

Daniel Ariad

Bioinformatics data scientist · Physicist

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Summary

As a bioinformatics data scientist at PrognomiQ Inc, I focus on researching and devising innovative solutions to tackle the analytical complexities associated with analyzing molecular entities in biological fluids. I'm a physicist by training, with research experience in condensed matter and astrophysics. I'm interested in adapting theory and analytical approaches from these fields to develop genetic tests for early detection of diseases and disorders. I received my Ph.D. from Ben-Gurion University of the Negev and subsequently worked as postdoctoral fellow at Indiana University Bloomington and Johns Hopkins University.

Professional Experience

- Oct 2022 - Present **Bioinformatics Data Scientist**, PrognomiQ Inc, CA, USA
Developed a methodology based on fragmentomics and methylation to estimate the proportion of cell-free tumor DNA in liquid biopsies, enhancing early cancer detection capabilities. Moreover, I spearheaded a comprehensive analysis of the company's genomics dataset, assessing the reproducibility of measurements and the detection boundaries of tumor signals through the implementation of diverse features and techniques. Recently, I developed an approach to identify tumor related peptides from a library-free data-independent acquisition of proteomics.
- Mar 2020 - Oct 2022 **Postdoctoral Researcher**, Johns Hopkins University, MD, USA
Uncovered basic mechanisms responsible for chromosomal abnormalities and the development of diagnostic tests to detect them. To this end, I developed classifiers to distinguish meiotic and mitotic aneuploidies and infer sex-specific landscapes of recombination. The categorization process is accomplished through Bayesian statistical models that I crafted for extremely low-coverage whole-genome sequencing from preimplantation genetic testing for aneuploidy.
- Mar 2019 - Mar 2020 **Postdoctoral Researcher**, Indiana University Bloomington, IN, USA
Classified phases of matter and phase transitions in disordered Graphene, using high performance clusters.
- Apr 2018 - Mar 2019 **Postdoctoral Fellow**, Ben-Gurion University of the Negev, Israel
Studied edge modes in topological insulators.
- 2009 - 2018 **Teaching Assistant**, Ben-Gurion University of the Negev, Israel
Labs instructor and teaching assistant in undergraduate physics courses

Education

- Ben-Gurion University of the Negev** *Israel*
PhD in Theoretical condensed matter physics *2013 - 2018*
• Advisor: Dr. Eytan Grosfeld
• Thesis: "Studied the geometric phases in topological superconductors."
- Ben-Gurion University of the Negev** *Israel*
MSc in Astrophysics *2009 - 2013*
• Advisor: Dr. Michael Gedalin
• Thesis: "The role pickup ions play in the termination shock."
- Ben-Gurion University of the Negev** *Israel*
BSc in Physics *2006 - 2009*

Military Service

Jul 2003 - Jul 2006 **Sergeant First Class**, Combat Corps, IDF, Israel
Electro-optic technician. Tested, evaluated, and analyzed EO/IR devices. Performed test planning, day-to-day operation, data analysis, and the preparation of reports.

Selected publications, Preprints and Patents

Daniel Ariad, Svetlana Madjunkova, Mitko Madjunkov, Siwei Chen, Rina Abramov, Clifford Librach, Rajiv C. McCoy. “Aberrant landscapes of maternal meiotic crossovers contribute to aneuploidies in human embryos”
bioRxiv, 2023.06.07.543910 (2023)

Daniel Ariad, Stephanie M. Yan, Andrea R. Victor, Frank L. Barnes, Christo G. Zouves, Manuel Viotti, Rajiv C. McCoy. “Haplotype-aware inference of human chromosome abnormalities”.
PNAS November 16, 2021 118 (46) (2021) bioRxiv:10.1101/2021.05.18.444721

Daniel Ariad, Rajiv C. McCoy, Manuel Viotti. Patent: “Methods and related aspects for analyzing chromosome number status”. Patent status: pending, PCT/US2021/058219

Daniel Ariad, Yshai Avishai and Eytan Grosfeld. “How vortex bound states affect the Hall conductivity of a chiral $p \pm ip$ superconductor”. Phys. Rev. B 98, 104511 (2018), arXiv:1603.00840. Appeared on PRB Kaleidoscope (Sep 2018)

Daniel Ariad, and Eytan Grosfeld. “Signatures of the topological spin of Josephson vortices in topological superconductors”. Phys. Rev. B 95, 161401(R) (2017), arXiv:1301.0538

Daniel Ariad, Eytan Grosfeld, and Babak Seradjeh. “On the effective theory of vortices in two-dimensional spinless chiral p-wave superfluid”. Phys. Rev. B 92, 035136 (2015), arXiv:1407.2553

Daniel Ariad, and Michael Gedalin. “The role pickup ions play in the termination shock”. Journal of Geophysical Research: Space Physics 118.6 (2013): 2854-2862.

Awards and Fellowships

- 2022 **Best Poster Award**, RECOMB 2022, the 26th edition of a series of algorithmic computational biology conferences, San-Diego, CA
- 2018 **Short-term post-doctoral fellowship**, The Kreitman School for Advanced Research Studies, Ben-Gurion University of the Negev
- 2014 **Scholarship for outstanding doctoral students**, Ilse Katz Institute for Nanoscale Science & Technology. (Declined due to a conflict with Negev-Zin policy)
- 2014 **The Negev-Zin scholarship for outstanding doctoral students**, Ben-Gurion University of the Negev

Technical Skills

Languages **Python, Julia**, Bash, C++, SQL, HTML, CSS, PHP and Assembler.
Bioinformatics **cfDNA sequencing, Methylation Sequencing**, RNAseq, WGS, WGBS, Single-Cell (10x) and Microarrays.
Productivity **Latex, Git**, Confluence, Slack, Zoom, JIRA

Service and Outreach

Peer Review

- 2020-2021 **Nature**, Reviewer of Springer Nature
- 2015-2018 **Physical Review Letters, Physical Review B**, Journal Referee of the American Physical Society (APS Physics)