

Demitry Farfurnik

Curriculum Vitae

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PERSONAL DETAILS

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EDUCATION

2019-Present: Postdoctoral Associate, University of Maryland, Inst. for Research in Electronics & Applied Physics and Joint Quantum Institute. Host: Prof. Edo Waks.

2013-2019: Ph.D., Hebrew University of Jerusalem, Physics. Supervisor: Prof. Nir Bar-Gill. Thesis Topic: "Controlling the Quantum Dynamics of Nitrogen-Vacancy Centers in Diamond".

2011-2013: M.Sc., Tel-Aviv University, Physics. Supervisors: Prof. Shimshon Bar-Ad and Prof. Lev Vaidman. Thesis Topic: "Weak Value Analysis of an Optical Mach-Zehnder Interferometer".

2005-2008: B.Sc. Tel-Aviv University, Physics and Mathematics.

HONORS AND AWARDS

2019-2021: Israel Council for Higher Education Quantum Technology Postdoctoral Fellowship.

2019-2020: Israel-US Fulbright Postdoctoral Fellowship.

2019: Dimitris N. Chorafas Excellence Award for Applied Research.

2018: Lipper Excellence Award for Innovative Engineering.

- 2018: Racah Award for Excellent Ph.D. research.
- 2018: HUJI Nanoscience Award for Excellent Ph.D. research.
- 2013-2018: CAMBR Fellowship for Nanoscience and Nanotechnology.
- 2017: Optical Society of America Chapter Travel Grant.
- 2014: Rahamimoff BSF Travel Grant for Young Scientists.

TEACHING EXPERIENCE

- 2013-2018: Teaching Assistant, Hebrew University of Jerusalem.
- 2011-2013: Teaching Assistant, Tel-Aviv University.
- 2007-2008: Teaching Assistant, Tel-Aviv University.

OTHER ACTIVITIES

- 2015-Present: Referee for Academic Journals: PRL, PRApplied, PRA, PRB, Optics Letters, APL Photonics, ACS Photonics, Nanotechnology, JOSA B, Applied Optics, Physica Scripta.
- 2018-2019: Academic Supervisor, the Youth Center for Advanced Studies, Hebrew University of Jerusalem.
- 2008-2011: Army Service at the Israeli Ministry of Defense, Technology R&D.
- 2008: Research Assistant, the Particle Physics Department, Tel-Aviv University.

PUBLICATIONS

1. H. Singh*, **D. Farfurnik***, Z. Luo, A. S. Bracker, S. G. Carter, and E. Waks. Large Purcell enhancement of a quantum dot coupled to a circular grating in a charge tunable device. [arXiv:2111.13653](https://arxiv.org/abs/2111.13653).
*- Equal Contributors.
2. S. Dutta, Y. Zhao, U. Saha, **D. Farfurnik**, E. A. Goldschmidt, and E. Waks. An atomic frequency comb memory in rare-earth doped thin-film lithium niobate. [arXiv:2111.01942](https://arxiv.org/abs/2111.01942) (submitted).
3. **D. Farfurnik**, H. Singh, Z. Luo, A. S. Bracker, S. G. Carter, R. M. Pettit, and E. Waks. All-optical noise spectroscopy of a solid-state spin. [arXiv:2109.03405](https://arxiv.org/abs/2109.03405) (submitted).

4. **D. Farfurnik**, R. M. Pettit, Z. Luo, and E. Waks. Single-Shot Readout of a Solid-State Spin in a Decoherence-Free Subspace. [*Phys. Rev. Applied* **15**, L031002 \(2021\)](#).
5. **D. Farfurnik** and N. Bar-Gill. Characterizing spin-bath parameters using conventional and time-asymmetric Hahn-echo sequences. [*Phys. Rev. B* **101**, 104306 \(2020\)](#).
6. K. I. O. Ben `Attar*, **D. Farfurnik***, and N. Bar-Gill. Hamiltonian Engineering of general two-body spin-1/2 interactions. [*Phys. Rev. Research* **2**, 013061 \(2020\)](#).
*- Equal Contributors.
7. J. Dziewior, L. Knips, **D. Farfurnik**, K. Senkalla, N. Benshalom, J. Efroni, J. Meinecke, S. Bar-Ad, H. Weinfurter, and L. Vaidman. Universality of local interactions and its application for interferometric alignment. [*PNAS*. **116**, 2881-2890 \(2019\)](#).
8. **D. Farfurnik**, Y. Horowicz, and N. Bar-Gill. Identifying and decoupling many-body interactions in spin ensembles in diamond. [*Phys. Rev. A* **98**, 033409 \(2018\)](#).
9. N. Alfasi, S. Masis, R. Winik, **D. Farfurnik**, O. Shtempluck, N. Bar-Gill, and E. Buks. Exploring the nonlinear regime of light-matter interaction using electronic spins in diamond. [*Phys. Rev. A* **97**, 063808 \(2018\)](#).
10. **D. Farfurnik**, A. Jarmola, D. Budker, and N. Bar-Gill. Spin ensemble-based AC magnetometry using concatenated dynamical decoupling at low temperatures. [*J. Opt.* **20** 024008 \(2018\)](#), “Emerging Leaders” issue.
11. E. Farchi, Y. Ebert, **D. Farfurnik**, G. Haim, R. Shaar, and N. Bar-Gill. Quantitative Vectorial Magnetic Imaging of Multi-Domain Rock Forming Minerals Using Nitrogen-Vacancy Centers in Diamond. [*SPIN* **07**, 1740015 \(2017\)](#).
12. **D. Farfurnik**, N. Alfasi, S. Masis, Y. Kauffmann, E. Farchi, Y. Romach, Y. Hovav, E. Buks, and N. Bar-Gill. Enhanced concentrations of nitrogen-vacancy centers in diamond through TEM irradiation. [*Appl. Phys. Lett.* **111**, 123101 \(2017\)](#). [Press Release](#).
13. **D. Farfurnik**, N. Aharon, I. Cohen, Y. Hovav, A. Retzker, and N. Bar-Gill. Experimental realization of time-dependent phase-modulated continuous dynamical decoupling. [*Phys. Rev. A* **96**, 013850 \(2017\)](#).
14. **D. Farfurnik**, A. Jarmola, L. M. Pham, Z. H. Wang, V. V. Dobrovitski, R. L. Walsworth, D. Budker, and N. Bar-Gill. Optimizing a dynamical decoupling protocol for solid state electronic spin ensembles in diamond. [*Phys. Rev. B* **92**, 060301 \(R\) \(2015\)](#).
15. A. Danan, **D. Farfurnik**, S. Bar-Ad, and L. Vaidman. Response: Commentary: Asking photons where they have been – without telling them what to say. [*Front. Phys.* **3**, 48 \(2015\)](#).
16. A. Danan, **D. Farfurnik**, S. Bar-Ad, and L. Vaidman. Asking Photons Where They Have Been. [*Phys. Rev. Lett.* **111**, 240402 \(2013\)](#). [PRL Recommendation & Physics Viewpoint](#).

TALKS

Invited

1. “Spin control of Quantum Dots toward quantum photonic applications”, Physics Colloquium, Queens College of the City University of New York, USA, October 2020 (virtual).
2. “Arbitrary, sequenced spin control of self-assembled Quantum Dots”, JILA Condensed Matter Seminar, University of Colorado, Boulder, USA, October 2020 (virtual).
3. “Enhancing the coherence properties of quantum dots toward quantum photonic applications”, Joint Condensed Matter Seminar, University of Connecticut, Storrs, USA, and Nordita, Nordic Institute for Theoretical Physics, Stockholm, Sweden, July 2020 (virtual).
4. “Spin Dynamics, Depolarization, Decoherence and Dynamical Decoupling”, Joint Quantum Institute Seminar, University of Maryland, College Park, USA, August 2019.
5. “Spin ensembles in diamond for sensing and many-body physics”, Condensed Matter Seminar, Tel-Aviv University, Israel, May 2019.
6. “Spin ensembles in diamond for sensing and many-body physics”, Solid-State Institute Seminar, Technion – Israel Institute of Technology, Haifa, Israel, May 2019.
7. “Spin ensembles in diamond for sensing and many-body physics”, Optics Seminar, Bar-Ilan University, Ramat Gan, Israel, March 2019.
8. “Spin ensembles in diamond for sensing and many-body physics”, Atomic, Molecular and Optical Physics Seminar, Weizmann Institute of Science, Rehovot, Israel, March 2019.
9. “Spin ensembles in diamond for sensing and many-body physics”, Quantum Optics Seminar, Ben Gurion University of the Negev, Beersheba, Israel, February 2019.
10. “Pursuing many-body dynamics in spin ensembles in diamond”, JILA Public Seminar, University of Colorado, Boulder, USA, January 2019.
11. “Pursuing many-body dynamics in spin ensembles in diamond”, Institute for Molecular Engineering Seminar, University of Chicago, USA, January 2019.
12. “Pursuing many-body dynamics in spin ensembles in diamond”, Joint Quantum Institute Seminar, University of Maryland, College Park, USA, January 2019.

13. “Spin Ensembles in Diamond for Sensing and Many-Body Physics”, Taiwan-Israel Workshop on Spin Manipulation and Measurement in Thin Layer Materials, Jerusalem, Israel, October 2018.
14. “Pursuing many-body dynamics in spin ensembles in diamond”, The Quantum Engineering Technology Labs seminar, University of Bristol, United Kingdom, July 2018.
15. “Pursuing many-body dynamics in spin ensembles in diamond”, The Quantum Information Science and Quantum Computation group seminar, University of Vienna, Austria, July 2018.
16. “Pursuing many-body dynamics in spin ensembles in diamond”, The Institute for Quantum Optics Seminar, Ulm University, Germany, June 2018.
17. “Pursuing many-body dynamics in spin ensembles in diamond”, Physikalisches Institut seminar, University of Stuttgart, Germany, June 2018.
18. “Identifying and decoupling many-body interactions of NV ensembles”, QDiamond 2018 – International Workshop on Quantum Information using NV Centers in Diamond, Tel-Aviv, Israel, April 2018.
19. “Pursuing many-body dynamics in spin ensembles in diamond”, The HUJI Racah Institute Colloquium, Jerusalem, Israel, April 2018.
20. “Spin ensembles in diamond for sensing and many-body physics”, The HUJI Nano Annual Conference, Dead Sea, Israel, March 2018.
21. “Pursuing many-body dynamics in medium-density spin ensembles in diamond”, The Walsworth Group Seminar, Harvard University, Cambridge, Massachusetts, USA, September 2017.
22. “Pursuing many-body dynamics in medium-density spin ensembles in diamond”, MIT-Harvard Center for Ultracold Atoms Special Seminar, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA, September 2017.
23. “Improving the coherence properties of solid-state spin ensembles via optimized dynamical decoupling”, DIADEMS Summer School, Diamonds and Spins, Cargese, Corsica, France, May 2016.
24. “Improving the Coherence Time of Electronic Spin Ensembles in Diamond”, Condensed Matter Seminar, Nordita, Nordic Institute for Theoretical Physics, Stockholm, Sweden, June 2015.

25. “Increasing the coherence time of electronic spins in diamond – toward improved magnetic sensing and quantum information”, Condensed Matter Seminar, Tel-Aviv University, Israel, May 2015.
26. “Using weak measurements to improve interference contrast and investigate photon trajectories”, Optical Society of America Nanophotonics and Optics Seminar, Hebrew University of Jerusalem, Israel, December 2013.

Contributed

27. “All-Optical Raman-Based Noise Spectroscopy of Solid-State Spin Qubits”, Quantum Information and Measurement Conference, Washington DC, USA, November 2021 (virtual).
28. “Single-shot readout of a solid-state spin in a decoherence-free subspace”, 11th International Conference On Quantum Dots, Munich, Germany, December 2020 (virtual).
29. “Arbitrary sequenced spin control of a Quantum Dot strongly coupled to a photonic crystal cavity”, Frontiers in Optics Conference, Washington DC, USA, September 2020 (virtual).
30. “Spin ensembles in diamond for sensing and many-body Physics”, Quantum Information and Measurement Conference, Rome, Italy, April 2019.
31. “Spin ensembles in diamond for sensing and many-body Physics”, The Center of Quantum Information Science & Technology conference, Ben Gurion University of the Negev, Beersheba, Israel, May 2018.
32. “Identifying and decoupling many-body interactions in spin ensembles in diamond”, The Israel Physical Society Annual Meeting, Technion – Israel Institute of Technology, Haifa, Israel, December 2017.
33. “Enhanced nitrogen-vacancy concentration in diamond through optimized electron irradiation“, OASIS6 Conference on Optics and Electro-Optics, Tel-Aviv, Israel, February 2017.
34. “Enhanced nitrogen-vacancy concentration in diamond through optimized electron irradiation”, The Israel Physical Society Annual Meeting, Tel-Aviv University, Israel, December 2016.
35. “Improving the coherence properties of solid-state spin ensembles via optimized dynamical decoupling”, SPIE Photonics Europe Conference, Brussels, Belgium, April 2016.

36. “Enhanced coherence properties and solid-state spin ensemble magnetometry using optimized dynamical decoupling “, The Israel Physical Society Annual Meeting, Bar Ilan University, Ramat Gan, Israel, December 2015.
37. “Optimizing a Dynamical Decoupling Protocol for Nitrogen-Vacancy Center Ensembles”, Technion – Israel Institute of Technology, Haifa, Israel, February 2015.