

## CONTACT INFORMATION

Germán Sciaini

Associate Professor

Head of the Ultrafast electron Imaging Lab (UeIL).

Department of Chemistry (C2 room 079)

Member of Waterloo Institute for Nanotechnology (WIN).

University of Waterloo

200 University Avenue West

Waterloo, Ontario, N2L 3G1

<https://uwaterloo.ca/chemistry/people-profiles/german-sciaini>

group website: <http://www.science.uwaterloo.ca/~gsciaini>

## DEGREES

- 2006 Ph.D. Chemistry (specialization: Physical Chemistry). Received with distinction. University of Buenos Aires.
- 2001 Licenciante in Chemistry six-year program, equivalent to MSc degree. University of Buenos Aires.

## AWARDS AND HONOURS

- 2021 Vice President Research and International's Award for Commercialization through Innovative Research.
- 2017 Early Researcher Award (ERA) from the Ministry of Research, Innovation and Science, Ontario.
- 2014 Canada Research Chair (Tier 2) from the Government of Canada.
- 2009 First mention, *Prof. Hans J. Schumacher award* 2006-2008 (2<sup>nd</sup> place, 3 theses awarded). This award is given every two years to the three best PhD theses in Chemical Physics in Argentina.
- 2008 First mention, *Prof. Doctor Luis Federico Leloir award* 2006-2007 (2<sup>nd</sup> place, 3 theses awarded). This award is given every year to three best PhD theses in Chemistry in Argentina.
- 2002 Graduate fellowship, National Research Council of Argentina.
- 2001 Graduate fellowship, National Agency of Science and Technology, Argentina.
- 2000 University of Buenos Aires undergraduate research fellowship.

## POST PH.D. EMPLOYMENT HISTORY

- 2014 – Associate Professor, Department of Chemistry, University of Waterloo.

- 2011 – 2013 Group Leader, Atomically resolved division, Max Planck Research Department for the Structure and Dynamics of Matter, Hamburg, Germany.
- 2010 – 2011 Research Associate, Departments of Chemistry and Physics, University of Toronto.
- 2006 – 2010 Postdoctoral Fellow, Departments of Chemistry and Physics, University of Toronto.

## PUBLICATIONS

HQP from UeIL-UW underlined, <sup>§</sup>equal contributions, \*corresponding author(s).

1. J. Z. Chan, R. M. Bradley, M. R. Groh, G. Sciaini, R. E. Duncan\*, “N-oleoylethanolamide treatment of lymphoblasts deficient in Tafazzin improves cell growth and mitochondrial morphology and dynamics” (revisions submitted) *Sci. Rep.*
2. D. Shen, H. Yang, C. Spudat, T. Patel, S. Zhong, F. Chen, J. Yan, X. Luo, M. Cheng, G. Sciaini, Y. Sun, D. A. Rhodes, T. Timusk, Y. N. Zhou, N. Y. Kim, A. W. Tsen\*, “High-Performance Mid-IR to Deep-UV van der Waals Photodetectors Capable of Local Spectroscopy at Room Temperature”. Under review in *NanoLett.* Also in *ArXiv:2202.00049* (2022).
3. M. Cheng, S. Zhong, N. Rivas, T. Dekker, A. A. Petruk, P. Gicala, K. Pichugin, F. Chen, X. Luo, Y. Sun, A. W. Tsen, G. Sciaini\*, “Photoinduced Interlayer Dynamics in  $T_d$ -MoTe: A Broadband Pump-Probe Study”. *Appl. Phys. Lett.* (accepted). Also in *ArXiv:2201.04961* (2022).
4. P. Gicala, A. A. Petruk, N. Rivas, S. Netzke, K. Pichugin, G. Sciaini\*, “A plastic feedthrough suitable for high-voltage DC femtosecond electron diffractometers”. *Rev. Sci. Inst.* 92 (10), 103303 (2021).
5. G. Jnawali, D. Boschetto, L. Malard, T. F. Heinz, G. Sciaini, F. Thiemann, T. Payer, L. Kremeyer, F.-J. Meyer zu Heringdorf, and M. Horn-von Hoegen, “Hot Carrier Transport Limits the Displacive Excitation of Coherent Phonons in Bismuth”. *Appl. Phys. Lett.* 119, 091601 (2021).
6. P. Gicala, M. Cheng, T. S. Lott, K. Du, S-W. Cheong, A. A. Petruk, K. Pichugin and G. Sciaini\*, “Time-resolved broadband impulsive stimulated Brillouin scattering in single crystal hematite” *Appl. Lett. Phys.* **118**, 264101 (2021).
7. T. S. Lott, A. A. Petruk, and G. Sciaini\*, “A miniature high-vacuum valve”. Engineering Archive (2021). doi:10.31224/osf.io/hx4np.
8. N. Rivas, T. Dekker, S. Zhong, A. A. Petruk, Patrick Gicala, Meixin Cheng, F. Chen, X. Luo, Y. Sun, K. Pichugin, A. W. Tsen and G. Sciaini\*, “Generation and detection of coherent longitudinal acoustic waves in ultrathin  $1T'$ -MoTe<sub>2</sub>”. *Appl. Phys. Lett.* **115**, 223103 (2019).
9. W. S. Hopkins, V. Verzilov, G. Sciaini, Mark Boland, Ian Burgess (on behalf of the working group for free electron laser research in Canada), “Establishing a Canadian free electron laser research program”. *Can J. Phys.* **97**, vii-x (2019).
10. N. Rivas, G. Sciaini, E. Marceca\*, “Static and dynamic scavenging of ammoniated electrons by nitromethane”. *Phys. Chem. Chem. Phys.* **21**, 21972 (2019).
11. M. Cheng<sup>§</sup>, N. Rivas<sup>§</sup>, S.J. Lim<sup>§</sup>, K. Pichugin<sup>§</sup>, A. A. Petruk, A. Klinkova, R. Smith, W. S. Hopkins\* and G. Sciaini\*, “Trapping a photoelectron behind a repulsive coulomb barrier in solution”. *J. Phys. Chem. Letters.* **10**, 5742 (2019).

12. A. A. Petruk, C. R. Allen, N. Rivas, K. Pichugin and G. Sciaini\*, “High flow rate nanofluidics for *in-liquid* electron microscopy and diffraction”. *Nanotechnology* **30**, 395703 (2019).
13. G. Sciaini\*, “Recent advances in ultrafast structural techniques” (invited review article, special issue “Photoinduced Cooperative Phenomena”), *Appl. Sci.* **9**, 1427 (2019).
14. E. Khairullina, K. Mosina, R. M. Choueiri, A. P. Paradis, A. A. Petruk, G. Sciaini, E. Krivoshapkina, A. Lee, A. Ahmed and A. Klinkova\*, “Trapping an octahedral core in a nanocage: synthesis, plasmonic, and catalytic properties”. *NanoScale* **11**, 3138 (2019).
15. A. A. Petruk, N. Rivas, T. Dekker, K. Pichugin, A. W. Tsen and G. Sciaini\*. “Ultrafast Electron Diffraction for the Dynamical Study of 2D Materials”. *Microscopy and Microanalysis* **24**, 1598-1599 (2018).
16. A. A. Petruk, K. Pichugin and G. Sciaini\*, “Shaped cathodes for the production of ultra-short multi-electron pulses” (invited article, special issue in memory of Professor Ahmed Zewail). *Struct. Dyn.* **4**, 044005 (2017).
17. G. Sciaini, M. Gao, C. Lu, H. Jean-Ruel, L.C. Liu, A. Marx, K. Onda, S. Koshihara, Y. Nakano, X. Shao, T. Hiramatsu, G. Saito, H. Yamochi, R. R. Cooney, G. Moriena, and R. J. D. Miller\*, “Ultrabright Femtosecond Electron Sources: Ultrafast Structural Dynamics in Labile Organic Crystals”. *Microscopy and Microanalysis* **21**, 1207-1208, (2015).
18. M. Hada, D. Zhang, K. Pichugin, J. Hirscht, M. A. Kochman, S. A. Hayes, S. Manz, R. Y. N. Gengler, D. A. Wann, T. Seki, G. Moriena, C. A. Morrison, J. Matsuo, G. Sciaini and R. J. D. Miller\*, “Cold ablation driven by localised forces in alkali halides”. *Nature Comm.* **5**, 3863 (2014).
19. M. Gao, H. Jean-Ruel, Cheng Lu, L.C. Liu, A. Marx, R. R. Cooney, Y. Jiang, G. H. Kassier, G. Moriena, G. Sciaini\* and R. J. D. Miller\*, “Ultrabright femtosecond electron sources: perspectives and challenges towards the study of structural dynamics in labile systems”. *Ultrafast Nonlinear Imaging and Spectroscopy II, Proc. SPIE* **9198**, 91980R (2014).
20. M. Hada, K. Pichugin and G. Sciaini\*. “Ultrafast structural dynamics with table top femtosecond hard X-ray and electron diffraction setups” (invited tutorial review article). *Eur. Phys. J. Special Topics* **222**, 1093-1123 (2013).
21. M. Gao<sup>§</sup>, C. Lu, H. Jean-Ruel, L.C. Liu, A. Marx, K. Onda, S-y. Koshihara, Y. Nakano, X. Shao, T. Hiramatsu, G. Saito, H. Yamochi, R.R. Cooney, G. Moriena, G. Sciaini<sup>§</sup> and R. J. D. Miller\*. “Mapping molecular motions leading to charge delocalization with ultrabright electrons” *Nature* **496**, 343 (2013).
22. H. Jean-Ruel, M. Gao, C. Lu, L. Liu, G. Moriena, R. R. Cooney, M. A. Kochman, C. A. Morrison, G. Sciaini and R. J. D. Miller\*, “Femtosecond Electron Diffraction Study of the Cyclization Reaction in Crystalline Diarylethene”, as part of the XVIII<sup>th</sup> International Conference on Ultrafast Phenomena. *EPJ Web of Conferences* **41**, 05033 (2013).
23. M. Gao, H. Jean-Ruel, R.R. Cooney, J. Stampe, M. de Jong, M. Harb, G. Sciaini, G. Moriena and R.J.D. Miller\*, “Full characterization of rf pulse compressed femtosecond electron pulses using ponderomotive scattering”. *Opt. Express* **20**, 12048 (2012).
24. M. Hada, J. Hirscht, D. Zhang, S. Manz, K. Pichugin, D. Mazurenko, S. Bayesteh, H. Delsim-Hashemi, K. Floettmann, M. Huening, S. Lederer, G. Moriena, C. Mueller, G. Sciaini and R. J. D. Miller\*, “REGAE: New Source for Atomically Resolved Dynamics,” in Research in Optical Sciences, OSA Technical Digest, paper JT2A.47 (Optical Society of America, 2012).

25. G. Moriena, M. Hada, G. Sciaini, J. Matsuo and R. J. D. Miller\*, “Femtosecond electron diffraction: preparation and characterization of (110)-oriented bismuth films”. *J. Appl. Phys.* **111**, 043504 (2012).
26. G. Sciaini, M. Eichberger, H. Schäfer, M. Krumova, M. Beyer, H. Berger, G. Moriena, J. Demsar and R. J. D. Miller, “Femtosecond Electron Diffraction for the Study of Charge Density Waves”, in *Research in Optical Sciences*, OSA Technical Digest, paper IT3D.2 (Optical Society of America, 2012).
27. M. Gao, H. Jean-Ruel, R. R. Cooney, J. Stampe, M. de Jong, G. Sciaini, G. Moriena, and R. J. D. Miller\*, “Direct Observation of Arrival Time Jitter for RF Compressed Femtosecond Electron Bunches by Ponderomotive Scattering” in *Research in Optical Sciences*, OSA Technical Digest, paper IW1D.6 (Optical Society of America, 2012).
28. G. Sciaini\* and R. J. D. Miller\*, “Femtosecond electron diffraction: heralding the era of atomically-resolved dynamics” (invited review article, dedicated to the memory of Professor David John Hugh Cockayne). *Rep. Prog. Phys.* **74**, 096101 (2011).
29. H. Jean-Ruel, M. Gao, R. R. Cooney, C. Lu, G. Moriena, G. Sciaini R. J. D. Miller\*, “Making the Molecular Movie: First Frames...Coming Features”, in *Laser Science*, OSA Technical Digest, paper LTuB1 (Optical Society of America, 2011).
30. M. Eichberger, H. Schäfer, M. Krumova, J. Demsar, H. Berger, G. Moriena, G. Sciaini and R. J. D. Miller\*, “Ultrafast order parameter melting in a 2D Charge Density Wave 1T-TaS<sub>2</sub> probed by Femtosecond Electron Diffraction”. *Ultrafast Phenomena XVII* (Edited by Chergui, Jonas, Riedle, Schoenlein, Taylor), Oxford University Press, pp. 158-160 (2010).
31. M. Eichberger<sup>§</sup>, H. Schäfer<sup>§</sup>, M. Krumova, M. Beyer, J. Demsar, H. Berger, G. Moriena, G. Sciaini<sup>§</sup> and R. J. D. Miller\*, “Snapshots of cooperative atomic motions in the optical suppression of charge density waves”. *Nature* **468**, 799 (2010).
32. R.J.D. Miller\*, R. Ernstorfer, M. Harb, M. Gao, C. T. Hebeisen, H. Jean-Ruel, C. Lu, G. Moriena and G. Sciaini, “Making the Molecular Movie: First Frames” (invited review article) *Acta Cryst. A* **66**, 137 (2010).
33. G. Sciaini, M. Hada, J. Matsuo, A. Karantza, G. Moriena and R. J. D. Miller\*, “Coherent Acoustic Phonons in Highly Oriented Bismuth Films Monitored by Femtosecond Electron Diffraction”. *Ultrafast Phenomena XVII* (Edited by Chergui, Jonas, Riedle, Schoenlein, Taylor), Oxford University Press, pp. 284-286 (2010).
34. H. Jean-Ruel, M. Gao, R. R. Cooney, C. Lu, G. Sciaini, G. Moriena and R. J. D. Miller\*, “Femtosecond Molecular Photocrystallography”. *Ultrafast Phenomena XVII* (Edited by Chergui, Jonas, Riedle, Schoenlein, Taylor), Oxford University Press, pp. 337-339 (2010).
35. M. Harb, W. Peng, G. Sciaini, C.T. Hebeisen, R. Ernstorfer, M. A. Eriksson, M. G. Lagally, S.G. Kruglik and R. J. D. Miller\*, “Excitation of longitudinal and transverse coherent acoustic phonons in nanometer free-standing films of (001) Si”. *Phys. Rev. B* **79**, 094301 (2009).
36. G. Sciaini, M. Harb, S. G. Kruglik, Th. Payer, C. T. Hebeisen, F. -J. Meyer zu Heringdorf, M. Yamaguchi, M. Horn von Hoegen, R. Ernstorfer and R. J. D. Miller\*, “Electronic acceleration of atomic motions and disordering in Bismuth”. *Nature* **458**, 56 (2009).
37. R. Ernstorfer, M. Harb, C. T. Hebeisen, G. Sciaini, T. Dartigalongue and R. J. D. Miller\*, “The formation of warm dense matter: experimental evidence for electronic bond hardening in Gold”. *Science* **323**, 1033 (2009).

38. R. Ernstorfer, M. Harb, C.T. Hebeisen, G. Sciaini, T. Dartigalongue, I. Rajkovic, M. Ligges, D. von der Linde, Th. Payer, M. Horn von Hoegen, F. -J. Meyer zu Heringdorf, S. G. Kruglik and R. J. D. Miller\*, "Atomic View of the Photoinduced Collapse of Gold and Bismuth," *Ultrafast Phenomena XVI (Editors: Corkum, de Silvestry, Nelson, Riedle, Schoenlein), Springer Series in Chemical Physics 92, 113* (2009).
39. M. Harb, W. Peng, G. Sciaini, C. T. Hebeisen, M. A. Eriksson, M. G. Lagally, S. G. Kruglik and R. J. D. Miller\*, "Electronically Driven Structural Dynamics of Si Resolved by Femtosecond Electron Diffraction," *Ultrafast Phenomena XVI (Editors: Corkum, de Silvestry, Nelson, Riedle, Schoenlein), Springer Series in Chemical Physics 92, 158* (2009).
40. C. T. Hebeisen, G. Sciaini, M. Harb, R. Ernstorfer, S. G. Kruglik and R. J. D. Miller\*, "Direct Visualization of Electron Emission during Femtosecond Laser Ablation," *Ultrafast Phenomena XVI (Editors: Corkum, de Silvestry, Nelson, Riedle, Schoenlein), Springer Series in Chemical Physics 92, 693* (2009).
41. C. T. Hebeisen, G. Sciaini, M. Harb, R. Ernstorfer, T. Dartigalongue, S. G. Kruglik and R. J. D. Miller\*, "Grating Enhanced Ponderomotive Scattering for Characterization of Femtosecond Electron Pulses," *Ultrafast Phenomena XVI (Editors: Corkum, de Silvestry, Nelson, Riedle, Schoenlein), Springer Series in Chemical Physics 92, 995* (2009).
42. G. Sciaini, E. Marceca and R. Fernández-Prini\*, "Is ammonia a better solvent than water for contact ion pairs?". *J. Phys. Chem. B* **112**, 11990 (2008).
43. C. T. Hebeisen, G. Sciaini, M. Harb, R. Ernstorfer, S.G. Kruglik and R. J. D. Miller\*, "Direct visualization of charge distributions near solid surfaces during femtosecond laser ablation". *Phys. Rev B (rapid comm.)* **78**, 081403 (2008).
44. M. Harb, R. Ernstorfer, C. T. Hebeisen, G. Sciaini, W. Peng, T. Dartigalongue, M. A. Eriksson, M. G. Lagally, S. G. Kruglik and R. J. D. Miller\*. "Electronically Driven Structure Changes of Silicon Captured by Femtosecond Electron Diffraction". *Phys. Rev. Lett.* **100**, 155504 (2008).
45. C. T. Hebeisen, G. Sciaini, M. Harb, R. Ernstorfer, T. Dartigalongue, S. G. Kruglik and R. J. D. Miller\*. "Grating Enhanced Ponderomotive Scattering for Visualization and Full Characterization of Femtosecond Electron Pulses". *Optics Express* **16**, 3334 (2008).
46. C. T. Hebeisen, G. Sciaini, M. Harb, R. Ernstorfer, S. G. Kruglik and R. J. D. Miller\*, "Time-resolved visualization of electric fields during femtosecond laser ablation," *Proceedings of SPIE -The International Society for Optical Engineering* 7099, art. no. 70992F (2008).
47. G. Sciaini, R. Fernández-Prini, D. Estrin and E. Marceca\*. "Short-range and long-range solvent effects on charge-transfer-to-solvent transitions of I<sup>-</sup> and K<sup>+</sup>I<sup>-</sup> contact ion pair dissolved in supercritical ammonia", *J. Chem. Phys.* **126**, 174504 (2007).
48. G. Sciaini, E. Marceca and R. Fernández-Prini\*. "Development of the charge-transfer-to-solvent process with increasing solvent fluid density: the effect of ion pairing", *Phys. Chem. Chem. Phys* (invited Article) **8**, 4839 (2006).
49. G. Sciaini, E. Marceca and R. Fernández-Prini\*. "Solvent Triggered Change of the electron excitation Route of KI in Supercritical NH<sub>3</sub>", *J. Phys. Chem. B (Letter)* **110**, 8921 (2006).
50. G. Sciaini, E. Marceca and R. Fernández-Prini\*. "Influence of Ion-pairing on the UV spectral Behavior of KI dissolved in Supercritical NH<sub>3</sub>: from Vapor Phase to Condensed Liquid". *J. Phys. Chem. B* **109**, 18949-18955 (2005).

51. G. Sciaiini, E. Marceca and R. Fernández-Prini\*. “Solubility of crystalline alkali metal iodides in supercritical ammonia”, *Journal of Supercritical Fluids* **35**, 106 (2005).
52. G. Sciaiini, E. Marceca and R. Fernández-Prini\*. “Intermolecular solvent–solute energies for thermodynamic and spectroscopic properties of solutes in near-critical solvents”. *Phys. Chem. Chem. Phys.* **14**, 3400 (2002).
53. G. Sciaiini, D.E. Wetzler, J. Alvarez, R. Fernández-Prini and M. L. Japas\*. “Kinetics of thermal decoloration of photomerocyanine in mixtures of protic and nonpolar solvents”. *J. Photochem. Photobiol. A* **153**, 25 (2002).

## TECHNICAL REPORTS

- 1.
2. A. A. Petruk, C. Tremblay, M. Black, C. Johnston, M. Devries-Aboud\*, G. Sciaiini\*, “Imaging tissue samples by STEM and development of nanofluidic platforms for in-liquid (S)TEM imaging of biospecimens”, internal progress report, WIN-IRFP (Interdisciplinary Research Fund Program), 2019.
3. K. Pichugin, A. A. Petruk, N. Rivas and G. Sciaiini, “High-resolution imaging system for electron microscopy: software and hardware development”, Technical final report NSERC-CRD Oct 2018.
4. K. Pichugin, A. A. Petruk, N. Rivas and G. Sciaiini, “Versatile retractable camera for Hitachi electron microscopes”, Technical final report OCE-VIP2 Oct 2018.
5. K. Pichugin, A. A. Petruk, N. Rivas, T. Aoyagi and G. Sciaiini, “Versatile retractable camera for Hitachi electron microscopes”, Technical report OCE-VIP2 Aug 2017.
6. K. Pichugin, A. A. Petruk, N. Rivas, T. Aoyagi and G. Sciaiini, “Versatile retractable camera for Hitachi electron microscopes”, Technical report OCE-VIP2 Dec 2016.

## EXPERT OPINION

1. 2012 Interview by Hannah Waters The Scientist magazine (Phone interview). Next Generation: A Molecular Camera, (<http://www.the-scientist.com/?articles.view/articleNo/31844/title/Next-Generation--A-Molecular-Camera/>). Commented on the work by C. Blaga et al., “Imaging ultrafast molecular dynamics with laser-induced electron diffraction,” *Nature* **483**, 194-197 (2012).
2. 2014 Assisted Mr. Mark Wilson and Johanna Miller, senior associate editors, *Physics Today*.
3. 2016 Assisted Mr. Sung Chang, associate editor, *Physics Today*.

## CONFERENCE PRESENTATIONS (different from those listed in list of invited addresses below. Contributed talks and posters since 2014 as UW PI).

1. (Oral presentation by Chan) J. Chan, R. Bradley, J. Aristizabal-Henao, K. Stark, M. Groh, G. Sciaiini, Robin Duncan\*, “Effects of N-oleoylethanolamide on lymphoblasts deficient in Tafazzin”. The FASEB Journal 35 (2021).

2. (Poster presentation) M. Cheng, S. Zhong, N. Rivas, T. Dekker, A. A. Petruk, P. Gicala, K. Pichugin, F. Chen, X. Luo, Y. Sun, A. W. Tsen, G. Sciaini, *Femtosecond non-linear optical techniques and their applications in condensed matter physics*, Canadian Photonics Online Meetup, Online, December 4, 2020.
3. (Invited talk delivered by A. A. Petruk) *Liquid-Cell Electron Microscopy Developments at UeIL*, CCEM User Group Meeting and Scientific Workshop, July 15, 2020.
4. (Poster presentation) F. Thiemann, M. Cheng, T. Lott, P. Gicala, E. Kjell, S. Oliphant, N. Rivas, A. A. Petruk, K. Pichugin, G. Sciaini, *Femtosecond spectroscopic and structural techniques at the Ultrafast electron Imaging Lab*, 35<sup>th</sup> University of Waterloo Symposium on Chemical Physics, 2019.
5. (Poster presentation) P. Gicala, N. Rivas, S. Zhong, T. Dekker, A. A. Petruk, M. Cheng, F. Chen, X. Luo, Y. Sun, K. Pichugin, A. Tsen, G. Sciaini, *Generation and detection of acoustic waves in ultrathin 1T'-MoTe<sub>2</sub>*, 35<sup>th</sup> University of Waterloo Symposium on Chemical Physics, 2019.
6. (Poster presentation) M. Cheng, N. Rivas, S. J Lim, K. Pichugin, A. A. Petruk, A. Klinkova, R. D. L. Smith, W. S. Hopkins, G. Sciaini, *Trapping a photoelectron behind a repulsive coulomb barrier in solution*, 35<sup>th</sup> University of Waterloo Symposium on Chemical Physics, 2019.
7. (Poster presentation) T. Lott, A. A. Petruk, X. Medvedeva, A. Klinkova, T. Prozorov, G. Sciaini, *Liquid Cell Electron Microscopy of Nanomaterials and Biospecimens*, 35<sup>th</sup> University of Waterloo Symposium on Chemical Physics, 2019.
8. (Oral presentation by Rivas) N. Rivas, T. Dekker, A. A. Petruk, S. Zhong, A. W. Tsen, K. Pichugin and G. Sciaini, *Metastable High Temperature Orthorhombic Phase in 1T'-MoTe<sub>2</sub>*, 6<sup>th</sup> Banff Meeting on Structural Dynamics, Banff, Calgary, Canada, February 9-13, 2019.
9. (Poster presentation) A. A. Petruk, C. R. Allen, C. Johnston, N. Rivas, S. Dogel, K. Pichugin and G. Sciaini, *A nanofluidic platform for reproducible TEM measurements of in-liquid samples*, 6<sup>th</sup> Banff Meeting on Structural Dynamics, Banff, Calgary, Canada, February 9-13, 2019.
10. (Poster presentation) P. Gicala, A. A. Petruk, N. Rivas, K. Pichugin, G. Sciaini, *Development of a 300-kilovolt high-voltage feedthrough for ultrafast electron diffraction*, 6<sup>th</sup> Banff Meeting on Structural Dynamics, Banff, Calgary, Canada, February 9-13, 2019.
11. (Poster presentation) T. Lott, N. Rivas, K. Pichugin and G. Sciaini, *Ultrafast Dynamical Studies on Molecular Systems*. 34<sup>th</sup> University of Waterloo Symposium on Chemical Physics, 2018.
12. (Poster presentation) A. A. Petruk, C. Johnston and G. Sciaini, *Nanofluidics for electron microscopy and femtosecond electron diffraction measurements in liquids*. 34<sup>th</sup> University of Waterloo Symposium on Chemical Physics, 2018.
13. (Poster presentation) M. Cheng, N. Rivas, Eric Haugen, S. Ngo, K. Pichugin and G. Sciaini, *Femtosecond transient absorption spectroscopy at UeIL*. 34<sup>th</sup> University of Waterloo Symposium on Chemical Physics, 2018.
14. (Poster presentation) P. Gicala, N. Rivas, A. A. Petruk, K. Pichugin and G. Sciaini, *Final steps in the Development of the 300 kV Femtosecond Electron Diffractometer at UeIL*. 34<sup>th</sup> University of Waterloo Symposium on Chemical Physics, 2018.
15. (Poster presentation) N. Rivas, T. Lott, P. F. M. Elango, M. Cheng, E. Haugen, A. A. Petruk, K. Pichugin, G. Sciaini, *Sample Preparation and Delivery Methods for Ultrafast Nonlinear Optical Studies at UeIL*. 33<sup>rd</sup> University of Waterloo Symposium on Chemical Physics, 2017.

16. (Poster presentation) A. A. Petruk, A. Hassan, N. Rivas, K. Pichugin and G. Sciaini (University of Waterloo) *Development of time-resolved electron microscope and its accessories at UeIL*. 33<sup>rd</sup> University of Waterloo Symposium on Chemical Physics, 2017.
17. (Oral presentation by Rivas) Satellite CSC meeting – N. Rivas and G. Sciaini, June 2, 2017.
18. (Oral presentation by Petruk) Satellite CSC meeting – A. A. Petruk and G. Sciaini, June 2, 2017.
19. (Poster presentation) N. Rivas, A. A. Petruk, K. Pichugin, T. Aoyagi and G. Sciaini. Banff Meeting on Structural Dynamics, Banff, Calgary, Canada, February 19-22, 2017.
20. (Poster presentation) A. Hassan, A. A. Petruk and G. Sciaini, *Accessories for electron microscopy: cryo-holders*. 32<sup>nd</sup> University of Waterloo Symposium on Chemical Physics, 2016.
21. (Poster presentation) P. Myatt, J. Burgess, M. Sadkowski, A. A. Petruk, N. Rivas, K. Lakin and G. Sciaini, *Current 494 student projects at the Ultrafast Electron Imaging Lab*. 32<sup>nd</sup> University of Waterloo Symposium on Chemical Physics, 2016.
22. (Poster presentation) A. A. Petruk, C. R. Allen, N. Castro-Folker, N. Rivas, K. Pichugin and G. Sciaini, *Accessories for electron microscopy: nanofluidics, and detection systems*. 32<sup>nd</sup> University of Waterloo Symposium on Chemical Physics, 2016.
23. (Poster presentation) K. Pichugin, A. A. Petruk and G. Sciaini, *Ultrafast electron diffraction and microscopy: breaking time-resolution limits*. 32<sup>nd</sup> University of Waterloo Symposium on Chemical Physics, 2016.
24. (Poster presentation) N. Castro-Folker, C. R. Allen, A. A. Petruk, K. Pichugin and G. Sciaini, *A New Ultrafast Electron Imaging Lab*. 31<sup>st</sup> University of Waterloo Symposium on Chemical Physics, 2015.
25. (Oral) G. Sciaini. "Ultrabright Femtosecond Electron Sources: Ultrafast Structural Dynamics in Labile Organic Crystals Microscopy and Microanalysis 2015 (M&M 2015) conference, Portland, Oregon, USA, August 2<sup>nd</sup>-6<sup>th</sup>, 2015.
26. (Poster presentation) A. A. Petruk, K. Pichugin, and G. Sciaini, *Atomically-Resolved Dynamics and Ultrafast Imaging*. 31<sup>st</sup> University of Waterloo Symposium on Chemical Physics, 2014.

## INVITED TALKS

1. "Towards Liquid-Phase Ultrafast Structural Dynamics". The 2021 International Chemical Congress of Pacific Basin Societies (Pacifichem 2021), will take place in Honolulu, Hawaii, USA, December 15<sup>th</sup>-20<sup>th</sup>, 2021.
2. "Current research directions at the Ultrafast electron Imaging Laboratory". Advanced Laser Light Source workshop, INRS, Montreal, Canada, 2021.
3. "The Ultrafast electron Imaging Laboratory of Waterloo". Laboratorio de Energías Sustentables, Universidad Nacional de Córdoba, Córdoba, Argentina, 2020.
4. "The Ultrafast electron Imaging Lab (UeIL) of Waterloo". 10th Annual Nano Ontario Conference, York University, Toronto, Canada, 2019.
5. "CPA-Enabled Techniques at the Ultrafast electron Imaging Lab of Waterloo: From Molecular Movies to Quantum Information Technologies". Celebratory Waterloo-Rochester Photonics



Symposium, in honour of Donna Strickland, Nobel Laureate. University of Waterloo, 2019.

6. "Ultrafast Electron Diffraction for the Dynamical Study of 2D Materials". Seminar, Iowa State University and DOE Ames Laboratory, Ames, Iowa, 2019.
7. "The Ultrafast electron Imaging Lab". WIN-National Cheng Kung University (Taiwan) Joint Workshop, Waterloo Institute for Nanotechnology, Waterloo, Canada, 2018.
8. "Complementary techniques to the IR-FEL facility". FEL based IR and THz workshop, TRIUMF, British Columbia, Canada, 2018.
9. "Developments at Ultrafast electron Imaging Lab". WIN elevator pitch, Waterloo Institute for Nanotechnology, Waterloo, Canada, 2018.
10. "Ultrafast Structural Dynamics: Developments and Applications". 20th Photonics North Conference, Montreal, Canada, 2018.
11. "Developments at the Ultrafast Electron Imaging Lab". Advanced Electron Microscopy Conference: From Steels to DNA, Canadian Centre for Electron Microscopy, McMaster, Hamilton, Canada, 2018.
12. "Current Developments at the Ultrafast electron Imaging Lab". Symposium Okayama University, Okayama, Japan, 2018.
13. "The Ultrafast electron Imaging Lab of Waterloo". University of Waterloo, Hong Kong, 2018.
14. "The Ultrafast electron Imaging Lab of Waterloo". McMaster Brockhouse Institute for Materials Research, Hamilton, Canada, March 26, 2018.
15. "Atomically resolved dynamics with ultrafast electrons". Drexel University, Physics Symposium, Philadelphia, USA, March 15, 2018.
16. "Current developments at the Ultrafast electron Imaging Lab". 100<sup>th</sup> Canadian Society for Chemistry, Toronto, Canada, May 28 – June 2, 2017.
17. WIN-CENIDE workshop, Duisburg, Germany, July 18<sup>th</sup>-21<sup>st</sup>, 2017.
18. "Observing dynamics with atomic spatiotemporal resolution". Institute of Chemistry of Materials, Energy and Environment (INQUIMAE), School of Sciences, University of Buenos Aires, December 21<sup>st</sup>, 2016.
19. "Observing dynamics with atomic spatiotemporal resolution". WIN-Cambridge workshop, Cambridge University, UK. Invited to present a talk as part of a workshop organized by WIN and Cambridge Electrical Engineering Department, July 2<sup>nd</sup>-6<sup>th</sup>, 2016.
20. "Ultrabright femtosecond electron sources for the study of ultrafast structural dynamics". Femtosecond Electron Imaging and Spectroscopy-2 (FEIS-2), May 6<sup>th</sup>-9<sup>th</sup>, 2015, Lansing, Michigan, USA.
21. "Ultrabright femtosecond electron sources for the study of ultrafast structural dynamics". First Conference on Laser and Synchrotron Radiation Combination Experiment (LSC), April 23<sup>rd</sup>-24<sup>th</sup>, 2014, Pacifico Yokohama, Yokohama, Japan.
22. "Mapping molecular motions leading to charge delocalization with ultrabright electrons". 45<sup>th</sup> Annual Meeting of the American Physical Society, Division of Atomic, Molecular, and Optical Physics. June

2<sup>nd</sup>-6<sup>th</sup>, 2014, Madison, Wisconsin, USA.

23. "Ultrabright femtosecond electron source captures key molecular motions in the photoinduced insulator-to-metal phase transition of (EDO-TTF)<sub>2</sub>PF<sub>6</sub>". Photo induced phase transitions and cooperative phenomena 5 (PIPT5). June 8<sup>th</sup>-13<sup>th</sup>, 2014, Bled, Slovenia.
24. "Ultrabright low-repetition rate femtosecond electron sources: perspectives and challenges towards the study of structural dynamics in labile systems". Ultrafast Imaging and Spectroscopy conference, SPIE Optics and Photonics, August 17<sup>th</sup>-21<sup>st</sup>, 2014, San Diego, California, USA.
25. (tutorial) University of Ontario Institute of Technology. Oshawa, Ontario, Canada, March 26, 2014. (Tutorial talk about Femtosecond diffraction, duration 3 hours).
26. (keynote) International School and Symposium on Molecular Materials (ISSMM2013). Tokyo Institute of Technology, O-Okayama Campus, Tokyo, Japan, November 4<sup>th</sup>-8<sup>th</sup>, 2013. (Keynote speaker, tutorial talk about Femtosecond Electron Diffraction, duration 1.5 hours).
27. New Trends and Faces in Ultrafast Structural Dynamics, Manor House at Stias in Stellenbosch, Oct 15<sup>th</sup>-17<sup>th</sup>, 2013 [Invited as supervisor of Meng Gao (presenter) for discussions].
28. "Ultrabright low-repetition rate femtosecond electron sources: perspectives and challenges towards the study of structural dynamics in biological systems". 246<sup>th</sup> ACS National Meeting. Symposium on "Chemistry at the Space-Time Limit" Indianapolis, September 8<sup>th</sup>-12<sup>th</sup>, 2013.
29. "Ultrabright low-repetition rate femtosecond electron sources: perspectives and challenges towards the study of structural dynamics in biological systems". Ultrafast Imaging and Spectroscopy, SPIE conference, August 25<sup>th</sup>-29<sup>th</sup>, 2013 San Diego, California USA.
30. "Ultrabright femtosecond electron sources: exploring ultrafast structural phenomena in labile organic materials and biological systems". Progress In Electromagnetics Research Symposium PIERS 2013 in Stockholm, Sweden, August 12<sup>th</sup>-15<sup>th</sup>, 2013.
31. "Ultrabright femtosecond electron sources: exploring ultrafast structural phenomena in labile organic materials and biological systems". 1st Germany-China young scientist workshop on ultrafast light sources and spectroscopy applications. CFEL, Hamburg, Germany, June 24<sup>th</sup>-26<sup>th</sup>, 2013.
32. "Ultrabright femtosecond electron diffraction for the study of dynamical phenomena at the atomic level of inspection". CECAM-Workshop on Novel 2D-materials, University of Bremen, Bremen, Germany, June 10<sup>th</sup>-14<sup>th</sup>, 2013.
33. "Femtosecond electron diffraction: heralding the era of atomically-resolved dynamics". XVIII Argentinean Congress in Inorganic and Physical Chemistry. April 9<sup>th</sup>-12<sup>th</sup>, 2013, Rosario, Argentina.
34. "Femtosecond electron diffraction: heralding the era of atomically-resolved dynamics". Workshop on Ultrafast Electron Sources for Diffraction and Microscopy applications. December 12<sup>th</sup>-14<sup>th</sup>, 2012 at the University of California, Los Angeles.
35. "Ultrabright femtosecond electron diffraction for the study of organic crystals". Electronic States and Phases Induced by Electric or Optical Impacts, IMPACT. September 10<sup>th</sup>-14<sup>th</sup>, 2012 Orsay, France. This invited talk resulted in a review article.
36. "Femtosecond Electron Diffraction for the Study of Charge Density Waves," (invited) II International Conference on Ultrafast Structural Dynamics (ICUSD), March 19<sup>th</sup>-21<sup>st</sup>, 2012, Laser Optics Berlin, Berlin, Germany.

37. "Making the Molecular Movies: first frames...coming features". 94th Canadian Chemistry Conference and Exhibition, Montréal June 5<sup>th</sup>-9<sup>th</sup>, 2011.
38. "Watching Atoms in Action by Femtosecond Electron Diffraction". 6<sup>th</sup> international conference on Nano-Scale Spectroscopy and Nanotechnology (NSS 6), Kobe, Japan, October 25<sup>th</sup>-29<sup>th</sup>, 2010.
39. "Watching Atoms in Action by Femtosecond Electron Diffraction". Tokyo Institute of Technology, Tokyo, Japan, October 22<sup>nd</sup>, 2010.
40. "Watching Atoms in Action". University of Ontario Institute of Technology, Material Science Seminar, September 29<sup>th</sup>, 2010.
41. "Coherent Acoustic Phonons in Highly Oriented Bismuth Films, Monitored by Femtosecond Electron Diffraction". 17<sup>th</sup> Ultrafast Phenomena, Snowmass, Colorado, USA. July 18<sup>th</sup>-23<sup>rd</sup>, 2010.
42. "Femtosecond Electron Diffraction: Making the molecular movie". 93<sup>rd</sup> Canadian Chemistry Conference and Exhibition. May 29<sup>th</sup>-June 2<sup>nd</sup>, 2010.
43. Femtosecond Electron Diffraction: "Making the molecular movie", Banff Meeting on Structural Dynamics: Ultrafast Dynamics with X-rays and Electrons. Banff, Alberta, Canada. February 25<sup>th</sup>-28<sup>th</sup>, 2010.
44. "Femtosecond electron diffraction: Making the molecular movie". Department of Inorganic Chemistry, Analytical and Physical Chemistry, School of Sciences, University of Buenos Aires, December 2009.
45. "Femtosecond electron diffraction: Making the molecular movie". Chemistry Unit, National Commission of Atomic Energy, Buenos Aires, December 2009.

## **START-UP CREATION**

Company name: Waterloo EM Inc.

Incorporated with the help of WatCo on February 08, 2022.

Founders: Germán Sciaini (CEO, temporary), Ariel A. Petruk.

## **AGREEMENT OF TECHNOLOGY TRANSFER**

We have signed a formal memorandum of understanding for a non-exclusive technology transfer with the Canadian Centre for Electron Microscopy (CCEM). The goal is to make our technologies broadly available to our Canadian community. We are currently receiving technical and infrastructure support from CCEM.

## **PATENTS RELATED TO WATERLOO EM INC. TECHNOLOGIES**

### ***Granted Patents***

1. G. Sciaini and A. A. Petruk. "Sample holder for electron microscopy", US17/209,491. Allowed to proceed/granted in full 01/27/2022.

- G. Sciaini and A. A. Petruk. “Nanofluidic cell system”, US11075054B2 (2021). Granted in full/all claims 2021-07-27.

**Pending Patents**

- G. Sciaini and A. A. Petruk. “Nanofluidic carrier”. US Provisional Patent, filed 2020-12-11 (added as a continuation in patent: “Nanofluidic cell and loading platform”).
- G. Sciaini and A. A. Petruk. “Nanofluidic cell and loading platform”. US Patent number 62/883,821, filed 2020-04-07 (IP protection dates back to 2019-02-05 via USPTO 62/801,327).

**RESEARCH FUNDING RECORD (UNDER REVIEW)**

Investigators	Funding Agency and Title	Total amount	Project Period
Sciaini (PI) Co-applicants: Klinkova (UW) Duncan (UW) Higgins (McMaster)  Collaborators: Salomons (NRC) Fleischauer (NRC)	NSERC Alliance Missions grant with Sciencetech Inc.. “CLCan: a complete and automated cathodoluminescence system for the spectroscopic investigation of in-liquid specimens with nanometre spatial resolution”	\$920K	
Sciaini (PI)	NSERC-RTI grant. “Liquid-phase ultrafast electron diffraction”	\$98K	

**RESEARCH FUNDING RECORD (GRANTED)**

Investigators	Funding Agency and Title	Total amount	Project Period
Sciaini (PI)	NSERC Alliance grant. “Development of SciFast: an ultrafast broadband spectrometer”, with Sciencetech Inc. *includes company cash cont. after overhead without in kind (\$50,000)	\$138.5K	Jan 2021 – 2023
Sciaini (PI)	WIN-NRC seed fund. “Development and Implementation of a Cathodoluminescence System for the Characterization of Light Emitting Nanomaterials and Nanostructures”	\$30K	Mar 2022 – Feb 2023
Sciaini (PI)	NSERC-I2I grant. “Nanofluidic Imaging Kit for Liquid-Phase Electron Microscopy Studies of Drop-Casted Samples”	\$125K	2021

**CURRICULUM VITAE – GERMÁN SCIAINI**

Sciaini (PI)	NSERC-RTI grant. “Repair of femtosecond laser system”.	\$150K	2020
Sciaini (PI)	NSERC Discovery grant. “The Ultrafast electron Imaging Lab of Waterloo”.	\$145K	2020 – 2024
Sciaini (PI)	NSERC-I2I “Ultrastable liquid nitrogen free holder for high resolution cryo-electron microscopy” – Phase I	\$125K	Jan 2020 – Jan 2021
Sciaini (PI)	NSERC-I2I (market assessment for “Universal nanofluidic cell with loading station”)	\$20K	2019
Sciaini (PI)	NSERC-I2I “Nanofluidic system with electrochemical and flow mixing capabilities for in-liquid electron microscopy studies” – Phase I (nine-month duration)	\$125K	2019
Sciaini (PI)	NSERC-Engage with CSL Silicones	\$25K	2019
Sciaini (PI)	NSERC-I2I (market assessment for “CryoEM Holder”)	\$20K	2019
Sciaini (PI)	NSERC-I2I (market assessment for “Nanofluidic system”)	\$20K	2019
Sciaini (PI) / Devries-Aboud (Co-PI)	WIN-IRFP Interdisciplinary program	\$50K	May 2018 Aug 2019
Sciaini (PI)	TQT-QQSF (Quantum Quest Seed Funds)	\$86.8K	Apr 2018 Mar 2020
Sciaini (PI)	Early Researcher Award (ERA). “Drug targets at atomic resolution”. (five-year duration)	\$150K	May 2017 Apr 2022
Sciaini (PI)	NSERC Collaborative Research and Development with Hitachi High Technologies Canada	\$153.8K	Aug 2016 Aug 2018
Sciaini (PI)	Ontario Centre of Excellence – VIP 2 with Hitachi High Technologies Canada	\$150K	May 2016 Aug 2018
Sciaini (PI)	Cash contribution Hitachi High Technologies Canada to match OCE-VIP 2 and NSERC-CRD (before overhead)	\$100K	May 2016 Aug 2018
Sciaini (PI)	Waterloo CIHR Research Incentive Fund – one installment	\$8K	2016
Sciaini (PI)	CFI – Infrastructure operating funds two-year duration	\$112.4K	May 2015 Apr 2017

**CURRICULUM VITAE – GERMÁN SCIAINI**

Sciaini (PI)	NSERC Research tools and instruments	\$150K	2015	
Sciaini (PI)	Canada Research Chair (tier 2). \$60/year as research support.	\$500K	2014 2019	–
Sciaini (PI)	CFI – JELF (expendable cash without in-kind contribution, three-year duration)	\$375K	2014 2017	–
Sciaini (PI)	Ontario Research Fund (three-year duration)	\$375K	2014 2017	–
Sciaini (PI)	NSERC Discovery grant (six years with ECR extension with funds)	\$210K	2014 2020	–
Sciaini (PI)	Start-up funds	\$300K	2014 2015	–
Marceca (PI) / Sciaini (Co-PI)	PICT – Argentina (four-year duration). It provided travel support for U. Buenos Aires students.	\$17.5K	2011 2015	–

**Total amount of funding received until Feb 15, 2020: \$3,660,000.**

**TEACHING ACTIVITIES**

**Record of Courses Taught**

<b>Term</b>	<b>Course</b>	<b>Title</b>	<b>Grad/Undergrad</b>	<b>Load</b>
F 2020	CHEM 120	Phys & Chem Prop of Matter	Undergrad	100%
W 2020	CHEM 400/750	Ultrafast spectroscopy	Grad/Undergrad	100%
W 2020	CHEM 400/750	Ultrafast spectroscopy	Grad/Undergrad	100%
F 2019	CHEM 120	Phys & Chem Prop of Matter	Undergrad	100%
F 2018	CHEM 120	Phys & Chem Prop of Matter	Undergrad	100%
W 2018	CHEM 750	Ultrafast spectroscopy	Grad	100%
W 2018	CHEM 400	Ultrafast spectroscopy	Undergrad	100%
F 2017	CHEM 120	Phys & Chem Prop of Matter	Undergrad	100%
W 2016	CHEM 450/750	Ultrafast spectroscopy	Grad/Undergrad	100%
F 2016	CHEM 120	Phys & Chem Prop of Matter	Undergrad	100%
F 2015	CHEM 120	Phys & Chem Prop of Matter	Undergrad	100%

F 2014	CHEM 120	Phys & Chem Prop of Matter	Undergrad	100%
--------	----------	----------------------------	-----------	------

### Summary of Teaching Evaluations

Student Evaluations				
Course	Term	Overall Common Score (maximum of 5.0)	# of Students	Response Rate
CHEM 120*	F 2021*	3.9*	1423*	19%*
CHEM 350	W 2021	4.6	120	39%
CHEM 400/750	F 2020	4.4	73	49%
CHEM 400/750	W 2020	4.3	53	40%
CHEM 120	F 2019	3.9	375	53%
CHEM 120	F 2018	4.3	377	56%
CHEM 750	W 2018	NA	12	NA
CHEM 400	W 2018	4.2	63	65%
CHEM 120	F 2017	4.5	380	67%
CHEM 120	F 2016	4.4	422	55%
CHEM 450/750	W 2016	4.6	26	81%
CHEM 120	F 2015	4.1	317	58%
CHEM 120	F 2014	3.9	284	51%

\* Owing to online delivery all lectures were prepared by Laura Ingram as videos she recorded the previous year. I contributed with answering student questions in Piazza, providing material for midterms and the final exam, and delivering three review sessions.

### SUPERVISION OF PERSONNEL

#### CO-SUPERVISORY ACTIVITIES AT MAX PLANCK AND UNIVERSITY OF TORONTO

Team member	PI's Role	Degree	Period	Current status
Gastón Corthey	Co-Supervisor	PDF	Oct 2012 – Dec 2013	PDF at Max Planck, Hamburg.

## CURRICULUM VITAE – GERMÁN SCIAINI

				Humboldt fellow moving on as an independent researcher to be part of the Research Council, Argentina.
Khalid Siddiqui	Co-Supervisor	PhD	Oct 2012 – Dec 2013	He is finalizing his PhD degree at Max Planck, Hamburg.
Kostyantyn Pichugin	Co-Supervisor	PDF	Oct 2011 – Dec 2013	He is currently a Research Associate at UeIL (see table above).
Dongfang Zhang	Co-Supervisor	PhD	Oct 2011 – Dec 2013	PDF at Max Planck, Hamburg.
Lai Chung Liu	Co-Supervisor	PhD	Sep 2010 – Apr 2013	He is finalizing his PhD degree at the University of Toronto.
Meng Gao	Co-Supervisor	PhD	Sep 2008 – Apr 2013	Data Scientist - Machine Learning at Yelp (Pilot AI Labs, Computer Software), San Francisco Bay Area.
Hubert Jean-Ruel	Co-Supervisor	PhD	Sep 2007 – Apr 2013	Postdoctoral Research Fellow (Mitacs accelerate) at Carleton University and Spartan Bioscience.
Daniel Elliott	Co-Supervisor	MSc	Nov 2006 – Aug 2008	Research Associate at the University of Basel, Switzerland.
Matthew Badali	Co-Supervisor	UG	Jun 2010 – Sep 2010	PhD student at the University of Toronto.
Andrew Fox	Co-Supervisor	UG	Apr 2009 – Aug 2009	PhD student, Carnegie Mellon University.
Nachum Plonka	Co-Supervisor	UG	Sep 2008 – Jun 2009	Data Scientist at Quantifind, San Francisco Bay Area.

### SUPERVISORY ACTIVITIES AT THE UNIVERSITY OF WATERLOO

#### Postdoctoral fellows and research associates

Name	Period	Position
Kostyantyn Pichugin	Jan 2014 – Present	Research Associate (co-supervised with A. W. Tsen since Jan 2022).
Ariel A. Petruk	Jun 2014 – Present	Postdoctoral Fellow
Nicolás Rivas	Jul 2016 – Oct 2020	Current position: Research Engineer, McMaster University.



Kristina Lekin	Sep 2015 – May 2017	Postdoctoral Fellow (co-supervised with Prof. Oakley) Current position: Materials and NanoScience Instructor, University of Waterloo
----------------	---------------------	---

**Ph.D. students**

Name	Period	Title of Research Project
Ruofei Zheng	Joining Sep 2022	Hyperspectral CL applied to the spectroscopic study of materials and bioimaging with nm-resolution (direct entrance to PhD)
Sam Netzke	Jan 2021 – Present	Ultrafast structural dynamics in 2D materials.
Tyler Lott	Sep 2019 – Present	High-resolution liquid-phase electron microscopy.
Meixin Cheng	Sep 2018 – Present	Ultrafast dynamics of valley-based <i>qubits</i> .
*Nicolás Rivas	Jan 2015 – Oct 2015	Visiting student, University of Buenos Aires, supported by Emerging Leaders in the Americas Program (ELAP) Current position: Research Engineer, McMaster University, Hamilton.

**M.Sc. students**

Name	Period	Title of Research Project
Nicolette Shaw	Joining May 2022	Inpainting techniques in liquid-phase electron microscopy.
Fabian Thiemann	Aug 2019 – Present	Visiting MSc student from Duisburg-Essen, Germany. He is working on a joint project with Michael Horn von Hoegen's team.
Patrick Gicala	Sep 2018 – Present	Carrier dynamics in hematite thin films and bulk crystals*
Tyler Lott	May 2018 – Sept 2019	Direct transfer to the PhD program (see above)
Meixin Cheng	Sep 2017 – Sep 2018	Direct transfer to the PhD program (see above)
Caroline R. Allen	Apr 2015 – Aug 2017	Design and fabrication of a nanofluidic cell system for high-resolution electron microscopy of in-liquid samples. Current position: TEM analyst, EMSL Analytical Labs, Mississauga, Canada

\* MSc defence delayed.

**Technicians**

<b>Name</b>	<b>Period</b>	<b>Position</b>
Teruaki Aoyagi	Jul 2016 – Aug 2017	Technician, supported by Hitachi High Technologies Canada and Japan

**B.Sc. Honors Thesis**

<b>Name</b>	<b>Year</b>
Sara Early	2021 – 2022 (Chemical Physics/Astro Physics)
Cengan Wang	2020 – 2021 (Chemistry)
Longfei Song	2020 – 2021 (Chemistry)
Maryam Ali	2020 – 2021 (Chemistry)
Shifeng Hong	2020 – 2021 (Materials and Nanosciences)
Yilin Yin	2020 – 2021 (Chemistry)
Yufei Li	2020 – 2021 (Chemistry)
Steven Ngo	2018 – 2019 (Chemistry)
Eric Haugen	2018 – 2019 (Chemistry)
Tyler Lott	2017 – 2018 (Chemistry)
Qihao Liu	2017 – 2018 (Nano Engineering)
Arnav Hasija	2017 – 2018 (Nano Engineering)
Spiro Bregu	2017 – 2018 (Nano Engineering)
Jiafeng Wu	2017 (Chemistry)
Justin Burgess	2016 – 2017 (Chemistry)
Philip Myatt	2016 – 2017 (Chemistry)
Michael Sadkowski	2016 – 2017 (Chemistry)

**Undergraduates**

<b>Name</b>	<b>Period</b>	<b>Position</b>
-------------	---------------	-----------------

Nicolette Shaw	Jan 2021 – Sep 2021	Co-op undergraduate student. NSERC-USRA.
Alyssa Oke	May 2019 – Sep 2019	Summer undergraduate student
Christine Johnston	May 2019 – Sep 2019	Summer undergraduate student
Christine Johnston	May 2018 – Sep 2018	Summer undergraduate student
Peiliang Guo	Jan 2018 – April 2018	Presidential scholar, undergraduate, Mechatronics Engineering
Eric Haugen	May 2017 – Sep 2017	NSERC-USRA
Aly Hassan	May 2016 – Dec 2017	Undergraduate, Nano Engineering
Nowwar Alzatmah	Jan 2016 – May 2016	Co-op undergraduate student
Afreen Ahmed	Jan 2016 – May 2016	Co-op undergraduate student
Nicolas Castro-Folker	May 2016 – Sep 2016	NSERC-USRA
Anson Lau	May 2016 – Sep 2016	Undergraduate Nano Engineering
Nicolas Castro-Folker	May 2015 – Sep 2015	NSERC-USRA
Qihao Liu	Jan 2015 – Sep 2015	NSERC-USRA

**NSERC Summer Fellowships for Undergraduates:** Supervised 4 NSERC-USRA students (5 fellowships awarded in total).

## SERVICE

### Committees

#### *University*

2019 – Present, UW Lab Safety Committee, as laser expert (I replaced Donna Strickland)

2019 – Present, PhD Advisory Committee, Zimin She (Mike Pope, Chemical Engineering)

2017 – Present, UW Faculty of Science Foundation, Board of Directors (Chemistry representative)

2017 – 2020, PhD Advisory Committee and thesis examiner, Karim Amin (Prof. Catherine Gebotys, ECE).

**Faculty**

- 2021/07 – Present, PhD advisory committee (Mingjian (Peter) Lyu; Strickland's group)
- 2020/05 – 2021/07, MSc advisory committee (Mingjian (Peter) Lyu; Strickland's group)
- 2017/04, MSc thesis defense, Mark Hamilton (Biology), Chair.
- 2016/12, MSc thesis defense, Daina Anderson (Biology), Chair.
- 2016/08, MSc thesis defense, Jaclyn Brush (Biology), Chair.
- 2015/12, MSc thesis defense, Brayden Mc Neill (Earth and Environmental Sciences), Chair.
- 2015/11, MSc thesis defense, Jessica Mendoza (Biology), Chair.
- 2015/08, MSc thesis defense, Yurui Wu (Physics), Chair.
- 2015/04, MSc thesis defense, Ziyi Sun (Chemistry), Chair.
- 2015/01, MSc thesis defense, Sana Louie (Earth and Environmental Sciences), Chair.
- 2014/09, MSc thesis defense, Janet Lorv (Biology), Chair.

**Department**

- 2021 – Present, Merit committee member.
- 2020 – Present, PhD advisory committee (Aaron Kenny-Wilby; Radovanovic's group).
- 2020 – Present, PhD advisory committee (Khue (Louis) Nguyen; Radovanovic's group).
- 2020 – Present, PhD advisory committee (Mike Lecours, Nooijen's/Hopkins' groups).
- 2020 – Present, PhD advisory committee (Fangzhou Yin, Tsen's group).
- 2020 – Present, PhD advisory committee (Nour Mashmoushi; Hopkins' group group).
- 2019 – 2020, MSc advisory committee (Fangzhou Yin, Tsen's group).
- 2019 – 2020, MSc advisory committee (Nour Mashmoushi; Hopkins' group group).
- 2019 – Present, PhD advisory committee (I-Hsuan Yeh; Radovanovic's group).
- 2019 – Present, PhD advisory committee (Wenyu Gao; Leung's group).
- 2019 – Present, MSc advisory committee (Milaan Thirukumaran; Pawliszyn's group).
- 2018 – 2019, Executive committee member.
- 2018 – 2020, MSc advisory committee and report examiner (Nathaniel Smith, Radovanovic's group).
- 2018 – Present, PhD advisory committee (Dan Rickert; Pawliszyn's group).

2018 – Present, PhD advisory committee (Tarun Patel; Tsen's group).

2018 – Present, PhD advisory committee (Emir Nazdrajic, Pawliszyn group).

2015 – Present, health and safety committee, member.

2017 – 2020, PhD advisory committee and thesis examiner (Weiqiang Fu; Hopkins' group).

2017, PhD thesis examiner (Vahid Goshi; Radovanovic's group), examiner.

2016 – 2019, PhD advisory committee and thesis examiner (Parisa Jafarzadeh; Kleinke's group).

2016 – 2020, PhD advisory committee and thesis examiner (Terry Yin, Radovanovic's group).

2016 – 2020, PhD advisory committee (Erika Ramos, Nazar's group).

2016 – 2018, MSc advisory committee (Yunyan Wang; Radovanovic's group).

2014 – 2017, PhD advisory committee and thesis examiner (Prateek Goel; Nooijen's group).

2015 – 2018, MSc advisory committee and thesis examiner (Johnny Steffen; Nooijen's/Hopkins' groups).

2015 – 2017, MSc advisory committee and thesis examiner (Siyuan Wu; Nooijen's group).

2014 – 2019, PhD advisory committee and thesis examiner (Patrick Carr, Hopkins' group).

2014 – 2016, MSc advisory committee (Jingfei Yao, Nooijen's/Hopkins' groups).

### ***Related Community Service***

2019, University of Waterloo Science Open House (open to the public). Developed and delivered a show with team members Nicolás Rivas and Tyler Lott. The name of our show was "magic lights". We illustrated some tricks involving a strobe flash and a fast-moving fan. Event hosted in University of Waterloo (Saturday October 26).

2019 – Present *Donna Strickland's UW Photonics Centre*. I'm involved in the planning of ultrafast laser labs with Donna Strickland, Joe Sanderson, Scott Hopkins, and Shirley Tang.

2016 – Present *UW Symposium on Chemical Physics*; this is an annual symposium that brings to Waterloo faculty members and students from all across Canada in addition to international participation from USA and Europe) to Waterloo. Role: I took over the role of Robert Le Roy as the main organizer (secretary) of this event. I also usually act as session Chair.

2019, Let's Talk Science, University of Waterloo. Participated as a judge in the Quiz Show. This event includes an exciting question and answer competition and a fun, hands-on design challenge that inspires students to acquire science, technology, engineering and math (STEM) knowledge beyond their curriculum. We hosted about 250 students from 20 local schools. Challenge competitions are held at 23 university and college campuses across Canada in 2019, and the Waterloo event is one of the largest (April 24).

2019, Chemistry Outreach Talk. Delivered a talk with a demonstration to 60 grade 11 and grade 12 students (April 8).

2018, Chemistry Outreach Talk. Delivered a talk with a demonstration to 60 grade 11 and grade 12 students (December 12).

2018, University of Waterloo Science Open House (open to the public). Developed and delivered a show with team members Nicolás Rivas and Tyler Lott. The name of our show was “magic lights”. We illustrated some tricks involving a strobe flash and a fast-moving fan. Event hosted in University of Waterloo (Saturday October 27). The event made it in Kitchener CTV News (<https://kitchener.ctvnews.ca/uw-students-use-fun-to-teach-young-scientists-1.4152429>).

2018, Let's Talk Science, University of Waterloo. Participated as a judge in the Quiz Show. This event includes an exciting question and answer competition and a fun, hands-on design challenge that inspires students to acquire science, technology, engineering and math (STEM) knowledge beyond their curriculum. We hosted about 250 students from 20 local schools. Challenge competitions are held at 23 university and college campuses across Canada in 2018, and the Waterloo event is one of the largest (April 25).

2017, Open doors event: Present your research to the public. Delivered a talk to the public (Sept. 16).

2017, Nanotechnology and Society: Interdisciplinary research. Science – Art Mixer organized by WIN. Delivered a 15 min talk (Oct. 30).

## PROFESSIONAL ACTIVITIES

### Society Memberships and Positions Held

Canadian Society of Chemistry

Argentinean Society for Physical Chemistry

### Refereeing

Current rate > 10 journals articles/year.

Referee of manuscripts submitted for publication to: *Phys. Rev. Lett*, *Appl. Phys. Lett.*, *J. Chem. Phys.*, *J. Phys. Chem.*, *J. Mod. Opt.*, *Acta Cryst.*, *New J Phys.*, *Struct. Dyn.*, *Sci. Rep.*, *Nat. Commun.*, *Commun. Phys.*, *Appl. Phys. Lett.*, *Microscopy & Microanalysis*, etc.

2015 Reviewer of book proposal: *Dynamic Processes in Crystals*, Eds. Paul R Raithby, Jeppe Christensen, and Lynne H. Thomas, WILEY, UK.

### Grant Applications

2022 Reviewer of 3 NSERC-DG applications (Chemistry).

2021 Reviewer of 1 NSERC-DG application (Chemistry).

2020 Reviewer of 1 Department of Energy (DOE) grant application.

2020 Reviewer of 1 NSERC-I2I application (Electronic Engineering).

2019 Reviewer of 1 NSERC-DG application (Physics).

2018 Reviewer of 1 NSERC-I2I application (Physics).

2018 Reviewer of 2 NSERC-DG applications (1 in Physics and 1 in Chemistry).

2018 Reviewer of proposal submitted to the Department of Energy (DOE), Office of Science, USA.

2016 Reviewer of proposal submitted to the New University Researchers Start Up Program from Fonds de recherche du Québec – Nature et technologies.

2016 Reviewer of grant submitted to American Chemical Society Petroleum Research Fund (ACS PRF), USA.

2015 Reviewer of proposal submitted to the Department of Energy (DOE), Office of Science, USA.

**External Thesis Examiner**

**Ph.D. theses**

2019 Isabel González Vallejo

Thesis title: Study of the structural dynamics of phase transitions using time resolved electron and X-ray diffraction. Thèse de doctorat de l'Université Paris-Saclay préparée à l'Université Paris-Sud et l'École nationale supérieure de techniques avancées. Supervisor: Jerome Faure.