

# CURRICULUM VITAE

Dr. Yonatan Sivan

(updated 7/2015)

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## PERSONAL DETAILS

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D.O.B.: 13/10/1975  
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## RESEARCH POSITIONS

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Oct. 12 – Senior lecturer, Electro-Optics Unit, Faculty of Engineering, Ben Gurion University of the Negev, Israel

Aug. 12 – July 13 Research consultant, School of Physics and Astronomy, Tel Aviv University, Israel

Feb. 12 – Aug. 12 Post-doctoral researcher, Complex Photonic Systems, MESA+ Institute for Nanotechnology, University of Twente, The Netherlands

Nov. 11 – Jul. 12 Visiting researcher, condensed matter theory and experimental Solid-state groups, Imperial College London, UK

Sept. 09 – Oct. 11 Royal Society Newton post-doctoral Fellow, Condensed Matter Theory group, Imperial College London, UK

Sept. 08 – Aug. 09 Fulbright post-doctoral Fellow at Purdue University, Indiana, and State University of New York at Buffalo, NY, USA

2002 – 2003 Physicist (Optics lab) at the Start-Up OpTun, Haifa, Israel

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## EDUCATION

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2002 – 2008	PhD in Physics, Tel-Aviv University (Direct program). Thesis title: "Soliton stability and dynamics in nonlinear inhomogeneous media" Advisors: Prof. Gadi Fibich, Prof. Shimshon Barad
2004 – 2007	B.A. in History and Music, Tel Aviv University
1999 – 2002	B.A. in Physics, Technion, Israel Institute for Technology Graduation with distinction

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## PRIZES AND AWARDS

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May 2010	Leo Baeck Bnai-Brith UK Scholarship
May 2009	Newton International Fellowship of the Royal Society for Post-Doctoral study in the UK
Mar. 2008	Fulbright Fellowship for Post-Doctoral study in the USA
Apr. 2008	Marejn Scholarship for PhD student excellence
Jun. 2006	"Applied Materials" prize for graduate student excellence
Jun. 2001	Dean's prize for outstanding undergraduate students
Jun. 2000	Dean's prize for outstanding undergraduate students

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## FUNDING

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2013 – 2016	Career Integration Grant (EU, FP7) – nonlinear nano-focusing in plasmonic systems (100,000 Euro)
2013 – 2016	MAFAT (Israel ministry of Defense) – Novel approach for the design of magnetic, negative refractive index and nonlinear metamaterials (550,000 NIS)

2013 – 2016	FTA (VATAT, Israel Nano-initiative) – Up-conversion in nano-photonic systems (360,000 NIS)
2013 – 2014	M.F.S. (BG Negev) – Ultrafast transient Bragg gratings in fibers and waveguides (95,000\$; with Amiel Isha'aya)
2013 – 2015	Leverhulme Trust (UK) – Nano-particle assisted STED nanoscopy for live-cell imaging (£125,000; with Stefan Maier and Paul French)
2011 – 2021	Royal Society Newton scholar alumni program (£60,000)

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#### TEACHING

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- Introduction to wave propagation and ray optics
- Advanced topics in electromagnetism
- Introduction to nano-plasmonics and metamaterials
- Advanced topics in nano-plasmonics and metamaterials
- Laboratory course: experiments in electro-optics
- Laboratory course: advanced experiments optics
- Laboratory course: optical communication systems

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#### MILITARY SERVICE

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1993 – 1998	Lieutenant in armored forces, and instructor at officer's Academy (BAHAD 1), commander in operational unit.
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# List of Publications

## Thesis Dissertation

"Soliton stability and dynamics in nonlinear inhomogeneous media",  
Advisors: Profs. G. Fibich, Prof. S. Bar-Ad, awarded 1/2009,  
School of Physics and Astronomy, Tel Aviv University.

## Journal papers – Summary

1 book chapter, 21 published papers, 3 patents.

**H-factor** – 10

## Book chapters

1. **Y. Sivan** & Y. Sonnefraud. *Nano-particle assisted stimulated- emission-depletion nanoscopy*, in "Plasmonics and super-resolution imaging", edited by Z. Liu, PAN Stanford Press (to appear 2015).

## Patents

1. **Y. Sivan**, A. Isha'aya. "Transient Bragg gratings in optical waveguides". **US Patent-pending no. 611940523.**

## Published papers

### I. Ultrafast optical switching

1. **Y. Sivan**, J.B. Pendry, *Time Reversal in Dynamically Tuned Zero-Gap Periodic Systems* - **Physical Review Letters** 106, 193902-1-4 (2011).
2. **Y. Sivan**, J.B. Pendry, *Broadband time-reversal of optical pulses using a switchable photonic-crystal mirror* - **Optics Express** 19, 14502-7 (2011).
3. **Y. Sivan**, J.B. Pendry, *Theory of wave-front reversal of short pulses in dynamically tuned zero-gap periodic systems* - **Physical Review A** 84, 033822-1-13 (2011).
4. **Y. Sivan**, G. Ctistis, E. Yuce, A.P. Mosk, *Femtosecond-scale switching based on excited free-carriers* - **Optics Express** 23, 16416-16428 (2011).

## II. Super-resolution microscopy of plasmonic structures

1. S. Kena-Cohen, A. Wiener, **Y. Sivan**, P. Stavrinou, D.D.C. Bradley, A. Horesfield, S. Maier, *Plasmonic sinks for the selective removal of long-lived states* – **ACS Nano** 5, 9958-65 (2011).
2. **Y. Sivan**, Y. Sonnefraud, S. Kena-Cohen, J.B. Pendry, S. Maier, *Nano-particle assisted Stimulated-Emission-Depletion nanoscopy* – **ACS Nano** 6, 5291-5296 (2012).
3. **Y. Sivan**, *Performance improvement in nano-particle assisted Stimulated-Emission-Depletion nanoscopy* – **Applied Physics Letters** 101, 021111 (2012).
4. M.R. Foreman, **Y. Sivan**, S.A. Maier, P. Török, *Illumination-dependence of plasmonic near-field enhancements*, **Phys. Rev. B** 86, 155441 (2012).
5. Y. Sonnefraud, H. Sinclair, **Y. Sivan**, M. Foreman, C. Dunsby, M. Neil, P. French, S. Maier, *Experimental proof-of-concept of nano-particle assisted Stimulated-Emission-Depletion nanoscopy* – **Nano Letters** 14, 4449-4453 (2014).

## III. Nonlinear effects in Metamaterials

1. **Y. Sivan**, S. Xiao, U. K. Chettiar, A.V. Kildishev, V.M. Shalaev, *Frequency domain simulations of a negative-index material with embedded gain* - **Optics Express** 17, 24060-74 (2009).
2. A.V. Kildishev, **Y. Sivan**, N. M. Litchinitser, V.M. Shalaev, *Frequency-domain modelling of TM wave propagation in optical nanostructures with a third order nonlinear response* - **Optics Letters** 34, 3364-6 (2009).

## IV. Stability and dynamics of solitons in inhomogeneous media

1. **Y. Sivan**, G. Fibich, M.I. Weinstein, *Bound states of nonlinear Schrodinger equations with a periodic nonlinear microstructure* - **Physica D** 217, 31-57 (2006).

**5<sup>th</sup> most cited paper in Physica D during the last 5 years.**

[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/505714/description](http://www.elsevier.com/wps/find/journaldescription.cws_home/505714/description)

2. Y. Linzon, **Y. Sivan**, S. Barad, B.A. Malomed, M. Zaezjev, R. Morandotti, *Non*

*collinear discrete soliton interactions in glass waveguides arrays* - **Physical Review Letters** 97, 193901-1-4 (2006).

3. **Y. Sivan**, G. Fibich, M.I. Weinstein, *Waves in nonlinear lattices – ultrashort optical pulses and Bose-Einstein condensates* - **Physical Review Letters** 97, 193902-1-4 (2006).  
Also available at the October 2006 edition of the APS virtual journal.
4. **Y. Sivan**, G. Fibich, N.K. Efremidis, S. Barad, *Analytic theory of narrow lattice solitons* - **Nonlinearity** 21, 509-536 (2008).
5. **Y. Sivan**, G. Fibich, B. Ilan, *Drift instability and tunneling of lattice solitons* – **Physical Review E** 77, 045601(R)-1-4 (2008).
6. S. Le-Coz, R. Fukuizumi, G. Fibich, B. Kshirim, **Y. Sivan**, *Instability of bound states of a nonlinear Schrodinger equation with a Dirac potential* - **Physica D** 237, 1103-28 (2008).
7. **Y. Sivan**, B. Ilan, G. Fibich, *Qualitative and quantitative analysis of stability and instability dynamics of positive lattice solitons* - **Physical Review E** 78, 046602-1-16 (2008).  
Also available at the November 2008 edition of the APS virtual journal.
8. B. Ilan, **Y. Sivan**, and G. Fibich, *A quantitative approach to soliton instability* – **Optics Letters** 36, 397-9 (2011).

## **V. Atmospheric propagation**

1. G. Fibich, **Y. Sivan**, Y. Ehrlich, E. Louzon, S. Eisenmann, Y. Katzir, A. Zigler, *Control of the collapse distance in atmospheric propagation* - **Optics Express** 14, 4946-57 (2006).
2. S. Eisenmann, E. Louzon, Y. Katzir, A. Zigler, **Y. Sivan**, G. Fibich, *Control of the filamentation distance and pattern in long-range atmospheric propagation* - **Optics Express** 15, 2779-84 (2007).

## **Conference proceedings**

1. **Y. Sivan**, G. Fibich, B. Ilan, *Drift instability of multidimensional solitons in inhomogeneous Kerr media*, SPIE Proceedings, ICONO/LAT conference 6725, 672503 (2007).
2. Y. Linzon, **Y. Sivan**, S. Bar-Ad et al., *Interaction-induced localization of self-defocusing discrete solitons*, CLEO/QELS, Baltimore, MD, Vol. 1-5, 2115-2116 (2007).

3. S. Eisenmann, **Y. Sivan**, G. Fibich et al., Extending femtosecond filamentation of high power laser propagating in the atmosphere, 1st International Symposium on Laser-Driven Relativistic Plasmas Applied for Science, Industry, and Medicine, Kyoto, JAPAN Volume: 1024, 257 (2008).
4. **Y. Sivan**, G. Fibich, B. Ilan, Lateral dynamics of lattice solitons, CLEO/QELS, San Jose, CA, Vol. 1-9, 2703-2704 (2008).
5. **Y. Sivan**, J.B. Pendry, Broadband time-reversal of optical pulses using a switchable photonic-crystal mirror, Metamaterials' 10 conference, Barcelona (2011).
6. Y. Sonnefraud, **Y. Sivan** et al. Nanoparticle-assisted STED, theory and experimental demonstration, Nanoimaging and Nanospectroscopy, Proceedings of SPIE 9169, 916903 (2014).

## List of scientific presentations

### INVITED LECTURES AT CONFERENCES

February 2016	Nano Israel 2016, Tel Aviv, Israel – “Nanoscopy in biological and solid state systems assisted by metal nanoparticles”
July 2015	PIERS 2015, Prague, Czech Republic – “Thermal aspects of plasmonic-based nanoscopy schemes”
February 2015	OASIS 5, Tel Aviv, Israel – “Nanoparticle-assisted fluorescence nanoscopy”
August 2014	SPIE optics and photonics 2014, San Diego, USA – “Nanoparticle-assisted fluorescence nanoscopy”
August 2014	PIERS 2014, Guangzhou, China – “Nanoparticle-assisted fluorescence nanoscopy”
May 2014	5 <sup>th</sup> international conference on metamaterials, photonic crystals and plasmonics (Meta’ 14) – “Nanoparticle-assisted fluorescence nanoscopy”
June 2013	Israel Life imaging meeting (ILIF), Ben-Gurion university, Israel – “Nanoparticle-assisted fluorescence nanoscopy”
October 2011	Metamaterials 2011, Barcelona, Spain – “Broadband time-reversal of optical pulses using a switchable photonic-crystal mirror”

- August 2009 SPIE optics and photonics meeting, San Diego, CA, USA – “Linear and nonlinear tuning of metamaterials with liquid crystals”
- September 2008 International symposium on filamentation, Paris, France – “Control of collapse distance, pattern and spectrum in long-range atmospheric propagation”
- Aug. 2007 International Laser PHYSics workshop (LPHYS’07), Leon, Mexico – “Control of collapse distance, pattern and spectrum in long-range atmospheric propagation”

#### REGULAR LECTURES AT CONFERENCES

- August 2015 SPIE optics and photonics, San Diego, USA – “retrieval of the dynamic polarizability of wire media”.
- August 2015 IEEE-OMN, Jerusalem, Israel – “Nonlinear wave mixing in plasmonic nanostructures – a Transformation Optics approach”.
- August 2015 IEEE-OMN, Jerusalem, Israel – “retrieval of the dynamic polarizability of wire media” (poster).
- August 2015 IEEE-OMN, Jerusalem, Israel – “Short pulse generation using transient Bragg gratings” (poster).
- July 2015 PIERS 2015, Prague, Czech Republic – “retrieval of the dynamic polarizability of wire media”.
- July 2015 PIERS 2015, Prague, Czech Republic – “Femtosecond switching based on free-carrier generation”.
- July 2015 PIERS 2015, Prague, Czech Republic – “Nano-particle assisted STED nanoscopy”.
- June 2015 ETOPIIM 10, Neve Ilan, Israel – “retrieval of the dynamic polarizability of wire media”.
- June 2015 ETOPIIM 10, Neve Ilan, Israel – “Nonlinear wave mixing in plasmonic nanostructures – a Transformation Optics approach”.
- June 2015 ETOPIIM 10, Neve Ilan, Israel – “Nano-particle assisted STED nanoscopy”.
- May 2015 SPP6, Jerusalem, Israel – “Nano-particle assisted STED nanoscopy”.



- May 2015 SPP6, Jerusalem, Israel – “retrieval of the dynamic polarizability of wire media” (poster).
- May 2015 Super-resolution workshop, Sde Boker, Israel – “Nano-particle assisted STED nanoscopy”.
- May 2015 Israel Microscopy Society meeting, Bar Ilan University, Israel – “Nano-particle assisted STED nanoscopy”.
- March 2015 Focus on Microscopy, Gottingen, Germany – “Nano-particle assisted STED nanoscopy”.
- June 2013 ICMAT, Singapore – “Nano-particle assisted STED nanoscopy”.
- May 2013 SPP6, Ottawa, Canada – “Nano-particle assisted STED nanoscopy” (poster).
- February 2013 FRISNO (FRench-Israeli Symposium on Nonlinear Optics) 12, Ein-Gedi, Israel – “Femto-second scale optical switching based on free-carrier nonlinearities – application to time-reversal of optical pulses” (poster).
- February 2013 FRISNO (FRench-Israeli Symposium on Nonlinear Optics) 12, Ein-Gedi, Israel – “Nano-particle assisted STED nanoscopy” (poster).
- February 2013 OASIS 4, Tel Aviv, Israel – “Femto-second scale optical switching based on free-carrier nonlinearities – application to time-reversal of optical pulses”.
- February 2013 OASIS 4, Tel Aviv, Israel – “Nano-particle assisted STED nanoscopy”.
- Sept. 2012 Near Field Optics, San Sebastian, Spain – “Nanoparticle-assisted Stimulated Emission Depletion nanoscopy” (poster).
- April 2012 Focus On Microscopy, Singapore – “Illumination matching in plasmonic fluorescence imaging”.
- July 2011 NLO (Nonlinear Optics), Hawaii, USA – “Time-reversal of short electromagnetic pulses using switchable photonic crystal mirrors”.
- May 2011 Recent developments in wave physics of complex media, Cargese, France – “Time-reversal of short electromagnetic pulses using zero-gap periodic systems” (poster).

- March 2011 FRISNO (FRench-Israeli Symposium on Nonlinear Optics) 11, Aussois, France – “Time-reversal of short electromagnetic pulses using zero-gap periodic systems” (poster).
- June 2010 CIMTEC, Montecatini Terme, Italy – “Loss compensation in nano-plasmonic structures with embedded gain”.
- April 2010 SPIE Europe, Brussels, Belgium – “Frequency-domain simulations of nano-plasmonic structures with embedded gain”.
- February 2010 Metamaterials 2010, Cairo, Egypt – “Frequency-domain simulations of negative-index materials with embedded gain”.
- May 2008 QELS (Quantum Electronics and Laser Science conference), San Jose, California, USA – “Drift instability and tunneling of lattice solitons” (poster).
- April 2008 Nonlinear phenomena in quantum degenerate gases, Toledo, Spain – “Unified theory of lattice soliton stability and dynamics”.
- Dec. 2007 IPS (Israel Physics Society) 2007, Weizmann Institute, Rehovot, Israel – “Lateral dynamics of lattice solitons”.
- Sept. 2007 Nonlinear Photonics’07, Quebec city, Canada – “Drift instability of lattice solitons” (poster).
- Sept. 2007 Nonlinear Photonics’07, Quebec city, Canada – “Control of collapse distance, pattern and spectrum in long-range atmospheric propagation” (poster).
- May. 2007 ICONO/LAT’07 (International Conference on Coherent and Nonlinear Optics), Minsk, Belarus – “Drift instability of multidimensional solitons”.
- May. 2007 ICONO/LAT’07 (International Conference on Coherent and Nonlinear Optics), Minsk, Belarus – “Control of collapse distance, pattern and spectrum in long-range atmospheric propagation”.
- March. 2007 OASIS (Optical engineering and Science In Israel) 1, Tel Aviv, Israel – “Drift and Width instability of multidimensional solitons”.
- March. 2007 OASIS (Optical engineering and Science In Israel) 1, Tel Aviv, Israel – “Control of collapse distance, pattern and spectrum in long-range atmospheric propagation”.

- Feb. 2007 FRISNO (FRench-Israeli Symposium on Nonlinear Optics) 9, Les Houches, France – “Control of collapse distance in long-range atmospheric propagation” (poster).
- Feb. 2007 FRISNO (FRench-Israeli Symposium on Nonlinear Optics) 9, Les Houches, France – “Drift and Width instability of multidimensional solitons” (poster).
- Dec. 2006 IPS (Israel Physics Society) 2006, Jerusalem, Israel – “Control of collapse distance in long-range atmospheric propagation”.
- Dec. 2005 IPS (Israel Physics Society) 2005, Carmiel, Israel – “Propagation of ultrashort Pulses in slab waveguide with a nonlinear microstructure”.
- Jul. 2005 Conference of nonlinear Dispersive Wave Phenomena, Crete, Greece – “Bound States of nonlinear Schrödinger equations with a periodic nonlinear microstructure”.
- Feb. 2005 FRISNO (FRench-Israeli Symposium on Nonlinear Optics) - 8, Dead sea, Israel – “Bound states of nonlinear Schrödinger equation” (poster).

#### INVITED SEMINAR PRESENTATIONS AND COLLOQUIA AT UNIVERSITIES

- May 2014 Optics seminar, Bar Ilan University, Israel – “Transient Bragg gratings: from time-reversal of optical pulses to ultrafast switching and ultrashort pulse generation”
- April 2014 Special seminar, Kaiserslautern, Germany – “Transient Bragg gratings: from time-reversal of optical pulses to ultrafast switching and ultrashort pulse generation”
- March 2014 Optics seminar, Exeter University, UK – “Transient Bragg gratings: from time-reversal of optical pulses to ultrafast switching and ultrashort pulse generation”
- March 2014 Solid state seminar, Tel Aviv University, Israel – “The nonlocal nature of free-carrier nonlinearities – theory and applications”
- March 2014 Applied Physics seminar, Hebrew University, Israel – “Transient Bragg gratings: from time-reversal of optical pulses to ultrafast switching and ultrashort pulse generation”

- December 2014 Optics seminar, Max Planck Institute for the Science of Light, Erlangen, Germany – “Nanoparticle-assisted fluorescence nanoscopy”
- October 2014 Institute of Optics seminar, university of Osaka, Japan – “Nanoparticle-assisted fluorescence nanoscopy”
- October 2014 Special optics seminar, National university of Taiwan, Taiwan – “Nanoparticle-assisted fluorescence nanoscopy”
- August 2014 Special optics seminar, university of Southampton, UK – “Nanoparticle-assisted fluorescence nanoscopy”
- February 2014 Special optics seminar, University of Twente, Enschede, The Netherlands – “Nanoparticle-assisted fluorescence nanoscopy”
- February 2014 Special optics seminar, AMOLF, Amsterdam, The Netherlands – “Transient Bragg gratings: from time-reversal of optical pulses to ultrafast switching and ultrashort pulse generation”
- January 2014 Electrical Engineering seminar, Technion, Haifa, Israel – “Nanoparticle-assisted fluorescence nanoscopy”
- November 2013 Laser Physics seminar, Ben Gurion University, Be’er Sheva, Israel – “Transient Bragg gratings: from time-reversal of optical pulses to ultrafast switching and ultrashort pulse generation”
- April 2012 Mini-symposium on plasmonics, Imperial College London, London, UK – “Nanoparticle-assisted fluorescence nanoscopy”
- December 2011 Applied physics seminar, Hebrew University, Jerusalem, Israel – “Nanoparticle-assisted fluorescence nanoscopy”
- December 2011 Applied math seminar, Technion, Haifa, Israel – “Time-reversal of optical pulses using a switchable photonic-crystal mirror”
- December 2011 Electrical engineering seminar, Bar Ilan University, Ramat Gan, Israel – “Nanoparticle-assisted fluorescence nanoscopy”
- December 2011 Optics seminar, Bar Ilan University, Ramat Gan, Israel – “Time-reversal of optical pulses using a switchable photonic-crystal mirror”
- December 2011 Physics seminar, Technion, Haifa, Israel – “Time-reversal of optical pulses using a switchable photonic-crystal mirror”

- December 2011 Condensed Matter Physics seminar, Ben Gurion University, Be'er Sheva, Israel – "Time-reversal of optical pulses using a switchable photonic-crystal mirror"
- December 2011 Physics seminar, Hebrew University, Jerusalem, Israel – "Time-reversal of optical pulses using a switchable photonic-crystal mirror"
- November 2011 Applied Nanophotonic **colloquium**, University of Twente, the Netherlands – "Time-reversal of optical pulses using a switchable photonic-crystal mirror"
- November 2011 Condensed Matter physics seminar, Tel Aviv University, Tel Aviv, Israel – "Nanoparticle-assisted fluorescence nanoscopy"
- November 2011 Electrooptics seminar, Ben Gurion University, Be'er Sheva, Israel – "Negative-index metamaterials and time-reversal of ultrashort pulses: A play in two acts"
- November 2011 Physical electronics seminar, Tel Aviv University, Tel Aviv, Israel – "Negative-index metamaterials and time-reversal of ultrashort pulses: A play in two acts"
- November 2011 Optics seminar, Weizmann Institute of Science, Rehovot, Israel – "Nanoparticle-assisted fluorescence nanoscopy"
- July 2011 Optics seminar, ESPCI, Paris, France – "Time-reversal of optical pulses using a switchable photonic-crystal mirror"
- April 2011 Mini-symposium on plasmonics, Imperial College London, London, UK – "Time-reversal of optical pulses using a switchable photonic-crystal mirror"
- November 2010 Condensed Matter theory seminar, Imperial College London, London, UK – "Time-reversal of optical pulses using a switchable photonic-crystal mirror"
- March 2010 Condensed Matter Physics seminar, Tel Aviv University, Tel Aviv, Israel – "Loss-compensation with gain materials in plasmonic nanostructures"
- November 2009 Condensed Matter theory seminar, Imperial College London, London, UK – "Loss-compensation with gain materials in plasmonic nanostructures"
- September 2008 Applied Math seminar, University of Maryland, USA – "Dynamics and stability of solitons in inhomogeneous microstructures"

- January 2008 Applied Math seminar, Massachusetts Institute of Technology, USA – “Dynamics and stability of solitons in inhomogeneous microstructures”
- December 2007 Applied Math seminar, Tel Aviv University, Tel Aviv, Israel – “Dynamics of solitons in inhomogeneous microstructures”
- January 2006 Condensed Matter Physics seminar, Tel Aviv University, Tel Aviv, Israel – “Nonlinear Schrödinger equation with a periodic microstructured nonlinearity”
- January 2006 Applied Math seminar, Tel Aviv University, Tel Aviv, Israel – “Nonlinear Schrödinger equation with a periodic microstructured nonlinearity”

## Refereeing services

Physical Review Letters, Physical Review A, B, E

Journal of the Optical Society America A & B

Optics Express

Optics Letters

Journal of Nanophotonics

Journal of Physics A & B

Journal of Optics

Optics Communications.