P. Marangos. (2017) *Soft X-ray Harmonic Generation in the Overdriven Limit*. Accepted for publication in Science Advances. doi:10.1126/sciadv.aar3761

A. F. Alharbi, A. E. Boguslavskiy, D.R. Austin, N. Thire, D. Wood, P. Hawkins, F. McGrath, **A.S. Johnson**, B. E. Schmidt, F. Legare, J. P. Marangos, Anh-Thu Le, and V. R. Bhardwaj. (2018) *Femtosecond Laser Mass Spectrometry and High Harmonic Spectroscopy of Xylene Isomers*. Scientific Reports, Vol. 8, pp. 3789 (2018). doi:10.1038/s41598-018-22055-9

Alvaro Sanchez-Gonzalez, **Allan S. Johnson**, Ann Fitzpatrick, Christopher D.M. Hutchison, Clyde Fare, Violeta Cordon-Preciado, Gabriel Dorlhiac, Josie Ferreira, Rhodri M. Morgan, Jon P. Marangos, Shigeki Owada, Takanori Nakane, Rie Tanaka, Kensuke Tono, So Iwata and Jasper J. van Thor. (2017) *Coincidence timing of femtosecond optical pulses in an X-ray free electron laser*. Journal of Applied Physics, Vol. 122, pp. 203105 (2017). doi.org/10.1063/1.5012749

Felicity McGrath\*, **Allan S. Johnson**\*, Dane Austin, Peter Hawkins, David Wood, Lukas Miseikis, Emma Simpson, Ricardo Torres, Susan Parker, Thomas Siegel, and Jon Marangos. (\* authors contributed equally to this work.) *An apparatus for quantitative high-harmonic generation spectroscopy in molecular vapours*. Review of Scientific Instruments, Vol. 88, pp. 103108 (2017). doi:10.1063/1.4986037

Christopher D.M. Hutchison, Violeta Cordon-Preciado, Rhodri M. L. Morgan, Takanori Nakane, Josie Ferreira, Gabriel Dorlhiac, Alvaro Sanchez-Gonzalez, **Allan S. Johnson**, Ann Fitzpatrick, Clyde Fare, Jon P. Marangos, Chun Hong Yoon, Mark S. Hunter, Sebastien Boutet, Shigeki Owada, Rie Tanaka, Kensuke Tono, So Iwata, Jasper J. van Thor. *X-ray free electron laser determination of crystal structures of dark and light states of a reversibly photoswitching fluorescent protein at room temperature*. International Journal of Molecular Sciences, Vol. 18, pp. 1918 (2017). doi:10.3390/ijms18091918

A. Sanchez-Gonzalez, P. Micaelli, C. Olivier, T. R. Barillot, M. Ilchen, A. A. Lutman, A. Marinelli, T. Maxwell, A. Achner, M. Agaker, N. Berrah, C. Bostedt, J. Buck, J.D. Bozek, P. H. Bucksbaum, S. Carron Montero, B. Cooper, J. P. Cryan, M. Dong, R. Feifel, L. J. Frasinski, H. Fukuzawa, A. Galler, G. Hartmann, N. Hartmann, W. Helml, **A. S. Johnson**, A. Knie, A. O. Lindahl, J. Liu, K. Motomura, M. Mucke, C. O'Grady, J-E. Rubensson, E. R. Simpson, R. J. Squibb, C. Sathe, K. Ueda, M. Vacher, D. J. Walke, V. Zhaunerchyk, R. N. Coffee, J. P. Marangos. *Accurate prediction of X-ray pulse properties from a free-electron laser using machine learning*. Nature Communications, Vol. 8, pp. 15461 (2017). doi:10.1038/ncomms15461

**A.S. Johnson**, L. Miseikis, D.A. Wood, D.R. Austin, C. Brahms, S. Jarosch, C.S. Strüber, P. Ye, and J.P. Marangos. *Measurement of sulfur  $L_{2,3}$  and carbon  $K$  edge XANES in a polythiophene film using a high harmonic supercontinuum*. Structural Dynamics Vol. 3, pp. 062603 (2016). doi:10.1063/1.4964821

Dane R. Austin, T. Witting, S.J. Weber, Peng Ye, T. Siegel, Paloma Matia, **Allan S. Johnson**, J.W.G. Tisch, J.P. Marangos. *Spatio-temporal characterisation of intense few-cycle  $2\mu\text{m}$  pulses*. Optics Express, Vol. 24, Issue 21, pp. 24786-24798 (2016). doi:10.1364/OE.24.024786

Dane R. Austin, Felicity McGrath, Lukas Miseikis, David Wood, Peter Hawkins, **Allan S. Johnson**, Morgane Vacher, Zdenek Masin, Alex Harvey, Olga Smirnova, and Jon P. Marangos. (2016) *Role of tunnel ionization in high harmonic generation from substituted benzenes*. Faraday Discussions (2016). doi:10.1039/C6FD00116E

M. Pitzer, G. Kastirke, M. Kunitski, T. Jahnke, T. Bauer, C. Goihl, F. Trinter, C. Schober, K. Henrichs, J. Becht, S. Zeller, H. Gassert, M. Waitz, A. Kuhlins, H. Sann, F. Sturm, F. Wiegandt, R. Wallauer, L. Ph. H. Schmidt, **A. S. Johnson**, M. Mazenauer, B. Spenger, S. Marquardt, S. Marquardt, H. Schmidt-Böcking, J. Stohner, R. Dörner, M. S. Schöffler and R. Berger. (2016) *Absolute configuration from different multifragmentation pathways in light-induced Coulomb Explosion Imaging*. ChemPhysChem Vol. 17, Issue 16, pp.2465-2472 (2016). doi:10.1002/cphc.201501118.

A Sanchez-Gonzalez, TR Barillot, RJ Squibb, P Kolorenc, M Agaker, V Averbukh, MJ Bearpark, C Bostedt, JD Bozek, S Bruce, S Carron Montero, RN Coffee, B Cooper, JP Cryan, M Dong, JHD Eland, L Fang, H Fukuzawa, M Guehr, M Ilchen, **A S Johnson**, C Liekhus-S, A Marinelli, T Maxwell, K Motomura, M Mucke, A Natan, T Osipov, C Östlin, M Pernpointner, VS Petrovic, MA Robb, C Sathe, ER Simpson, JG Underwood, M Vacher, DJ Walke, TJA Wolf, V Zhaunerchyk, JE Rubensson, N Berrah, PH Bucksbaum, K Ueda, R Feifel, LJ Frasinski, JP Marangos. *Auger electron and photoabsorption spectra of glycine in the vicinity of the oxygen  $K$ -edge measured with an X-FEL*. Journal of Physics B: Atomic, Molecular and Optical Physics, Vol. 48, Issue 23, pp.234004 (2015). doi:10.1088/0953-4075/48/23/234004

**Allan S. Johnson**, Joel Yuen-Zhou, Alan Aspuru-Guzik, Jacob J. Krich. *Practical witness for electronic coherences*. The Journal of Chemical Physics, Vol. 141, Issue 24, pp.244109 (2014). doi:10.1063/1.4903982

**Allan S. Johnson**, Kevin Piche, Jeff Z. Salvail, Jonathan Leach, Robert W. Boyd. *Eigenmode Super-Resolution Imaging in Arbitrary Optical Systems*. Journal of Modern Optics, Vol. 60, Issue 21, pp. 1931-1936 (2014). doi:10.1080/09500340.2013.867096

**Allan S. Johnson**, Andre Staudte, David M. Vielleneuve. *Semi-Classical Methods in Non-Sequential Double Ionization*. Chinese Journal of Physics, Vol. 52, Number 1-II, pp.329-339 (2014). doi:10.6122/CJP.52.329

Martin Pitzer, Maksim Kunitski, **Allan S. Johnson**, Till Jahnke, Hendrik Sann, Felix Sturm, Lothar Ph. H. Schmidt, Horst Schmidt-Böcking, Reinhard Dörner, Jürgen Stohner, Julia Kiedrowski, Michael Reggelin, Sebastian Marquardt, Alexander Schießler, Robert Berger, Markus S. Schöffler. *Direct determination of absolute molecular stereochemistry in gas phase by Coulomb explosion imaging*. Science, Vol. 341 no. 6150 pp. 1096-1100 (2013). doi:10.1126/science.1240362

Jeff Z. Salvail, Megan Agnew, **Allan S. Johnson**, Eliot Bolduc, Jonathan Leach, Robert W. Boyd. *Full characterization of polarization states of light via direct measurement*. Nature Photonics 7, pp.

316-321 (2013). doi:10.1038/nphoton.2013.24

D. Shafir, H. Soifer, C. Vozzi, **A.S. Johnson**, A. Hartung, Z. Dube, D.M. Villeneuve, P.B. Corkum, N. Dudovich and A. Staudte. *Trajectory-Resolved Coulomb Focusing in Tunnel Ionization of Atoms with Intense, Elliptically Polarized Laser Pulses*. Phys. Rev. Lett., Vol. 111, Issue 2, pp. 023005 (2013). doi:10.1103/PhysRevLett.111.023005

Kevin Piche, Jonathan Leach, **Allan S. Johnson**, Jeff Z. Salvail, Mikhail I. Kolobov, Robert W. Boyd. *Experimental realization of optical eigenmode super-resolution*. Optics Express, Vol. 20, Issue 24, pp. 26424-26433 (2012). doi:10.1364/OE.20.026424

## Publications Under Review or in Preparation

**Allan S. Johnson**, Dane R. Austin, Jon P. Marangos. (2018) *Soft X-ray High Harmonic Generation*. In preparation, Invited Article for Philosophical Transactions of the Royal Society A.

Dane R. Austin, Alex Harvey, Peter Hawkins, Misha Ivanov, **Allan S. Johnson**, Jon P. Marangos, Zdenek Masin, Felicity McGrath, Lukas Miseikis, Serguei Patchkovskii, Olga Smirnova, Morgane Vacher, David Wood. *Extracting dynamical contributions from the high harmonic spectra of polyatomic molecules*. In preparation.

**Allan S. Johnson**, David A. Wood, Dane R. Austin, Christian Brahms, Andrew Gregory, Konstantin B. Holzner, Sebastian Jarosch, Susan Parker, Christian S. Strüber, Peng Ye, John W. G. Tisch, Jon P. Marangos. *Apparatus for soft X-ray table-top high harmonic generation*. In preparation.

## Selected Conference Proceedings

Christian Brahms, Dane R. Austin, Francesco Tani, **Allan S. Johnson**, John C. Travers, Philip St. J. Russell, and Jon P. Marangos (2017) *Bright Deep-UV Pulses for Few-femtosecond Pump-probe Experiments Based on Kagome PCF*. Progress in Electromagnetics Research Symposium Singapore 2017.

Adam S Wyatt, Paloma Matía-Hernando, **Allan S Johnson**, Oliver Alexander, Richard Chapman, Cephise Cacho, Dane R Austin, John WG Tisch, Jon P Marangos, Emma Springate (2015) *Compression and Amplification of SWIR Single-Cycle Pulses for Water Window Attosecond Pulse Generation*. CLEO Europe, CG\_3\_3, 21-25 June 2015. Online ISBN: 978-1-4673-7475-0.

AS Wyatt, **AS Johnson**, P Matía-Hernando, O Alexander, RT Chapman, C Cacho, DR Austin, JWG Tisch, JP Marangos, E Springate (2015) *Complete characterization of short-wavelength infrared few-cycle pulses via third harmonic generation dispersion scan*. SILAP 2015, 7-10 Sept. 2015. Online Pdf.

M. Agnew, E. Bolduc, R.W. Boyd, **A.S. Johnson**, J. Leach, O.S. Magana-Loaiza, M. Malik, M. Mirhosseini, M.N. O'Sullivan, J.Z. Salvail, Z. Shi. (2012) *New results in quantum nonlinear optics*. Photonics Conference (IPC), 2012 IEEE, pp.469-470, 23-27 Sept. 2012. doi:10.1109/IPCon.2012.6358696

MD Yandt, JF Wheeldon, CE Valdivia, S Chow, O Theriault, **A Johnson**, F Szadkowski, M Armstrong, L Motte, T Cassidy, I Sivill, J Berrios, B Rosier, SG Wallace, S Fafard, M Swinton, F Shepherd, J Cook, K Hinzer, Frank Dimroth, Sarah Kurtz, Gabriel Sala, Andreas W Bett. *A New On-Sun Test*

*Facility At The 'SUNRISE' Quantum-Dot-Enhanced CPV Module Demonstration System.* CPV-7  
(International Conference). AIP Conf. Proc. 1407, pp. 224-227 (2011). doi:10.1063/1.3658332