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Prof. Avi Pe'er
Curriculum Vitae and List of Publications

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Education, Certificates and Degrees, Post-Doctorate

From-To	Institute	Area of Specialty	Degree
2005-2008	JILA, University of Colorado	Precision measurement and Ultrafast frequency combs	Post-doctoral research
2000-2005	Weizmann Institute of Science	Quantum optics – sources and applications of broadband bi-photons	PhD
1997-1999	Weizmann Institute of Science	Linear optics and holography - optical processing with white incoherent light	MSc
1993-1996	Tel Aviv University	Physics and Computer Science	BSc

Positions Held:

From-To	Institute	Research Area	Title
2008 –	Bar Ilan University	Physics	Associate Prof.

Funding Sources

Period	Funding Agency	Title	Amount
2018-2021-	<i>NSF-BSF – Israel-USA binational program</i>	<i>Squeezing the Quantum Comb</i>	\$ 243K over 3 years
2019-2022	<i>MAGNET - program of the Israel Ministry of Industry</i>	<i>Quantum Leap (with Michael Rosenbluh)</i>	NIS 1050K for 3 years
2016-2019	<i>MAGNET - program of the Israel Ministry of Industry</i>	<i>ALTIA – Novel lasers for the industry</i>	NIS 1135K over 3 years
2014-2019	<i>Israel Science Foundation: Individual research grant</i>	<i>A coherent Raman Laser pumped by a frequency comb</i>	NIS 1120K for 4 years
2014-2018	<i>Israel Science Foundation: F.I.R.S.T program for research of high-risk, high-gain</i>	<i>Quantum Combs - Ultrabroadband High-Power Squeezing with a Bi-Photon Frequency Comb</i>	NIS 1200K for 3 years

2014-2016	<i>The R&D Directorate of the Israel Ministry of Defense (MAFAT)</i>	<i>Quantum Key Distribution at an Ultra-high Bit-rate</i>	NIS 400K for 2 years
2013-2015	<i>BIODISC German-Israeli joint program on bio-technology</i>	<i>Principles of hyperspectral CARS imaging with quantum-correlated photons (QuantumCARS)</i>	Euro 550K for 2 years (250K for Israeli side)
2012-2014	<i>KAMIN program of the Israel Ministry of Industry</i>	<i>High power mode locked lasers based on semiconductor gain media</i>	NIS 800K for two years
2009-2013	<i>Marie Curie – International Reintegration Grant</i>	<i>Precision Measurement with Broadband Down Converted Light</i>	Euro 100K for 4 years
2009-2013	<i>Israel Science Foundation</i>	<i>A coherent amplifier of molecular dynamics</i>	NIS 960K for 4 years
2009	<i>Israel Science Foundation</i>	<i>Equipment grant for young researcher</i>	\$400K

Awards and Honors:

Date	Awards and Honors
2018	Excellent Research award, BIU rector
2016	Excellent Teacher award, BIU rector
2005	Fulbright Scholarship for post doctoral research
2005	Feinberg school award for excellence in the PhD studies
2001-2004	A fellowship for excellent PhD students in the field of high technology from the Israeli Council for Higher Education
1999	Feinberg school dean award for excellence in the MSc studies
1996	Tel-Aviv university rector's award for excellence in the BSc studies
1995	Exact Sciences faculty dean award for undergraduate students
1994	Tel-Aviv university rector's award for undergraduate students

Research Interests

I am an expert in quantum optics and laser physics, specializing in precision measurement and control of light-matter interaction with broadband light sources. In quantum optics, I harness broadband quantum entanglement and squeezing of light to overcome the classical precision limits of physical measurements. Specifically, I utilize my expertise in the "less common" field of broadband time-energy entangled bi-photons to develop schemes of ultra-high speed quantum communication (quantum key distribution - QKD) and of nonlinear Raman spectroscopy beyond the classical limits. As a laser-physicist, I develop schemes for visualization and manipulation of fast molecular dynamics using novel sources of optical frequency combs. I dwell into the physics of mode locked lasers in order to develop new sources of ultrashort pulses with unique, attractive and otherwise unattainable properties. Specific research subjects are:

- The physics of mode-locked lasers: new sources of ultrashort pulses and frequency combs
- Optical bandwidth as a resource for quantum information: Novel schemes for quantum measurement and sources of broadband squeezed light
- Sub shot-noise interferometry and coherent Raman spectroscopy (quantum CARS) using broadband squeezed light.
- Visualization and manipulation of fast vibrational dynamics in molecules with optical frequency combs

Publications (last 10 years)

1. Yoad Michael, Leon Bello, Michael Rosenbluh and Avi Pe'er, "Squeezing-enhanced Raman Spectroscopy", [*npj – Quantum Information* **5**, 81 \(2019\)](#)
2. Marcello Calvanese Strinati, Leon Bello, Avi Pe'er, and Emanuele G. Dalla Torre, "Theory of coupled parametric oscillators beyond coupled Ising spins", [*Phys. Rev. A* **100**, 023835 \(2019\)](#)
3. Leon Bello, Marcello Calvanese Strinati, Emanuele G. Dalla Torre, and Avi Pe'er, "Persistent Coherent Beating in Coupled Parametric Oscillators", [*Phys.Rev.Lett.* **123**, 083901 \(2019\)](#)
4. Yaakov Shaked, Yoad Michael, Rafi Vered, Leon Bello, Michael Rosenbluh and Avi Pe'er, "Lifting the Bandwidth limit of Optical Homodyne Measurement", [*Nat. Commun.*, **9**, 609 \(2018\)](#)
5. Mallachi Meller, Shai Yefet and Avi Pe'er, "Mode-Locking With Ultra-Low Intra-Cavity Pulse Intensity Using Enhanced Kerr Nonlinearity", [*IEEE J. Quantum Electron.* **53**, 1300105 \(2017\)](#).
6. David Goldovsky, Valery Jouravsky, and Avi Pe'er, "Simple and robust phase-locking of optical cavities with > 200 KHz servo-bandwidth using a piezo-actuated mirror mounted in soft materials", [*Optics Express* **24**, 028239 \(2016\)](#).
7. Igal Aharonovich and Avi Pe'er, "Coherent Amplification of Ultrafast Molecular Dynamics in an Optical Oscillator ", [*Phys. Rev. Lett.* **116**, 073603 \(2016\)](#).
8. **Selected for PRL Editors' Suggestion:** Rafi Z. Vered, Yaakov Shaked, Yelena Ben-Or, Michael Rosenbluh and Avi Pe'er, "Classical-to-quantum Transition with Broadband Four-Wave Mixing", [*Phys. Rev. Lett.* **114**, 063902 \(2015\)](#).
9. Yaakov Shaked, Shai Yefet, Tzahi Geller and Avi Pe'er, "Octave-spanning spectral phase control for single-cycle bi-photons", [*New J. Phys.* **17**, 073024 \(2015\)](#).
10. Yaakov Shaked, Roey Pomerantz, Rafi Z. Vered and Avi Pe'er, "Observing the nonclassical nature of ultra-broadband bi-photons at ultrafast speed", [*New J. Phys.* **16**, 053012 \(2014\)](#).
11. Shai Yefet and Avi Pe'er, "A Review of Cavity Design for Kerr Lens Mode-Locked Solid-State Lasers", [*Appl. Sci.* **3**, 694-724 \(2013\)](#)
12. Faina Shikerman and Avi Pe'er, "Sum-frequency generation as a detector of high-power two-mode squeezing", [*Phys. Rev. A.* **88**, 043808 \(2013\)](#)
13. Shai Yefet and Avi Pe'er, "Mode locking with enhanced nonlinearity - a detailed study", [*Opt. Express* **21**, 19040–19046 \(2013\)](#)
14. Shai Yefet, Valery Jouravsky and Avi Pe'er, "Kerr-lens Mode Locking Without Nonlinear Astigmatism, [*J. Opt. Soc. Am. B* **30**, 549–551 \(2013\)](#)
15. Rafi Vered, Michael Rosenbluh and Avi Pe'er, "Two-Photon Correlation of Amplified Spontaneous Four Wave Mixing", [*Phys. Rev. A* **86**, 043837 \(2012\)](#)
16. Shai Yefet, Na'aman Amer, and Avi Pe'er, "Intra-cavity gain shaping of mode-locked Ti:Sapphire laser oscillations", [*Opt. Express* **20**, 9991-9998 \(2012\)](#)
17. Y. Stern, O. Klinger, T. Schneider, K. Jamshidi, A. Pe'er and A. Zadok, "Low-distortion long variable delay of linear frequency modulated waveforms," [*IEEE Photonics* **4**, 499-503 \(2012\)](#)
18. Faina Shikerman, Avi Pe'er and Larry P. Horwitz, "Semigroup evolution in the Wigner-Weisskopf pole approximation with Markovian spectral coupling", [*Phys. Rev. A* **84**, 012122 \(2011\)](#).