

Giulio Vampa, Ph.D.

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17 (since 2016)

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 (N = 29, 2116 citations since 2016 – Google Scholar)

- 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** – “Saddle point approaches in strong field physics and generation of attosecond pulses”.
 - **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. Nesrallah, T. Brabec, P. B. Corkum.
- 2017**
- **Nature Photonics** 11, 594 – “Integrating solids and gases for attosecond pulse generation”, T. J. 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. Sivi, 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.

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- **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

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

- Extreme Photonics summer school, Ottawa, Ontario (Canada)

27 June 2014

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"

KNOWLEDGE & TECHNOLOGY TRANSFER

R&D collaboration with industry. Outcome: development of nanofocused extreme-ultraviolet. 8/2020 - ongoing

AWARDS AND HONORS

- Honorable mention – Bernard J. Couillaud prize, The Optical Society (OSA) 2019
- **Finalist of Carl E. Anderson Division of Laser Science Dissertation Award competition, American Physical Society 2016**

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-present
- *Executive Board member* 2015 – 2018
- 2011 – 2016
- Ottawa-Carleton OSA Student chapter, *President*

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