

HAIM SUCHOWSKI

CURRICULUM VITAE

PERSONAL DETAILS

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RESEARCH POSITIONS

2014 – Today **Senior Lecturer (Assistant Professor)**

Tel Aviv University

Leading the Ultrafast Nano-optics and Metamaterial group.

2011 – 2014 **Post-doctoral fellow**

University of California at Berkeley

Nonlinear optical interactions with nano-structures. Advisor: Prof. X. Zhang.

2003 – 2004 **Custom circuit design**

IBM Research Lab, Tel Aviv

Physical circuit custom design for Giga speed electronic devices.

EDUCATION

2006 – 2010 **Weizmann Institute of Science**

Ph.D. in Physics

Dissertation – “Spatio-temporal coherent control of nonlinear light matter interactions”. Advisor: Prof. Y. Silberberg.

2004 – 2006 **Weizmann Institute of Science**

M.Sc. in Physics

Thesis – “Generation of nonlinear dark focus”. Advisor: Prof. Y. Silberberg

2000 – 2004 **Tel Aviv University – Dual degree program**

B.Sc. in Physics - Graduated Magna Cum Laude.

B.Sc. in Electrical Engineering - Graduated Magna Cum Laude.

WORK EXPERIENCE

2000 – 2003 **BVR Technologies** *Requirement engineering and algorithmic developer*

Planning and Supervision on certain simulator models and algorithms.

1995 – 2000 **Israeli Air Force** *Active jet navigator*

Served in F-16 squadron, participating and supervising routine defense activities.

Also, served as a Flight instructor and course commander in ‘Flying Academic School’, coordinating and supervising 25 instructors and cadets.

Current status – reserved duty. Current rank – Major.

1993 – 1995 **Israeli Air Force** *Flying Academic School*

AWARDS & MAJOR GRANTS

- ERC-StG Grant for 2014 - 2019.
- BSF Young Investigator Grant for 2015 - 2017.
- Alon young investigator fellowship by the Israeli minister of Science for 2014 - 2017.
- Postdoctoral Fulbright-ISEF Fellowship for 2011 - 2012.
- The Azrieli foundation scholarship for outstanding PhD students 2007 - 2010.
- Tel Aviv University President's award for students performing outstanding volunteer work for 2003.
- Dean excellence awards in Physics and in Electrical Engineering faculties for 2001 - 2002.
- Dean excellence awards in Physics and in Electrical Engineering faculties for 2000 - 2001.

JOURNAL PUBLICATIONS

1. M. Mrejen*, H. Suchowski*, T. Hatakeyama, C. Wu, L. Feng, K. O'Brien, Y. Wang, X. Zhang, "Adiabatic elimination based coupling control in densely packed subwavelength waveguides", Nat. Comm. 6, 7565 (2015).
2. K. O'Brien*, H. Suchowski*, J. Rho, B. Kante, A. Salandrino, X. Yin, X. Zhang, "Predicting nonlinear properties of metamaterials from the linear response", Nat. Mat. 14, 379 (2015).
3. H. Suchowski*, G. Porat*, A. Arie, "Adiabatic processes in frequency conversion", Laser and Photonics Reviews, 8, 333 (2014).
4. E. Svetitsky*, H. Suchowski*, R. Resh, Y. Shalibo, J. M. Martinis, N. Katz, "Hidden two-qubit dynamics of a four-level Josephson circuit", Nat. Comm. 5, 6617 (2014).
5. K. O'Brien, N. D. L. Kimura, J. S. Rho, H. Suchowski, X. Yin, X. Zhang, "Ultrafast acousto-plasmonic control and sensing in complex nanostructures", Nat. Comm. 5, 5042 (2014).
6. H. Cankaya, A. L. Calendron, H. Suchowski, F. X. Kärtner, "Highly efficient broadband sum-frequency generation in the visible wavelength range", Opt. Lett. 39, 2912 (2014).
7. H. Suchowski*, K. O'Brien*, Z. J. Wong*, A. Salandrino, X. Yin, X. Zhang, "Phase-mismatch free nonlinear propagation in zero-index optical materials", Science 342, 1223 (2013).
8. H. Suchowski, P. Krogen, S. W. Huang, F. X. Kärtner, J. Moses, "Octave-spanning coherent mid-IR pulses via adiabatic difference frequency generation", Opt. Exp. 21, 28892 (2013).
9. J. Moses, H. Suchowski, F. X. Kärtner, "Fully efficient adiabatic frequency conversion of broadband Ti:sapphire oscillator pulses", Opt. Lett. 37, 1589 (2012).
10. G. Porat, Y. Silberberg, A. Arie, H. Suchowski, "Two photon frequency conversion", Opt. Exp. 20, 3613 (2012).
11. K. O'Brien, N. D. L. Kimura, H. Suchowski, B. Kante, Y. Park, X. Yin, X. Zhang, "Reflective interferometry for optical metamaterial phase measurements", Opt. Lett. 37, 4089 (2012).
12. M. Fridman*, H. Suchowski*, M. Nixon, A. A. Friesem, N. Davidson, "Modal dynamics in multimode fibers", J. Opt. Soc. Am. A 29, 541 (2012).
13. H. Suchowski, B. D. Bruner, A. G. Padowicz, I. Juwiler, A. Arie, Y. Silberberg, "Efficient upconversion of ultrafast pulses", App. Phys. B. 105, 697 (2011).
14. A. A. Rangelov*, H. Suchowski*, N. V. Vitanov, Y. Silberberg, "Wireless adiabatic power transfer", Annals of Physics 326, 3, 626 (2011).
15. H. Suchowski, Y. Silberberg, D. Uzkov, "Pythagorean coupling: Complete population transfer in four level system", Phys. Rev. A 84 1, 013414 (2011).

16. B. Bruner, H. Suchowski, N. Vitanov, Y. Silberberg, “Spatio-temporal coherent control of three level systems”, *Phys. Rev. A* 81, 063410 (2010).
17. G. Porat, H. Suchowski, Y. Silberberg, A. Arie “Robust up-converted optical parametric oscillator with intracavity adiabatic sum frequency generation”, *Opt. Lett.* 35, 1590 (2010).
18. H. Suchowski, B. D. Bruner, A. Arie, Y. Silberberg, “Broadband frequency conversion”, *Optics and Photonics News* 21, 10, 36 (2010).
19. T. Polack, H. Suchowski, D. Tannor, “Uncontrollable quantum systems: A classification scheme based on Lie subalgebras”, *Phys. Rev. A* 79, 053403 (2009).
20. H. Suchowski, V. Prabhudesai, D. Oron, A. Arie, Y. Silberberg, “Robust efficient sum frequency conversion”, *Opt. Exp.* 17, 12732 (2009).
21. H. Suchowski, D. Oron, A. Arie, Y. Silberberg, “Geometrical representation of sum frequency generation and adiabatic frequency conversion”, *Phys. Rev. A* 78, 063821 (2008).
22. H. Suchowski, A. Natan, B. D. Bruner, Y. Silberberg, “Spatio-temporal coherent control of atomic systems: weak to strong field transition and breaking of symmetry in 2D maps”, *J. Phys. B: At. Mol. Opt. Phys.* 41, 074008 (2008).
23. H. Suchowski, D. Oron, Y. Silberberg, “Generation of a dark nonlinear focus by spatio-temporal coherent control”, *Opt. Comm.* 264, 482 (2006).

PATENTS

- H. Suchowski, Y. Silberberg, “Efficient Broadband Optical Wavelength Converter”, No. WO/2009/118738 (2009).
- H. Suchowski, A. Rangelov, N. Vitanov, Y. Silberberg, “Efficient Robust Wireless Energy Transfer”, WO/2011/107995 (2011).
- H. Suchowski, M. Mrejen, C. Wu, Y. Wang, X. Zhang, “Adiabatic modulation device for densely integrated nano-photonics”, PCT (July 2015).

REFEREED CONFERENCE PROCEEDINGS

- P. Krogen, H. Suchowski, H. Liang,, F. Kärtner, J. Moses, “Toward Multi-Octave Pulse Shaping by Adiabatic Frequency Conversion”, Conference on Lasers and Electro-Optics (CLEO) 2015 paper: SW1O.3, San Jose, CA, USA.
- M. Mrejen, H. Suchowski, T. Hatakeyama, C. Wu, L. Feng, K O'Brien, Y. Wang, X. Zhang, “Sub-wavelength critical coupling for densely integrated nano-photonics”, Conference on Lasers and Electro-Optics (CLEO) 2015 paper: FTh4E. 6, San Jose, CA, USA.
- M. Mrejen, H. Suchowski, T. Hatakeyama, C. Wu, L. Feng, Y. Wang, X. Zhang, “Sub-wavelength critical coupling for densely integrated nano-photonics”, *Frontier in Optics (FiO)* 2014 paper: FM4A.4, Tucson, AR, USA.
- P. Krogen, H. Suchowski, G. J. Stein, F. Kärtner, J. Moses, “Tunable few-cycle mid-IR pulses towards single-cycle duration by adiabatic frequency conversion”, *International Conference on Ultrafast Phenomena (UP)* 2014 paper: 08.Tue.D.6, Okinawa, Japan.
- P. Krogen, H. Suchowski, G. J. Stein, F. Kärtner, J. Moses, “Tunable and near-Fourier-limited few-cycle mid-IR pulses via an adiabatically chirped difference frequency grating”, Conference on Lasers and Electro-Optics (CLEO) 2014 paper: SM3I5, San Jose, CA, USA.
- K. O'Brien, H. Suchowski, Z. J. Wong, X. Yin, X. Zhang, “Phase mismatch-free nonlinear propagation in optical zero-index materials”, Conference on Lasers and Electro-Optics (CLEO) 2014 paper: FTh4D2, San Jose, CA, USA.
- J. Moses, P. R. Krogen, S. W. Huang, F. X. Kärtner, H. Suchowski, “Octave-spanning coherent mid-IR pulses via adiabatic difference frequency generation”, *Nonlinear Optics Topical Meeting (NLO)* 2013 paper: NF1A.6, Kohala, Hawaii, USA.

- H. Suchowski, K. O'Brien, Z. J. Wong, X. Yin, X. Zhang, "Four Wave Mixing Propagation in Fishnet Metamaterials", Conference on Lasers and Electro-Optics (CLEO) 2013 paper: QM1A2, San Jose, CA, USA.
- H. Suchowski, P. R. Krogen, S. W. Huang, F. X. Kärtner, J. Moses, "Octave-spanning Coherent Mid-IR Generation via a Single Adiabatically Chirped Grating", Conference on Lasers and Electro-Optics (CLEO) 2013 paper: JM3K5, San Jose, CA, USA.
- K. O'Brien, H. Suchowski, J. S. Rho, A. Salandrino, B. Kante, X. Yin, X. Zhang, "Mode Matched Harmonic Generation in Plasmonic Nanostructures", Conference on Lasers and Electro-Optics (CLEO) 2013 paper: QTu2B, San Jose, CA, USA.
- J. Moses, F. X. Kärtner, H. Suchowski, "Fully efficient adiabatic frequency conversion of broadband Ti:sapphire oscillator pulses", Conference on Lasers and Electro-Optics (CLEO) 2012 paper: CTh3B, San Jose, USA.
- G. Porat, Y. Silberberg, A. Arie, H. Suchowski, "Two-photon frequency conversion", Conference on Lasers and Electro-Optics (CLEO) 2012 paper: CTh3B, San Jose, USA.
- B. Bruner, H. Suchowski, A. Gannany-Padowicz, I. Juwiler, A. Arie, Y. Silberberg, "Generation of ultrafast visible and mid-IR pulses via adiabatic frequency conversion", Advanced Solid-State Photonics (ASSP) 2011 paper: AMD6, Istanbul, Turkey.
- G. Porat, H. Suchowski, Y. Silberberg, A. Arie, "Tunable Intracavity up-Converted Optical Parametric Oscillator by Cascaded Adiabatic Sum Frequency Generation", Conference on Lasers and Electro-Optics (CLEO) 2010 paper: CThP4, San Jose, USA.
- H. Suchowski, B. D. Bruner, A. Gannany-Padowicz, A. Arie, Y. Silberberg, "Adiabatic frequency conversion of ultrashort Pulses", International Conference on Ultrafast Phenomena (UP) 2010 paper: MB6, Snowmass village, Co., USA.
- H. Suchowski, D. Oron, A. Arie, Y. Silberberg, "Adiabatic sum frequency conversion", International Quantum Electronics Conference (IQEC) 2009 paper: IML1, Baltimore, USA.
- B. D. Bruner, H. Suchowski, A. Natan, Y. Silberberg, "Strong Field Coherent Control Using 2D Spatio-Temporal Mapping", Ultrafast Phenomena 2008, Stresa, Italy.

PRESENTATIONS

Invited conference presentations

- "Nonlinear optics in zero-index materials", Conference on Metamaterials, Photonic Crystals and Plasmonics (META), New-York City, NY, USA, 2015.
- "Adiabatic elimination scheme for densely integrated nano-photonics", Control of Quantum Dynamics of Atoms, Molecules and Ensembles by Light (CAMEL XI), Burgas, Bulgaria, 2015.
- "Phase-Mismatch Free Nonlinear Propagation in Zero-Index Materials", Optical Engineering and Science in Israel (OASIS), Tel Aviv, Israel, 2015.

Conference presentations:

- "Toward Multi-Octave Pulse Shaping by Adiabatic Frequency Conversion", Nonlinear Optics Conference (NLO), Kauai, Hawaii, 2015.
- "Predicting nonlinear properties of metamaterials from the linear response", Electrical, Transport, and Optical Properties of Inhomogeneous Media (ETOPIM), Neve Ilan, Israel, 2015.
- "Adiabatic elimination based modulation for densely integrated nano-photonics", International Topical Meeting on Nanophotonics and Metamaterials (NANOMETA), Seefeld, Austria, 2015.
- "Four Wave Mixing Propagation in Fishnet Metamaterials", Conference on Lasers and Electro-Optics (CLEO), San Jose, CA, USA, 2013.

- “Two-photon frequency conversion”, Conference on Lasers and Electro-Optics (CLEO), San Jose, USA, 2012.
- “Pythagorean triples coupling and four level dynamics”, Control of Quantum Dynamics of Atoms, Molecules and Ensembles by Light (CAMEL VI), Varna, Bulgaria, 2010.
- “Adiabatic frequency conversion of ultrashort Pulses”, International Conference on Ultrafast Phenomena (UP), Snowmass village, USA, 2010.
- "SU(2) and SU(1,1) symmetries in nonlinear optics”, Quantum Control Workshop, Kavli Institute of Theoretical Physics (KITP), Santa Barbara, USA, 2009.
- “Robustness of adiabatic sum frequency conversion scheme”, Optical Engineering and Science in Israel (OASIS), Tel Aviv, Israel, 2009.

Invited seminar presentations

- “Observing ultrafast spatio-temporal dynamics using adiabatic frequency conversion”, Photonics seminar, Harvard, Boston, USA, 2015.
- “Adiabatic elimination based modulation for densely integrated nano-photonics”, Soreq national research center, Israel, 2015.
- “Nonlinear optical propagation in Zero-index materials”, Photonics Seminar, Physics Faculty, Kassel University, Kassel, Germany, 2014.
- “Pythagorean coupling – complete inversion in four level systems”, Photonics Seminar, Physics Faculty, Kassel University, Kassel, Germany, 2014.
- “Adiabatic processes in frequency conversion”, Photonics seminar, Stanford-SLAC, Palo Alto, USA, 2013.
- “Nonlinear light matter interaction with metamaterials”, Mini AMO Workshop, School of Physics, Tel Aviv University, Tel Aviv, Israel, 2013.
- “Nonlinear light matter interaction with metamaterials”, Photonics seminar, Center of Free Electron Lasers, DESY, Hamburg, Germany, 2013.
- “Adiabatic optical frequency conversion”, Photonics seminar, Center of Free Electron Lasers, DESY, Hamburg, Germany, 2013.
- “Dynamics of four level systems and Pythagorean coupling for complete inversion”, Quantum information Seminar, University of California, Berkeley, USA, 2012.
- “Pythagorean coupling – complete inversion in four level systems”, Quantum information Seminar, Physics Faculty, Hebrew University, Jerusalem, Israel, 2012.
- “Two photon frequency conversion”, Optics and Quantum electronics seminar, Massachusetts Institute of Technology, Boston, USA, 2012.
- “Adiabatic frequency conversion of ultrashort pulses”, Photonics and plasmonics seminar, Electrical engineering department, University of California, Berkeley, USA, 2011.
- “Adiabatic frequency conversion of short pulses”, Applied Physics seminar, Hebrew University, Jerusalem, Israel, 2011.
- “Adiabatic frequency conversion”, App. Phy. seminar, Ben Gurion University, Israel, 2011.
- “Efficient upconversion of ultrashort pulses via adiabatic frequency conversion”, Applied Physics Seminar, Caltech, Pasadena, USA, 2010.
- “Adiabatic frequency conversion”, guest seminar at Xiang Zhang group, Engineering faculty, University of California, Berkeley, USA, 2010.
- “Efficient upconversion of ultrashort pulses via adiabatic frequency conversion”, Optics and Quantum electronics seminar, Massachusetts Institute of Technology, Boston, USA, 2010.
- “Adiabatic frequency conversion of ultrashort pulses”, guest seminar at David Brady and David Smith group, Department of electrical engineering, Duke University, Durham, USA, 2010.