

CURRICULUM VITAE Professor Eli Barkai

Current Address:

Prof. Barkai received his B.Sc, M.Sc, and Ph.D in Physics from Tel-Aviv university. His M.Sc. and Ph.D degrees were received with summa cum laude. During his Ph.D studies he developed the now well known fractional kinetic framework describing anomalous transport in dynamical systems. In 1998, he joined the Chemistry department in Massachusetts Institute of Technology for his postdoctoral research. He there developed the theory of single molecule spectroscopy. He joined the faculty in Notre Dame University Indiana in 2002. In 2004 he returned to Israel to join the Physics Department at Bar-Ilan University. He now works on the theory of weak ergodicity breaking, proposing an extension of standard ergodic statistical mechanics. Physical application of infinite ergodic theory is a related theme. He continued developing theories of photon counting statistics for single molecule spectroscopy, in particular single photon spectroscopy. He then turned to the investigation of dynamics of single molecules in the live cells and the investigation of statistical mechanics of cold atoms in optical traps. More recently he studies hitting times and search in quantum mechanics including the applicability to quantum computers. In his research he combined tools from quantum optics, statistical mechanics, chemical physics and condensed matter theory. His work on the theory of blinking quantum dots and single molecule spectroscopy, sheds light on the fundamental problem of noise in nano technology, and his work on single photon control is related to applications of quantum computation and cryptology.

Academic Employment

2010 Professor, Department of Physics, Bar-Ilan University.

2009 Visiting scientist, Massachusetts Institute of Technology sabbatical with Prof. Silbey.

2007- Associate Prof. Department of Physics, Bar-Ilan University.

2005 Visiting Professor, University of Notre Dame.

2004-07 Senior Lecturer, Department of Physics, Bar-Ilan University.

2002-05: Assistant Professor, Department of Chemistry and Biochemistry, University of Notre Dame.

1998-02: Post-doctoral fellow at the School of Chemistry, Massachusetts Institute of Technology with Prof. Silbey.

Higher Education

1995-1998: Ph.D. student, School of Physics and Astronomy, Dept. of Condensed Matter, Tel-Aviv University. Subject of thesis: “Generalized Collision Models Lévy Walk Approach”. Degree received *summa cum laude*.

1992-1994: M.Sc. student School of Physics and Astronomy, Dept. of Condensed Matter, Tel-Aviv University. Subject of thesis “From Mechanical Collisions To Brownian Motion”, Degree received *summa cum laude*.

1989-1991: B.Sc. in Physics, Tel Aviv University.

Awards and Academic Honors

1. Dean’s list of distinguished M.Sc. students, 1994.
2. Receipt of M.Sc. *summa cum laude*.
3. Shenkar scholarship for excellence in graduate studies in, 1995.
4. The Salim and Rachel Bannin scholarship for excellence 1998.
5. Receipt of Ph.D. *summa cum laude*.
6. **Yeshiahu Horowitz Science of Complexity Fellowship** (2004).
7. **Krill prize for excellence in scientific research** selected by the Wolf Foundation (2006).
8. **The Michael Bruno Memorial Award** funded by Yad Hanadiv (2009).
9. **Friedrich Wilhelm Bessel Research Award** selected by the Alexander von Humboldt foundation (2011).
10. Ludwig Maximilians universität München Center for Nanoscience publication award (2011).
11. Academic cooperation award Alexander von Humboldt foundation (2018) (roughly 12000 Euro).
12. Best lecturer award, Bar-Ilan Physics Department, (2019).

13. Bar-Ilan Rector's prize for scientific innovation (5000 NIS) (2020).
14. Entropy Best paper award (2021).
15. Appointment as distinguished fellow, senior advisory group scientist, with the Asia Pacific Center for Theoretical Physics (APCTP) June. 2022, March 2024 (Postech Korea).

Publications

Barkai published 191 papers. Many papers appeared in leading journals, such as Physics Today, Phys. Rev. Letters, Nature communications, etc. According to google scholar number of citations as of Feb. 2023, is 15941 and the h-index is 61. A full list of publications can be found on google scholar.

Teaching Experience Courses Taught

Stochastic Processes in Physics, Quantum Mechanics 1 and 2 Statistical Mechanics and Thermodynamics 1 and 2 Electrodynamics

Scientific Referee

- *NSF (USA), Israel Science Foundation, US-Israel Binational Science Foundation Phys. Rev. Lett., Phys. Rev., Proceeding of the National Academy of Science USA, Single Molecules, J.of Statistical Physics, Journal of Physics A: Mathematical and Theoretical, Chemical Physics, The Journal of Chemical Physics, The Journal of Physical Chemistry, Journal of Luminescence, physica status solidi, ChemPhysChem, Chemical Physics, Biophysical Journal, Europhysics Letters, J. of Computational Physics, New J. of Physics, Physica, Molecular Physics, Journal of Mathematical Physics, Journal of Statistical Mechanics: theory and experiment, Journal of the Royal Society Interface, Chaos, Fluctuation and Noise Letters, Nuclear Physics A, Proceedings of the Royal Society A: Mathematical, Physical and Engineering sciences, Chaos, Solitons and Fractals, Reports on Progress in Physics, Journal of applied mathematics, Advances in Mathematical Physics, Chinese physics B, Advances in water resources, Review of Modern Physics, Scientific reports, Nature Physics, Nature communications, Le Studium, Science advances, Communication in Nonlinear Science and Numerical Simulations, Journal of Taibah University of Science, Dynamics of Atmospheres and Oceans, Physical Biology.*

Current and Pending Support 2012 – –

12. From Lévy fluctuations to ergodicity breaking Israel Science Foundation, grant 376/12 with D. Kessler (Oct. 2012- Oct. 2016) 270000 Shekel (67500 \$) per year.
13. WE-Heraeus Seminar 22 – 27 May 2016: Quantifying complex transport with Lévy walks: from cold atoms to humans and robots S. Denisov, E. Barkai, and P. Hänggi, 33000 Euro

14. Dr. Felix Thiel's grant from Deutsche Forschungsgemeinschaft (DFG) roughly 54000×2 Euro (post-doc salary and expenses) July-2017 – 19 on First Detection Problem in Quantum Physics.
15. Summer School: Stochastic Processes with Applications to Physics and Biophysics. 106860 Shekel (Sept. 2017).
16. WE-Heraeus Seminar 2018: Search and Problem solving by random walks Tamás Kiss, Sergey Denisov and Eli Barkai (42,500 Euro).
17. Making sense of non-normalized densities: Infinite Ergodic Theory from $1/f$ noise to cold atoms Israel Science Foundation with David Kessler, 320,000 Shekel times 4 which is roughly equal to 360,000 USA dollars. With David Kessler. October 2017 - Sept. 2021.
18. Next step in random walks: Understanding mechanisms behind complex spreading phenomena. A CECAM Workshop in Tel-Aviv with S. Denisov, and M. Urbakh, 2018 (12000 Euro).
19. Sandwich scholarship, funded by the council for higher education, for Dr. Wanli Wang 2019 (80,000 Shekel).
20. Sandwich scholarship, funded by the council for higher education, for Zhenbo Ni 2019 under the supervision of David Kessler (80,000 Shekel).
21. China-India-Israel scholarship for Wanli Wang 2020 (90,000 Shekel).
22. Dr. Marc Hoell's grant from Deutsche Forschungsgemeinschaft (DFG) roughly 55000 Euro (post-doc salary) Jan. -2020 – 21 on Big Jump Principle for Correlated Processes.
23. Infinite Ergodic Theory: Thermodynamics and Transport Israel Science Foundation with David Kessler (2021-2024). Roughly 300,000 Shekel times 4
24. London Mathematical Laboratory fellowship (3000 pounds) [2020 – ...]
25. Dr. Marc Hoell's grant from Deutsche Forschungsgemeinschaft (DFG) roughly 55000 Euro (post-doc salary) Jan. -2021 – 22 on Big Jump Principle for Correlated Processes.
26. Kollman Soref scholarships for postdocs: Nickolay Korabel (2009) Daniela Fromberg (2013) Johannes Schulz (2014) Felix Thiel (2016) Lucianno Defaveri (2022) roughly 14000 \$ each.
27. Yad Hanadiv support for international conference Extreme Events in Physics and Climate, 87000NIS (2022).

Research Personnel and Visitors

Yong He (post-doc, research associate), Igor Rozhkuv (post-doc), Gennady Margolin (post-doc), Ren Yongqiang (graduate), Vladimir Protasenko (with Prof. Kuno), Golan Bel (research associate), Tzahi Peleg (graduate), Adi Rebenshtok (graduate, PhD), Stanislav Burov (PhD), Faina Shikerman (graduate), Tzvi Shemer (PhD), Adrian Budini (visitor), Michael Lomholt (visitor), Lior Turgeman (graduate) Nickolay Korabel (post-doc), Weihua Deng (visitor) Shai Carmi (research associate) Guy Milshtain (physics project), Nava Leibovish (graduate, PhD) Roberto Venegeroles (visitor), Andreas Dechant (long term visitor), Shimon Yudovich (undergraduate), Elad Bar (undergraduate) Daniela Fromberg (post-doc), Erez Aghion (graduate, PhD), Lukasz Machura (visitor), Idan Niv (undergraduate), Daniel Yonat (undergraduate), Dan Fishgold (undergraduate), Inbar Savorai (undergraduate), Takuma Akimoto (visitor), Netanel Hazot (graduate), Shalom Tzvi Shafier (graduate), Harel Friedman (graduate), Johannes Schulz (post-doc), John Lapeyre (visitor), Netanel Barel (graduate), Hila Cohen (undergraduate), Dotan Ankri (undergraduate), Ruthi Balter (undergraduate), Anna Bodrova (visitor), Itzhak Fouxon (research associate), Felix Thiel (post-doc), Jun Zhang (long term visitor), Daxing Xiong (long term visitor), Lior Zarfaty (PhD), Mattya Ben-Efraim (undergraduate), Talia Baravi (undergraduate) Adily Goldenzweig (undergraduate), Ittai Mualem (undergraduate), Peng Yonggang (visitor), Wanli Wang (post-doc), Mario Hidalgo-Soria (PhD), Ruoyo Yin (graduate, PhD), Avihai Didi (graduate), Quancheng Liu (graduate, PhD) Yijun Lu (undergraduate) Marc Hoell (post-doc), Zhenbo Ni (PhD long term visitor), Dror Meidan (graduate) Bijoy Daga (visitor), Aviram Samama (graduate), Omer Hamdi (graduate), Talia Baravi (PhD), Ido Simon (undergraduate), Eden Sadeh (undergraduate). Itai Hudes (undergraduate), Qingyuan Wang (undergraduate) Silin Ren (undergraduate)

Advisory Committees, Editorial Boards, Professional Organizations

1. Advisory Committee of International SigmaPhi Conference on Statistical Physics. Orthodox Academy of Crete, Greece (2008), Larnaka Cyprus (2011) Rhodes (2014) Corfu (2017).
2. Scientific committee the seventh International Workshop on Applied Probability IWAP Jerusalem (2012).
3. Steering committee for bi-annual meeting on fractional differentiation and its applications (2012-...).
4. Editorial Board of the International Journal of Statistical Mechanics, Hindawi Publishing Corporation (2013-2015)
5. Member of the institute for complex adaptive matter (ICAM consurium) (2013-...).
6. Member of the research council of the Hugo Steinhaus centre Wrocklaw Poland (2013-2016).
7. Editorial Board and Associate Editor Chaos, Solitons and Fractals: the interdisciplinary journal of nonlinear science, and non-equilibrium and complex phenomena. Grigolini, Boccaletti, Courbage chief editors (2014-2015).

8. Guest editor, Fractional Dynamics special issue J. Stat. Mech. Theory and Experiment (JSTAT) (2014).
9. Chairperson Statistical Physics Session, Israel Physical Society meeting (2014).
10. Programme committee: International conference Stochastic Modeling of Anomalous Dynamics in Complex Physical and Biological Systems, Wrocklaw (2015).
11. Editorial board Journal of Statistical Mechanics: theory and experiments (2015-....).
12. Advisory Committee of the UPoN Conference series (2017-..).
13. Editorial board of Entropy section statistical physics (2020-..).
14. Editorial board of the soon launched ChemPhysMater (2020-..).
15. Guest editor *Proceeding of the National Academy of Science USA* (2020).
16. London Mathematical Laboratory Fellowship (2020-..).
17. Disciplinary committee for faculty members at Bar-Ilan (2020-..).
18. Editorial board Fractal and Fractional (2021-..).