NIR LIVNE

Jerusalem, Israel

I am an experimental physicist drawn to biological problems. In my PhD, I paired quantitative experiments with mathematical models to explore how motile bacteria navigate complex environments through chemotaxis. While I focused most of my formal training on statistical physics and nonlinear dynamics, I also studied quantum mechanics, general relativity, economics, neuroscience, and more. I enjoy running, building DIY projects, and spending time with my family. Having launched projects in academia, industry, and at my own bench, I plan to bring the same initiative and multidisciplinary mindset to new questions in biological physics as a postdoc.

EDUCATION

- **PhD Student (Physics) Prof. Ady Vaknin's Lab, The Hebrew University of Jerusalem (October 2021 - Present)**
  I study how E. coli bacteria navigate complex environments via their chemotaxis system. My research spans emergent behavior at the population scale and sub-cellular signaling within chemoreceptor arrays, combining quantitative experiments with mathematical modeling and numerical simulations.
- **M.Sc. in Physics (MAGNA CUM LAUDE), Prof. Ady Vaknin's Lab, The Hebrew University of Jerusalem (October 2019 – September 2021)**
  Thesis title: Bacterial response to conflicting chemotactic signals.
- **B.Sc. in Physics, Amirim Honors Program (MAGNA CUM LAUDE), The Hebrew University of Jerusalem (October 2016 – September 2019)**

ACADEMIC EXPERIENCE

- **Internship on microfluidics, Gabriel Amselem's Lab (active matter), École Polytechnique (France, September 2021 – December 2021)**
  Studied collective behavior of Chlamydomonas under phototactic stress, focusing on active matter dynamics. The internship included fabrication of microfluidic devices and hydrogel micropatterning.
- **Teaching assistant (Physics), The Hebrew University of Jerusalem (September 2019 – Present)**
  Developed a new biophysics experimental setup (fluorescence microscopy), led lectures, guided undergraduate lab experiments, and provided feedback to students.
- **University-appointed tutor, The Hebrew University of Jerusalem (October 2018 – Present)**
  Provided one-on-one tutoring in physics and mathematics for new immigrants and students needing additional support.
- **Research assistant, Ady Vaknin's Lab, The Hebrew University of Jerusalem (September 2017 - September 2018)**

SELECTED WORK EXPERIENCE

- **3D scanning (point-cloud acquisition).** Founded a new department in an engineering firm, selected and operated 3D scanners for point-cloud capture of industrial sites (e.g., Intel), analyzed results with CAD software, and coordinated with clients.
- **CCTV installation (team manager).** Oversaw installation projects, managed an on-site team, and installed electronic equipment.

PERSONAL PROJECTS

I have a small workshop at home for 3D printing, laser cutting, woodworking, electronics, and other DIY projects. I share some of my projects online through my personal website (nirlivne.com), instructables.com, and YouTube.

AWARDS & HONORS

- Racah Prize for Excellence in Teaching (2025)
- Milner 70@70 Fellowship – 4-year full funding for outstanding PhD candidates (2022–present)
- Excellence scholarship for PhD admission (2021–present)
- Graduated M.Sc. with Honors (*magna cum laude, final grade: 97/100*, *2021*)
- Erasmus+ mobility scholarship (2021)
- Dean's List (2020, M.Sc.); awarded the Dean's Prize (top 2.5% of the faculty)
- Excellence scholarship for M.Sc. admission (2019–2021)
- Graduated B.Sc. in Physics and Amirim Multidisciplinary Honors Program with honors (*magna cum laude, final grade: 95/100, 2019*)
- Dean's List (2019, B.Sc.)
- Amirim Honors Program scholarship – full tuition (2016–2019)
- 1st-year tuition (B.Sc.) based on psychometric score (*754/800, top 1% nationwide, 2016*)
- Winner of 20 contests (>$2,500 in prizes) for ideas, inventions, and tutorials (link).

PUBLICATIONS

- **Livne, N.** & Vaknin, A. (2025). *Bacterial condensation is fundamentally constrained by the emergence of active turbulence.* Under review (PNAS).

- Frank, V.*, **Livne, N.***, Koler, M. & Vaknin, A. (2025). *Single-array measurements reveal non-uniform, mosaic-like chemosensory arrays in bacteria.* Accepted (Nature Communications). ***Equal contribution.**

- **Livne, N.**, Vaknin, A. & Agam, O. (2025). *Pattern formation in E. coli through negative chemotaxis: instability, condensation, and merging.* Phys. Rev. Res.

- **Livne, N.**, Koler, M. & Vaknin, A. (2024). *Collective condensation and auto-aggregation of Escherichia coli in uniform acidic environments.* Commun. Biol.

- **Livne, N.** & Vaknin, A. (2022). *Collective responses of bacteria to a local source of conflicting effectors.* Sci. Rep.