

Department of Physics  
Massachusetts Institute of Technology  
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## ACADEMIC POSITIONS

2012 – MIT, department of physics:  
Pappalardo post-doctoral fellow

## EDUCATION

2006 – 2011 Weizmann Institute of Science:  
PhD studies in Physics, under the supervision of Professor Yaron Silberberg.  
Thesis title: “Nonlinear and quantum optics of disordered media”  
2003 – 2005 Weizmann Institute of Science  
M.Sc. in Physics – Nonlinear and Ultra-Fast Physics Group  
Thesis: “Nonlinear propagation in one-dimensional periodic structures”  
1999 – 2001 Hebrew University - B.Sc. in Physics

## RESEARCH INTERESTS

Anderson localization of light, nonlinear effects in disordered and quasi-periodic systems, quantum walks and quantum many-body dynamics, statistical nonlinear optics, quantum optics in complex media, integrated quantum optics, topological phases of quasicrystals, Soft matter physics.

## HONORS AND AWARDS

2000, 2001 The Rosalind Henwood scholarship for undergraduates (Hebrew University)  
2006- 2011 Weizmann Institute PhD fellowship  
2007- 2011 Adams Fellowship of the Israel Academy of Sciences and Humanities  
2008 The Incubic/Milton Chang travel award of the Optical Society of America  
2010 Young researcher delegate to the 60th Lindau Nobel Laureates Meeting  
2010 Rothschild fellowship (Yad-Hanadiv foundation).  
2010 John F. Kennedy Award for outstanding doctoral thesis, Weizmann Institute  
2012-2015 Pappalardo Postdoctoral Fellowships, MIT.

## PROFESSIONAL ACTIVITIES

### Participation in international conferences, schools and workshops:

- The 8th European/French Israeli Symposium on Nonlinear and Quantum Optics, 2005
- Nonlinear Guided Waves and Their Applications, (NLGW), 2005
- The Quantum Electronics and Laser Science Conference (CLEO/QELS), 2006
- Photonic Metamaterials: From Random to Periodic (META), 2006
- The 9th European/French Israeli Symposium on Nonlinear and Quantum Optics, 2007
- Photonic Metamaterials: From Random to Periodic ( META), 2007
- Nonlinear Physics in Periodic Structures and Metamaterials - seminar and workshop, 2007
- Nonlinear Photonics (NP), 2007
- The 53'rd annual meeting of the Israel Physical Society (IPS), 2007
- The Quantum Electronics and Laser Science Conference (CLEO/QELS), 2008

- Mathematical Physics Days, 2008
- WE-Heraeus-Seminar "Discrete optics and beyond", 2008
- Anderson localization for the nonlinear Schrödinger equation? (Technion) 2008
- Frontiers in Optics 2008
- The 10th European/French Israeli Symposium on Nonlinear and Quantum Optics, 2009
- Anderson localization in nonlinear and many body systems, MPIPKS, 2009
- International Fermi School of Physics 'Nano optics and atomics', 2009
- The annual meeting of the Photonics society (invited talk), 2009.
- The 60th Lindau Nobel Laureates Meeting, 2010.
- The Third HOPE meeting, Japan, 2011
- Summer school: Disordered Systems: From Condensed-Matter Physics to Ultra-cold Atomic Gases, France (invited talk), 2011
- Scattering systems with complex dynamics: X-Billiard workshop (invited talk), 2011
- Workshop: "Quantum Walks, Quantum Simulators, and Quantum Networks" (invited talk), 2012.
- WE-Heraeus-Seminar: "Quantum-Optical Analogies: a Bridge Between Classical and Quantum Physics" (invited talk), 2012.
- Wilhelm und Else Heraeus-Seminar: "Classical and Quantum Transport in Complex Networks" (invited talk), 2013
- Complex Nano-Photonics Science camp, Berkshire UK , 2013
- ICQ12: the 12th International Conference on Quasicrystals (invited talk), Poland 2013

#### Scientific community service

Reviewer for Physical Review Letters, Applied Physics Letters, Optics Letters, Optics Express.

## LIST OF PUBLICATIONS

### Journal papers:

1. **"Polarization dependent properties of waveguide arrays: band-structure anomaly and high-band localizations"**, Y. Lahini, D. Mandelik, Y. Silberberg, and R. Morandotti, *Optics Express* **13**, 1762 (2005).
2. **"Nonlinearly induced relaxation to the ground state in a two-level system"**, D. Mandelik, Y. Lahini and Y. Silberberg, *Physical Review Letters* **95**, 073902 (2005).
3. **"Ground-state selection as a four-wave-mixing process"**, A. Avidan, Y. Lahini, D. Mandelik and Y. Silberberg, *Physical Review A* **73**, 063811 (2006).
4. **"Discrete X-waves formation in nonlinear waveguide arrays"**, Y. Lahini, E. Frumker, Y. Silberberg, S. Droulias, K. Hizanidis, R. Morandotti and D. N. Christodoulides, *Physical Review Letters*. **98**, 023901 (2007).
5. **"Anderson localization and nonlinearity in one-dimensional photonic lattices"** Y. Lahini, A. Avidan, F. Pozzi, M. Sorel, R. Morandotti, D. N. Christodoulides and Y. Silberberg, *Physical Review Letters*. **100**, 013906 (2008).
6. **"Realization of quantum walks with negligible decoherence in waveguide lattices"** H.B. Perets, Y. Lahini, F. Pozzi, M. Sorel, R. Morandotti and Y. Silberberg. *Physical Review Letters* **100**, 170506 (2008).
7. **"Multiple breakup of high-order spatial solitons"** O. Katz and Y. Lahini (equal contribution) and Y. Silberberg, *Optics Letters* **33**, 2830–2832 (2008).

8. **"Effect of nonlinearity on adiabatic evolution of light"**, Y. Lahini, F. Pozzi, M. Sorel, R. Morandotti, D. N. Christodoulides and Y. Silberberg, *Physical Review Letters* **101**, 193901 (2008).
9. **"Classical diffusion of a quantum particle in a noisy environment"** A. Amir, Y. Lahini and H.B. Perets, *Phys. Rev. E* **79**, 050105(R) (2009).
10. **"Universal correlations in nonlinear periodic 1D systems"** Y. Silberberg, Y. Lahini, Y. Bromberg, E. Small and R. Morandotti, *Physical Review Letters* **102**, 233904 (2009).
11. **"Classical and quantum correlations in waveguide lattices"** Y. Bromberg, Y. Lahini, R. Morandotti and Y. Silberberg, *Physical Review Letters* **102**, 253904 (2009)
12. **"Observation of a localization transition in quasi-periodic photonic lattices"** Y. Lahini, R. Pugatch, F. Pozzi, M. Sorel, R. Morandotti, N. Davidson, and Y. Silberberg, *Physical Review Letters* **103**, 013901 (2009)
13. **"Analysis of a new class of three-core adiabatic directional couplers"**, A. Salandrino, K. Makris, D. N. Christodoulides, Y. Lahini, Y. Silberberg and R. Morandotti, *Optics Communications*, **282**, 4524-4526 (2009).
14. **"Photon correlations in waveguide lattices"**, Y. Bromberg, Y. Lahini, R. Morandotti and Y. Silberberg, *Optics and Photonic News*, **20** (12), 22 (2009).
15. **"Hanbury-Brown and Twiss interferometry with interacting photons"** Y. Bromberg and Y. Lahini (equal contribution), E. Small and Y. Silberberg, *Nature Photonics* **4**, 721 (2010).
16. **"Quantum walk of correlated photons"** A. Peruzzo, M. Lobino, J. C. F. Matthews, N. Matsuda, A. Politi, K. Poulios, X.-Q. Zhou, Y. Lahini, N. Ismail, K. Wörhoff, Y. Bromberg, Y. Silberberg, M. G. Thompson and J. L. O'Brien, *Science* **329**, 1500 (2010).
17. **"Quantum correlations in two-particle Anderson localization"** Y. Lahini, Y. Bromberg and Y. Silberberg. *Phys. Rev. Lett.* **105**, 163905 (2010).
18. **"Bloch oscillations of path-entangled photons"** Y. Bromberg, Y. Lahini, Y. Silberberg, *Phys. Rev. Lett.* **105**, 263604 (2010).
19. **"Hanbury Brown and Twiss correlations of Anderson localized waves"** Lahini, Y.; Bromberg, Y.; Shechtman, Y.; Szameit, A.; Christodoulides, D. N.; Morandotti, R.; Silberberg, Y. *Phys. Rev. A* **84**, 041806(R) (2011).
20. **"Perfect imaging through a disordered waveguide lattice"**, R. Keil, Y. Lahini et al., *optics letters* **37**, 809-811 (2012).
21. **"Disorder-enhanced nonlinear delocalization in segmented waveguide"**, Matthias Heinrich, Robert Keil, Yoav Lahini, Uta Naether, Felix Dreisow, Andreas Tünnerman, Stefan Nolte and Alexander Szameit, *New J. Phys.* **14**, 073026 (2012)
22. **"Quantum walk of two interacting Bosons"** Y. Lahini, M. Verbin, S. Huber, Y. Bromberg, R. Pugatch and Y. Silberberg *Phys. Rev. A* **86**, 011603(R) (2012).
23. **"Topological states and adiabatic pumping in quasicrystals"** K. E. Kraus, Y. Lahini, Z. Ringler, M. Verbin and O. Zeitler (equal contribution), *Phys. Rev. Lett.* **109**, 106402 (2012).  
 See also: *"Viewpoint: Quasicrystals, Meet Topological Insulators"* *Physics* **5**, 99 (2012)  
*Selected for Editor's Choice in Physics Review Letters*  
*"Research highlights: Mid-guide spread"* *Nature Physics* **8**, 702 (2012)  
*Editor's Choice, Science* **338**, 6106, Issue of 26 October 2012
24. **"Fourier processing of quantum light"**, E. Poem, Y. Gilead, Y. Lahini and Y. Silberberg, *Phys. Rev. A* **86**, 023836 (2012)

25. **"Observation of Topological Phase Transitions in Photonic Quasicrystals"**, M. Verbin, Y. E. Kraus, O. Zilberberg, Y. Lahini and Yaron Silberberg, Phys. Rev. Lett. 110, 076403 (2013) , *Selected for Editor's Choice*.
26. **"Self-trapping threshold in disordered nonlinear photonic lattices"** U. Naether, M. Heinrich, Y. Lahini, S. Nolte, R. A. Vicencio, M. I. Molina, and A. Szameit, Optics Letters 38, 1518-1520 (2013)

#### Book Chapters

1. **"Anderson Localization of Light: disorder-induced linear, nonlinear, and quantum phenomena"** Y. Lahini, T. Schwartz, Y. Silberberg, and M. Segev *"Optical properties of photonic structures: interplay of order and disorder"*, CRC Press Taylor & Francis

#### Popular articles

1. **"Hanbury Brown and Twiss Interferometry with Interacting Photons"**  
<http://www.2physics.com/2010/11/hanbury-brown-and-twiss-interferometry.html>
2. **"Topological States and Adiabatic Pumping in Quasicrystals"**  
<http://www.2physics.com/2012/10/topological-states-and-adiabatic.html>

#### Conference papers - Invited talks:

1. **"Linear and nonlinear photonics in inhomogeneous waveguide lattices"** in *LEOS the annual meeting of the Photonics Society* (2009).
2. **"Anderson Localization of light: from nonlinear to non-classical effects"** in *Summer School: "Disordered Systems: From Condensed-Matter Physics to Ultracold Atomic Gases"* (2011)
3. **"Quantum walks on lattices: from disorder to interaction effects"** in *Scattering systems with complex dynamics: X-Billiard workshop*: (2011)
4. **"Quantum correlations and topological phases in photonic lattices "** Workshop: "Quantum Walks, Quantum Simulators, and Quantum Networks", 2012.
5. **"Quantum correlations and topological phases in photonic lattices "** WE-Heraeus-Seminar on "Quantum-Optical Analogies: a Bridge Between Classical and Quantum Physics" 2012.
6. **"Quantum walks – from integrated photonics to cold atoms"**, Wilhelm und Else Heraeus-Seminar: Classical and Quantum Transport in Complex Networks, 2013
7. **"Topological and nonlinear properties of photonic quasicrystals"**, ICQ12: the 12th International Conference on Quasicrystals, 2013

#### Conference papers - talks:

1. **"Enhanced Nonlinear Beam Steering near Band-Edges of Waveguide Arrays"**, Y. Lahini, D. Mandelik, A. Avidan, Y. Silberberg; in *NLW 2005, paper ThC2*.
2. **"Ground-State Selection and Modal 'Cooling' in a Nonlinear Waveguide"**, Y. Lahini, D. Mandelik, A. Avidan, Y. Silberberg; in *NLW 2005, paper FB5*.
3. **"Stability of Nonlinear Bound States in the Presence of a Continuous Spectrum,"** A. Avidan, Y. Lahini, D. Mandelik, and Y. Silberberg; in *NLW 2005, paper PDP6*.
4. **"Nonlinear Tuning of the Superprism Effect near Photonic Band Edges"**, Y. Lahini, D. Mandelik, Y. Silberberg; in *CLEO/QELS 2006, paper QTuC3*.

5. **"Discrete Nonlinear X-Waves in Waveguide Arrays"**, Y. Lahini, E. Frumker, Y. Silberberg, S. Droulias, K. Hizanidis, R. Morandotti, D. N. Christodoulides; in *CLEO/QELS 2006, paper QFB5*.
6. **"Direct Observation of Anderson Localized Modes and the Effect of Nonlinearity,"** Y. Lahini, A. Avidan, Y. Silberberg, F. Pozzi, M. Sorel, and R. Morandotti in *Photonic Metamaterials: From Random to Periodic (META) 2006, paper ThC4*.
7. **"Excitation of Discrete X-waves in Nonlinear Waveguide Arrays"**, Y. Lahini, E. Frumker, Y. Silberberg, S. Droulias, K. Hizanidis, R. Morandotti and D. N. Christodoulides; in *LEOS 2006 The 19th Annual Meeting of the IEEE Lasers & Electro-Optics Society, paper MI5*.
8. **"EIT and STIRAP in waveguides: linear and nonlinear effects in a three-core coupled system"** Y. Lahini, F. Pozzi, M. Sorel, R. Morandotti, and Y. Silberberg; in *Nonlinear Photonics 2007, paper JWBPD1*
9. **"Anderson localization, wave diffusion, and the effect of nonlinearity in randomized photonic lattices"** Y. Lahini, A. Avidan, F. Pozzi, M. Sorel, R. Morandotti, D. N. Christodoulides and Y. Silberberg in *Photonic Metamaterials: From Random to Periodic (META) 2007, paper MB4*.
10. **"Anderson localization in waveguide lattices and the effect of nonlinearity"**, Y. Lahini, A. Avidan, F. Pozzi, M. Sorel, R. Morandotti and Y. Silberberg, in *FRISNO 9 (2007), the 9h European/French Israeli Symposium on Nonlinear and Quantum Optics*.
11. **"Anderson localization and nonlinearity in one dimensional photonic lattices"** in *IPS 2007 - the 53'rd annual meeting of the Israel Physical Society (2007)*.
12. **"Anderson Localization and Nonlinearity in One Dimensional Disordered Waveguide Arrays"** Y. Lahini, A. Avidan, F. Pozzi, M. Sorel, R. Morandotti, D. N. Christodoulides and Y. Silberberg; in *Nonlinear Photonics 2007, paper JMB6*
13. **"Wavepacket Expansion in Nonlinear Disordered Lattices"**, Y. Lahini, F. Pozzi, M. Sorel, R. Morandotti, and Y. Silberberg; in *CLEO/QELS 2008, paper QThG*
14. **"Delocalization of Localized Modes in Nonlinear Disordered Waveguide Lattices"**, Y. Lahini, F. Pozzi, M. Sorel, R. Morandotti, and Y. Silberberg; in *CLEO/QELS 2008, paper QThG*
15. **"STIRAP in Waveguides: Linear and Nonlinear Effects in an Adiabatic Three-Core System"** Y. Lahini, F. Pozzi, M. Sorel, R. Morandotti, and Y. Silberberg; in *CLEO/QELS 2008, paper QMI4*
16. **"Observation of a Localization Transition in Quasi-Periodic Photonic Lattices"** Y. Lahini, R. Pugatch, F. Pozzi, M. Sorel, R. Morandotti, N. Davidson and Y. Silberberg; in *Frontiers in Optics 2008, paper FThJ2 (paper competition finalist)*.
17. **"Nonlinear Effects in Adiabatic Optical Structures"** Y. Lahini, F. Pozzi, M. Sorel, R. Morandotti, and Y. Silberberg; in *Frontiers in Optics 2008, paper FThC5*
18. **"Hanbury-Brown and Twiss Interferometry with Interacting Photons"**, Y. Bromberg, Y. Lahini and Y. Silberberg, in *Frontiers in Optics 2008, paper FTu11*
19. **"Classical and Quantum Correlations in Waveguide Lattices"**, Y. Bromberg, Y. Lahini, R. Morandotti and Y. Silberberg, in *Frontiers in Optics 2008, paper FMA4*
20. **"Intensity Correlations in Disordered Photonic Lattices"**, Y. Lahini, Y. Bromberg, F. Pozzi, M. Sorel, R. Morandotti, D. Christodoulides and Y. Silberberg, *Frontiers in Optics 2009, paper FMC2*;
21. **"Quadratic Compressed Sensing in a Waveguide Array "**, Y. Shechtman, E. Small, Y. Lahini, M. Verbin, Y. C. Eldar, Y. Silberberg and M. Segev in *CLEO 2013, paper CTh4L*

22. **"Nonlinear and Quantum Optics of Disordered Media"**, Y. Lahini, Complex Nano-Photonics Science camp, Berkshire UK, 2013;

Conference papers - posters:

1. **"Nonlinearly induced relaxation in a two level system"**, Y. Lahini, D. Mandelik and Y. Silberberg, in *FRISNO 8, the 8th European/French Israeli Symposium on Nonlinear and Quantum Optics, paper Mo-5*.
2. **"All-Optical Tuning of the Superprism Effect near Band Edges of Nonlinear Waveguide Arrays"**, Y. Lahini, D. Mandelik, and Y. Silberberg, in *Photonic Metamaterials: From Random to Periodic (META) 2006, paper ThD10*.
3. **"Observation of Discrete Nonlinear X-waves"**, Y. Lahini, E. Frumker, Y. Silberberg, S. Droulias, K. Hizanidis, R. Morandotti, D. N. Christodoulides, in *Photonic Metamaterials: From Random to Periodic (META) 2006, paper ThD3*.
4. **"The effect of nonlinearity on the evolution of light in adiabatic waveguides"**, Y. Lahini, F. Pozzi, M. Sorel, R. Morandotti, D. N. Christodoulides and Y. Silberberg *WE-Heraeus-Seminar "Discrete optics and beyond", 2008*.
5. **"Quantum and Classical correlations in waveguide arrays"**, Y. Bromberg, Y. Lahini, R. Morandotti, and Y. Silberberg. *WE-Heraeus-Seminar "Discrete optics and beyond", 2008*.
6. **"Anderson localization and nonlinearity in disordered waveguide arrays"**, Y. Lahini, F. Pozzi, M. Sorel, R. Morandotti, D. N. Christodoulides and Y. Silberberg. *WE-Heraeus-Seminar "Discrete optics and beyond", 2008. Awarded the best poster prize*.
7. **"Direct observation of a localization transition in quasi-periodic photonic lattices"** Y. Lahini, R. Pugatch, F. Pozzi, M. Sorel, R. Morandotti, N. Davidson, and Y. Silberberg, in *the 10th European/French Israeli Symposium on Nonlinear and Quantum Optics, paper Wed-18*.
8. **"Experiments in nonlinear disordered and incommensurate photonic lattices"**, Y. Lahini, A. Avidan, F. Pozzi, M. Sorel, R. Morandotti, D. N. Christodoulides and Y. Silberberg in *Anderson localization in nonlinear and many body systems, MPIPKS (2009)*.
9. **"Nonlinear dynamics in disordered and incommensurate photonic lattices"**, Y. Lahini, R. Pugatch, F. Pozzi, M. Sorel, R. Morandotti, D. N. Christodoulides and Y. Silberberg in *the International Fermi School of Physics 'Nano optics and atomics' (2009)*.
10. **"Quantum walks and quantum correlations in optical waveguide lattices"**, Y. Lahini, Y. Bromberg and Y. Silberberg in *Entanglement in Atomic systems, WIS (2010)*.

Seminar talks:

1. **"Direct observation of Anderson localization in randomized waveguide lattices and the effect of nonlinearity"**
  - Seminar talk in *Nonlinear Physics in Periodic Structures and Metamaterials-International seminar and workshop (2007)*.
  - Department seminar at *Inst. Natl. de la Recherche Scientifique, Canada. (2007)*.
2. **"Localization and nonlinear effects in disordered and incommensurate photonic lattices"**
  - Seminar at *Bar-Ilan University (2008)*
  - Seminar in *"Anderson localization for the nonlinear Schrödinger equation?" (2008)*
  - *Condensed-Matter Seminar at Tel-Aviv University (2008)*.

- Seminar at Institut d'Optique, Ecole Polytechnique (2008).
- 3. **"Quantum walks and quantum correlations in waveguide lattices"**
  - Seminar at the center for quantum photonics, Bristol University (2010).
  - Seminar at the department of solid state physics, Technion (2010).
  - Seminar at the physics department, Harvard University (2010).
  - Seminar at the physics department, ETH, Zurich (2011)
- 4. **"Quantum walks– from integrated photonics to cold atoms"**
  - Seminar at the Max-Planck Institute for Quantum Optics, Munich (2011)
  - Physics students colloquium, Weizmann Institute of science (2011)
  - Group meetings (Greiner, Manoharan), Harvard university (2011)
  - Department seminar, Weizmann institute (2011)
  - Condensed matter "kids" seminar, Harvard university (2011)
  - Seminar at Bonn university (2012)
  - Quantum Information Seminar, Physics department, MIT (2012)
  - Condensed matter physics seminar, ETH (2013)
- 5. **"Topological phases and adiabatic pumping in quasicrystals"**
  - Physics colloquium (with K. Kraus), the Weizmann institute of science (2012)

## ADDITIONAL ACCTIVITEIS

Army service: Four year service, including commanding, designing and supervising the basic training of first stage special-unit soldiers. Rank: Captain

1998 – 1999 **Freelance computer programming:** developing research-supporting software for startup biotech companies.

2001 **Research assistant at Nanonics inc.:** developing methods and conducting basic research in mico-photonics and near field microscopy.

2003- today **Theater acting:** I am part of an active theater group which I helped establish at the Weizmann institute. In addition to many small acting performances, over the years we have produced several major plays that have been raised on stages inside and outside the institute. Among those:

2005 - "They shoot horses don't they?", adapted from the novel by Horace McCoy.  
Role: Robert Syverton.

2006 - "One flew over the Cuckoo's nest", adapted from the novel by Ken Kesey. Role:  
Randle McMurphy.

2007 – "The suitcase packers" – a play by the Israeli writer Hanoch Levine.  
Role: Elhanan.

2009 – "Isabella", based on a novel "Le Capitaine Fracasse" by Théophile Gautier.

2010 – "Parity" – seven short stories by young Israeli writers

2011 – "Walk in darkness" – a play by the Israeli writer Hanoch Levine.