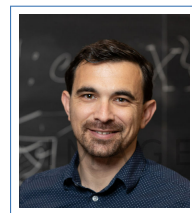


Lior Alon

CV

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Research interests

My works lie under the fields: mathematical physics, Fourier analysis and quasi-crystals, spectral geometry and nodal count, quantum chaos and quantum graphs.

My passion is the interplay between physics and the many facets of mathematics. Within my works you can find connections to Number theory, Morse theory, probability, dynamics, and ergodic theory, among others.

Academic Appointments

- 2025–2026 **Post-Doctoral Associate**, Massachusetts Institute of Technology (MIT).
Simons collaboration for waves localization. Host - David Jerison
- 2024–2025 **Instructor**, Massachusetts Institute of Technology (MIT).
Department of mathematics. Courses: Fourier Analysis, Spectral Theory
- 2022–2024 **Post-Doctoral Associate**, Massachusetts Institute of Technology (MIT).
Simons collaboration for waves localization. Host - David Jerison
- 2020–2022 **Post-Doctoral Member**, Institute for Advanced Study (IAS), Princeton.
Host - Peter Sarnak

Academic Degrees

- 2015–2020 **Ph.D. in mathematics**, *Technion*, Haifa, Israel.
Quantum Graphs - Nodal count, Neumann count and generic eigenfunctions. Supervisor - Prof. Ram Band. Direct track.
- 2012–2015 **B.Sc. in mathematics and physics**, *Technion*, Haifa, Israel.
Cum Laude.
- 2006–2009 **B.A. multidisciplinary curriculum**, *Haifa University*, Haifa, Israel.
As part of the naval academy training. Magna Cum Laude.

Awards

Research Awards:

- 2025 Infinite Expansion Award, MIT School of Science
- 2020 The Foundation for Excellence in Mathematics award for outstanding doctoral dissertation (Technion).
- 2019 Jacobs scholarship (Technion).
- 2018 Haim Hanani prize (Technion).
- 2018 Pinchi scholarship (Technion).

Teaching Awards:

- 2018–2019 Consistent excellence in teaching prize.

2017 Excellent teaching assistant prize.

Publications

- L. Alon and M. Goresky. *Nodal count for a random signing of a graph with disjoint cycles*. Accepted for publication in Journal of Spectral Theory (JST), to appear.
- L. Alon, M. Kummer, P. Kurasov, C. Vinzant. *Higher Dimensional Fourier Quasicrystals from Lee–Yang Varieties*. Inventiones Mathematicae 239, 321-376 (2025).
- L. Alon, C. Vinzant. *Gap distributions of Fourier quasicrystals with integer weights via Lee–Yang polynomials*. Rev. Mat. Iberoam. 40, no. 6 (2024): 2203-2250.
- L. Alon, M. Goresky. *Morse theory for discrete magnetic operators and nodal count distribution for graphs*. Journal of Spectral Theory 13.4 (2023): 1225-1260.
- L. Alon, A. Cohen, C. Vinzant. *Every real-rooted exponential polynomial is the restriction of a Lee–Yang polynomial*. Journal of Functional Analysis 286, no. 2 (2024): 110226.
- L. Alon. *Generic Laplacian eigenfunctions on metric graphs*. Journal d’Analyse Mathématique. 152, no. 2 (2024): 729-775.
- L. Alon, R. Band, G. Berkolaiko. *Universality of nodal count distribution in large metric graphs*. Experimental Mathematics 33, no. 2 (2024): 301-335.
- L. Alon, R. Band. *Neumann Domains on Quantum Graphs*. Ann. Henri Poincaré, vol. 22, no. 10 (2021): 3391-3454.
- L. Alon, R. Band, M. Bersudsky, S. Egger. *Neumann domains on graphs and manifolds*. Analysis and Geometry on Graphs and Manifolds 461, no. 203-249 (2020): 1-2.
- L. Alon, R. Band, G. Berkolaiko. *Nodal Statistics on Quantum Graphs*. Communications in Mathematical Physics 362 (2018): 909-948.
- Y. Shapira, M. Mutzafi, G. Harari, I. Kaminer, L. Alon, M. Segev. *Cerenkov radiation from particles carrying orbital angular momentum in a cylindrical waveguide*. In 2016 Conference on Lasers and Electro-Optics (CLEO), pp. 1-2. IEEE, 2016.

Preprints:

- L. Alon, J. Urschel. *Average Nodal Count and the Nodal Count Condition for Graphs*. arXiv:2404.03151 (2024).
- L. Alon, G. Berkolaiko and M. Goresky. *Smooth critical points of eigenvalues on the torus of magnetic perturbations of graphs*. arXiv:2505.17215 (2025).
- L. Alon and M. Kummer. *Periodic hypersurfaces and Lee–Yang polynomials*. arXiv:2507.16029 (2025).

Selected Talks

Here is a list of some of the talks I was invited to give in the last two years:

- 2024 *Mini Course: Nodal count of eigenvectors and Morse theory of spectral bands for magnetic operators on graphs.* TXST Summer School in Mathematical Physics, UT San Marcos.
- 2024 *The average nodal count and the nodal count condition for graphs.* AMS fall sectional meeting, UT San Antonio.
- 2024 *A construction of Fourier quasicrystals via Lee-Yang varieties.* Simons Collaboration Workshop: Geometry, Disorder, and Delocalization of Eigenfunctions. MIT.
- 2023 *Finite quantum graphs and algebraic geometry.* Workshop on Algebraic Geometry in Spectral Theory. ICERM, Brown university.
- 2023 *Nodal count and Morse theory of magnetic operators on graphs.* Analysis seminar, Yale.
- 2023 *Fourier Quasicrystals via Lee-Yang Polynomials.* Colloquium, Hebrew university.

Mentoring Experience

- 2025 **Mentor**, Massachusetts Institute of Technology (MIT).
Students: Ezra Guerrero and Oluyinka Lindblad. Project: *Nodal count for the Anderson model*. Program: SPUR+.
- 2024 **Mentor**, Massachusetts Institute of Technology (MIT).
Students: Allen Lin and Roni Edwin. Project: *The Gauss Circle Problem for Fourier Quasicrystals*. Program: SPUR+.
- 2023 **Mentor**, Massachusetts Institute of Technology (MIT).
Student: Adam Rothbaum. Project: *Dependence of the Gap Distribution of Quantum Graphs on the Dimension of the Edge Lengths over the Rational Numbers*. Program: UROP.
- 2018 **Mentor**, Center for Mathematical Sciences, Technion.
Students: Tamuz Ofer, Neta Madvil, Sapir Yevdaiev, and Ran Kiri. Project: *Bounding the number of wavelengths in a quantum graph*. Program: Math department Summer projects.

Academic Service

- 2024 **Workshop organizer.**
I organized the workshop on Geometry, Disorder, and Delocalization of Eigenfunctions, at MIT, as part of the Simons collaboration on localization of waves.
- 2018–today **Referee.**
Inventiones, Letters in Mathematical Physics, Journal of Spectral Theory, Journal of Mathematical Physics, Annals Henri Poincare, Experimental Mathematics, Proceedings of the 8th ICCM,
- 2018–2020 **Graduate Seminar Organizer.**
Initiating and organizing the 'What Is' seminar, mathematics graduates seminar, Technion.

Teaching experience

- 2025 **18.104 introduction to ODE, Instructor (TA).**
Massachusetts Institute of Technology (MIT)
- 2024 **Seminar in Analysis, Instructor (sole lecturer).**
Massachusetts Institute of Technology (MIT)
- 2019 **Calculus, T.A.**

- 2015–2019 **Multivariable Calculus**, *T.A.*
2016–2018 **Introduction to Probability**, *T.A.*
2018 **Complex Analysis**, *T.A.*

Extracurricular Activities

- 2016–2020 **Community Engagement.**
Organizer of annual 'Wine & Cheese' social event for graduate students, Technion.
- 2015–2020 **Student Representation.**
Math graduate student representative, Students Association of the Technion.
- 2012–2015 **Student Representation.**
Math undergraduate student representative, Students Association of the Technion.
- 2012–2017 **Competitive Sports.**
Member of the Technion rowing crew, 3-time state champions.

Non-Academic Experience

Seven years of service in the Israeli Navy as a naval officer.

Rank: Lieutenant commander (res.).

- 2011–2012 **Head of Department, Naval Operations Platoon.**
Planning and executing highly complicated operations. Navy representative to civilian organizations. In charge of knowledge management.
- 2009–2011 **Operations Specialist Officer in a Missile Boat Unit.**
Managing the naval combat systems. Member of the command team. Responsible for mentoring and training junior officers.
- 2006–2009 **Commander of a Naval Operations Division in the Naval Academy.**
Leadership of soldiers and officers. Coordinating multi-disciplinary operations. Responsible for training and evaluations.