Giulio Vampa, Ph.D.

National Research Council of Canada 100 Sussex drive Ottawa, ON K1N 0R6, Canada	Email Web presence h-index	gvampa@uottawa.ca Google Scholar, LinkedIn 20 (since 2018)

EMPLOYMENT

Research Officer, National Research Council of Canada, Ottawa, Canada 9/2020 – present
Adjunct Professor, Department of Physics, University of Ottawa, Canada 9/2020 – present
Fellow, Joint Center for Extreme Photonics, Ottawa, Canada 9/2020 - present

EDUCATION

Stanford PULSE Institute, Menlo Park, CA 11/2016 – 7/2020

- Post-doctoral fellow, advisor: David Reis

- Nanoscale sources of high harmonics
- High harmonic generation at interfaces
- Awards: W. M. Keck Foundation ($1M/3 years, proposal I co-wrote with David Reis).

University of Ottawa, Ottawa, Canada 2011 – 05/2016

- Graduate research with Paul Corkum (co-supervised by Thomas Brabec)
- *Ph.D., Physics* (finalist of the Carl E. Anderson Division of Laser Science Dissertation Award competition, American Physical Society).

Thesis: "Role of electron-hole recollisions in high harmonic generation from bulk crystals"

- Fundamentals of high harmonic generation from solids.
- High harmonic generation from micro- and nano-structured semiconductors
- Plasmonic enhancement for high harmonics
- Generation and characterization of few-cycle phase-stable infrared pulses from an Optical Parametric Amplifier for generation of isolated attosecond pulses.
- Amplification of broadband and widely tunable infrared pulses by Kerr instabilities for applications of strong-field physics in solids.

Universita' degli Study di Trieste, Trieste, Italy 2004 – 2010

- Undergraduate research with Fulvio Parmigiani
- *M.Sc., Solid State Physics* (Graduated *Summa cum Laude*) – Sept. 2010
- *B. Sc., Physics* – July 2008

M.Sc. Thesis: "Towards the observation of ultrafast demagnetization by high harmonic generated ultraviolet coherent pulses"
B.Sc. Thesis: "Generation of light pulses in the extreme ultraviolet (30-60 nm)"

- Magnetic dichroism on Fe and Ni M-edges with a high harmonic source.
- Infrared photoluminescence from quantum wells.
- X-Ray Photoemission spectroscopy, Low Energy Electron Diffraction.

PUBLICATIONS (h-index = 20, 3326 citations since 2018 – Google Scholar)	
2023	• **Nature Communications**, accepted – "Orbital perspective on high-harmonic generation from solids", A. J. Galan, C. Bossaer, G. Ernotte, A. Parks, R. E. F. Silva, D. Villeneuve, A. Staudte, T. Brabec, A. Luican-Mayer, G. Vampa. • **Phys. Rev. A** 108, L051103 – "Microscopic mechanism of high-order wavemixing in solids", D. N. Purschke, A. Jimenez-Galan, T. Brabec, A. Y. Naumov, A. Staudte, D. M. Villeneuve, G. Vampa. • **Optica** 10(5), 642-649 – "In situ high-harmonic microscopy of a nanostructured solid", A. Korobenko, S. Rashid, A. Y. Naumov, D. M. Villeneuve, D. A. Reis, P. Berini, P. B. Corkum, G. Vampa. • **Laser & Photonics Reviews**, 2300448 – "Spectroscopic signatures of plasmonic near-fields on high-harmonic emission", S. A. Jalil, K. M. Awan, J. Bazxter, G. Bart, D. N. Purschke, T. Fennel, D. M. Villeneuve, A. Staudte, P. Berini, T. Brabec, L. Ramunno, G. Vampa.
2022	• **Phys. Rev. X** 12, 041036 – "In-situ nanoscale focusing of extreme ultraviolet solid-state high harmonics", A. Korobenko, S. Rashid, C. Heide, A. Yu Naumov, D. A. Reis, P. Berini, P. B. Corkum, G. Vampa. • **Optica** 9, 987-991 – "Controlling the polarization and phase of high-order harmonics with a plasmonic metasurface.", S. Jalil, K. M. Awan, I. A. Ali, S. Rashid, J. Baxter, A. Korobenko, G. Ernotte, A. Anumov, D. M. Villeneuve, A. Staudte, P. Berini, L. Ramunno, G. Vampa. • **Phys. Rev. A.** 106.1, 013106 – "Disentangling interferences in the photoelectron momentum distribution from strong-field ionization.", T. Wang, Z. Dube, Y. Mi, G. Vampa, D. M. Villeneuve, P. B. Corkum, X. Liu and A. Staudte.
2021	• **Optics Express** 29, 24161-24168 – "Generation of structured coherent extreme ultraviolet beams from an MgO crystal", A. Korobenko, S. Rashid, C. Heide, A. Naumov, D. A. Reis, P. Berini, P. Corkum, G. Vampa.
2020	• **Comm. Phys.** 3, 1-6 – "Beating absorption in solid-state high harmonics", H. Liu, G. Vampa, J. L. Zhang, Y. Shi, S. Buddhiraju, S. Fan, J. Vuckovic, P. H. Bucksbaum, D. A. Reis. • **J. Phys. B: At. Mol. And Opt. Physics** – "Attosecond synchronization of extreme ultraviolet high harmonics from crystals", G. Vampa, J. Liu, Y. S. You, D. Baykusheva, M. Wu, H. Liu, K. Schafer, M. Gaarde, D. A. Reis and S. Ghimire.
2019	• **Physics Reports** 833, 1-52 – "Saddle point approaches in strong field physics and generation of attosecond pulses", A Nayak et al. • **Optica** 6, 553-556 – "Disentangling interface and bulk contributions to high-harmonic emission from solids", G. Vampa, H. Liu, T. F. Heinz, D. A. Reis. • **Optics Letters** 44, 259-262 – "Characterization of high-harmonic emission from ZnO up to 11 eV pumped with a Cr: ZnS high-repetition-rate source", G. Vampa, S. Vasilyev, H. Liu, M. Mirov, P. H. Bucksbaum, D. A. Reis.
2018	• **Journal of Optics** 20, 110201 – "Emerging attosecond technologies", J. Mauritsson, G. Vampa, C. Vozzi. • **Nature Physics** 14, 1006-1010 – "Enhanced high-harmonic generation from an all-dielectric metasurface", H. Liu, C. Guo, G. Vampa, J. L. Zhang, T. Sarmiento, M. Xiao, P. H. Bucksbaum, J. Vuckovic, S. Fan, D. A. Reis. • **Nature Photonics** 12, 465-468 – "Strong-field optoelectronics in solids" - G. Vampa, T. J. Hammond, M. Taucer, X. Ding, X. Ropagnol, T. Ozaki, S. Delprat, M. Chaker, N. Thire, B. Schmidt, F. Legare, D. D. Klug, A. Yu Naumov, D. M. Villeneuve, A. Staudte, P. B. Corkum. • **Optics Express** 26, 12210 – "Observation of backward high-harmonic emission from solids", G. Vampa, Y. S. You, H. Liu, S. Ghimire, D. A. Reis. • **Optica** 5, 271-278 – "Theory of Kerr instability amplification", M. Nesrallah, G. Vampa, G. Bart, P. B. Corkum, C. R. McDonald, T. Brabec. • **Science** 359, 673-675 – "Light amplification by seeded Kerr instability", G. Vampa, T. J. Hammond, M. Nesrellah, T. Brabec, P. B. Corkum.
2017	• **Nature Photonics** 11, 594 – "Integrating solids and gases for attosecond pulse generation", TJ Hammond, S. Monchoce, C. Zhang, G. Vampa, D. D. Klug, A. Yu Naumov, D. M. Villeneuve, P. B.

	Corkum. • **Science** 357, 303-306 – "Tailored semiconductors as building blocks for high-harmonic optoelectronics", M. Sivis, M. Taucer, G. Vampa, K. Johnston, A. Staudte, A. Yu Naumov, D. M. Villeneuve, C. Ropers, P. B. Corkum. • **Phys. Rev. B** 96, 195420 –"Non-perturbative harmonic generation in graphene from intense mid-infrared pulsed light", M. Taucer, T. J. Hammond, C. A. Couture, N. Thire, B. Schmidt, H. Selvi, N. Unsuree, B. Hamilton, T. J. Echtermeyer, F. Legare, M. A. Denecke, P. B. Corkum, G. Vampa. • **Phys. Rev. Lett**., 118, 173601 – "Intense laser solid state physics – unraveling the difference between semiconductors and dielectrics", C. R. McDonald, G. Vampa, P. B. Corkum, T. Brabec. • **Nature Photonics** 11, 210-212 – "Nonlinear optics: attosecond nanophotonics", G. Vampa, H. Fattahi, J. Vuckovic, F. Krausz. • **Nature Physics** – "Plasmon-enhanced high-harmonic generation from silicon", G. Vampa, B. G. Ghamsari, S. Siadat Mousavi, T. J. Hammond, A. Olivieri, E. Lisicka-Skrek, A. Yu Naumov, D. M. Villeneuve, A. Staudte, P. Berini and P. B. Corkum (advanced online publication) • **Optics Letters** 42, 1113-1116 – "Harmonic generation in solids with direct fiber laser pumping", K. Lee, X. Ding, T. J. Hammond, M. E. Ferman, G. Vampa, P. B. Corkum • (*invited*) **J. Phys. B: At. Mol. And Opt. Physics** 50, 083001 – "Merge of high harmonic generation from gases and solids and its implications for attosecond science", G. Vampa and T. Brabec.
2015	• **Phys. Rev. Lett.** 115, 193603 – "All-optical reconstruction of crystal band structure", G. Vampa, T. J. Hammond, N. Thiré, B. E. Schmidt, F. Légaré, C. R. McDonald, T. Brabec and P. B. Corkum. • **Phys. Rev. A** 92.3, 033845 – "Interband Bloch oscillation mechanism for high-harmonic generation in semiconductor crystals", C. R. McDonald, G. Vampa, P. B. Corkum and T. Brabec. • **Nature Physics** 11.7, 529-530 – "High-harmonic generation: To the extreme", G. Vampa and D. M. Villeneuve. • **Nature** 522, 462-464 – "Linking high harmonics from gases and solids", G. Vampa, T. J. Hammond, N. Thiré, B. E. Schmidt, F. Légaré, C. R. McDonald, T. Brabec and P. B. Corkum • *(invited)* **IEEE Journal of Selected Topics in Quantum Electronics**, 21.5, 1-10 – "High-Harmonic Generation in Solids: Bridging the Gap Between Attosecond Science and Condensed Matter Physics", G. Vampa, C. McDonald, A. Fraser and T. Brabec. • **J. Phys. B: At. Mol. Opt. Phys.** 48, 061001 – "Attosecond lighthouse driven by sub-two-cycle 1.8um laser pulses", C. Zhang, G. Vampa, D. Villeneuve and P. B. Corkum • **Phys. Rev. B** 91.6, 064302 – "Semiclassical analysis of high harmonic generation in bulk crystals", G. Vampa, C. R. McDonald, G. Orlando, P. B. Corkum and T. Brabec.
2014	• **Phys. Rev. Lett**. 113, 073901 – "Theoretical analysis of high-harmonic generation in solids", G. Vampa, C.R. McDonald, G. Orlando, D. D. Klug, P. B. Corkum and T. Brabec • **J. Phys. B** 47, 204002 – "Tunnelling time, what does it mean?", G. Orlando, C. R. McDonald, N. H. Protik, G. Vampa and T. Brabec
2013	• **Phys. Rev. Lett**. 111, 090405 – "Tunnel ionization dynamics of bound systems in laser fields: how long does it take for a bound electron to tunnel?", C. R. McDonald, G. Orlando, G. Vampa and T. Brabec

INVITED TALKS

• Advanced Laser Light Source workshop, Quebec	September 2023
• Canadian Banknote Company, Ottawa	May 2023
• Nexus for Quantum Technologies, University of Ottawa	October 2023
• OASIS 8, Tel-Aviv (IL)	September 2022
• OPTICA incubator on "high-field nanophotonics", Organizer & chair	July 2022
• ATTO conference, Orlando (USA)	July 2022
• KPS Fall meeting, Korea (virtual)	October 2021
• Max Planck-uOttawa yearly symposium (virtual)	October 2021
	September 2021

- COST Action Atto-chem conference (virtual) 8-11 March 2021
- Winter school for attosecond technologies, SmartX project (virtual) 22-23 March 2021
- ALLS users workshop (virtual) 28 Sept – 3 Oct 2020
- META conference, New York (USA) Oct 2020
- Schawlow-Townes symposium, Ottawa (Canada) 7-10 January 2020
- 50th Physics of Quantum Electronics (PQE), Snowbird (USA) 1 October 2019
- IEEE Photonics Conference, San Antonio (USA) 10 July 2019
- Attosecond science and Extreme Photonics, ICFO Schools on the frontiers of light, Casteldefels (Spain) 31 May 2019
- APS DAMOP, Milwaukee (USA) 2 November 2018
- International workshop on Attosecond physics at the nanoscale, Institute of Basic Science, Daejeon (Korea) 5-8 June 2018
- Photonics North, Montreal (Canada) 5-9 March 2018
- Symposium on 25 years of recollision physics, DPG Spring meeting, Erlangen (Germany) 28 February 2017
- QUTIF meeting, Dresden (Germany) 15 November 2016
- Annual Attosecond MURI grant Meeting, Tucson, Arizona (USA) 20 October 2016
- Frontiers In Optics 2016, Rochester (USA) 18 October 2016
- Carl E. Anderson for Outstanding Doctoral Dissertation Award final competition, Frontiers In Optics & Laser Science, Rochester (USA) 5-10 June 2016
- Cleo Conference, San Jose, California (USA) 25 May 2016
- Photonics North, Quebec city, Quebec (Canada) 17-21 April 2016
- SPIE Bandgap Photonics conference, Baltimore, Maryland (USA) 20-22 March 2016
- High Intensity Lasers and High Field Phenomena (HILAS) conference, Long Beach, California (USA) 24 January 2016
- McGill university, Montréal, Québec (Canada) 6 October 2015
- annual meeting of University of Ottawa Max Planck center for extreme and quantum photonics, Ottawa, Ontario (Canada) 18 August 2015
- UltraFastOptics X conference, Beijing (China) June 2015
- Advanced Laser Light Source (ALLS) users workshop, Mt. Saint-Sauveur, Québec (Canada) 18 November 2014
- MURI Kick-off meeting, Berkeley, California (USA) 4 November 2014
- SFPUP conference, Zhangjiajie (China) 27 June 2014
- Extreme Photonics summer school, Ottawa, Ontario (Canada)

INTELLECTUAL PROPERTY

US 2016/9496681, "Apparatus and method for tunable generation of coherent radiation"
US 2017/9746748, "Generation of high harmonics from silicon"
US 2018/10107846, "Apparatus and method for strong-field probing of electric fields in solid-state electronic circuits"

AWARDS AND HONORS

- OPTICA award to the "Short Wavelength Sources and attosecond/high-field physics" technical group, during my tenure as chair. 2022
- Honorable mention – Bernard J. Couillaud prize, The Optical Society (OSA) 2019

2016

- **Finalist of Carl E. Anderson Division of Laser Science Dissertation Award competition, APS**

AFFILIATION TO PROFESSIONAL SOCIETIES AND RELATED ACTIVITIES

- The Optical Society (OSA) 2011 – present
- American Physical Society 2016 – present
- OSA Technical group on "Short wavelength sources and attosecond/high field physics",
  Chair 2019 – 2022
  Executive Board member 2015 – 2018
- Ottawa-Carleton OSA Student chapter, *President* 2011 – 2016

SUPERVISION AND TRAINING

Vedran Jelic (PDF)	Nov 2023 - present
Samuel Lemieux (PDF)	May 2023 - present
Sohail Jalil (PDF)	Sept 2020 – present
David Purschke (PDF)	Sept 2021 – present
Alvaro Jimenez Galan (PDF)	Sept 2021 – 2023
Laurent David (undergraduate)	
Michael Weil (undergraduate)	
Saadat Mokhtari (PhD)	Sept 2020 – present
Chandler Bossaer (PhD)	Sept 2020 – present
Parnia Bastani (PhD)	Sept 2022 – present
Idriss Amadou Ali (coop)	Jan 2021 – Sept 2021
Aleksey Korobenko (co-supervision, PDF)	Sept 2020 – Nov 2023
Jason McLaurin (coop)	Jan 2021 – Sept 2022
Sebastian Pachon Quesada (coop)	May 2022 – Sept 2022

INTERVIEWS & MEDIA COVERAGE

"Strong IR laser fields for measuring the band structure of solids", SPIE Newsroom	31 August 2016
"All-optical reconstruction of crystal band structure", 2Physics	3 January 2016
"All-optical technique shines light on electronic band structure", Physics World	18 November 2015

"Synopsis: light sees electronic bands", APS Physics 5 November 2015