Daniel Ariad

Physics PhD · Scientific Polymath · AI & Algorithm Architect

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Summary

Applied scientist with a track record of conceiving and developing mathematical models and computational algorithms to solve complex scientific problems. My work includes solutions for cancer detection and reproductive medicine by combining statistical inference, mechanistic modeling, machine learning, and domain-specific knowledge to analyze sparse, noisy, and high-dimensional data. I enjoy turning imperfect data into reliable, actionable insights. I earned my PhD at Ben-Gurion University and conducted postdoc research at Indiana University Bloomington and Johns Hopkins.

Professional Experience

Applied Scientist | **Evidium Inc,** San Francisco, CA, USA — Feb 2026 – Jun 2026

- Developed rule-based and unsupervised clustering methods to extract and analyze oncology treatment patterns from large-scale healthcare RWD.
- Translated oncology clinical guidelines into machine-readable rules and billing-code mappings using an LLM-assisted agent coupled with validation tests to enforce logical consistency and code-system integrity while enabling scalable, reproducible feature generation from claims data.

Senior Data Scientist | **PrognomiQ Inc,** San Mateo, CA, USA — Jul 2024 – Dec 2025

- Identified key biomarkers for early lung cancer detection and translated findings into data-driven recommendations for R&D product development.
- Integrated clinical data with proteomic and metabolomic measurements to uncover sources of technical bias and implement model improvements that enhanced the accuracy and reproducibility of machine-learning classifiers.
- Developed and validated machine learning models, leveraging multi-omics data from mass spectrometry, Luminex, ELISA, and RNA-seq.
- Automated model training, evaluation, and deployment workflows using the AWS SDK for Python (boto3), enabling execution at scale.

Bioinformatics Data Scientist | **PrognomiQ Inc,** San Mateo, CA, USA — Oct 2022 – Jul 2024

- Formulated a methodology based on fragmentomics and methylation patterns to estimate the proportion of cell-free tumor DNA in liquid biopsies, enhancing early cancer detection capabilities.
- Spearheaded a comprehensive analysis of the company's genomics dataset, assessing the reproducibility of measurements and the detection boundaries of tumor signals.
- Developed a DBSCAN-inspired clustering approach to identify tumor-related peptides from library-free data-independent acquisition proteomics.
- Enhanced cancer diagnostic models by customizing scikit-learn machine-learning frameworks, with identified biomarkers guiding diagnostic product development. Additionally, developed variant-calling approaches to identify cancer-associated genetic alterations.

Postdoctoral Researcher | **Johns Hopkins University,** Baltimore, MD, USA — Mar 2020 – Oct 2022

- Specialized in developing diagnostic solutions for reproductive medicine. More specifically, I identified the basic mechanisms responsible for chromosomal abnormalities in early embryonic development and conceived diagnostic tests to detect them.
- Developed machine learning classifiers to distinguish between meiotic and mitotic aneuploidies and to infer sex-specific recombination patterns.
- Formulated Bayesian statistical models for classification, tailored for extremely low-coverage whole-genome sequencing data from preimplantation genetic testing for aneuploidy.

Postdoctoral Researcher | **Indiana University Bloomington,** Bloomington, IN, USA — Mar 2019 – Mar 2020

- Modeled the formation of flat bands in twisted bilayer graphene at low magnetic fields.
- Built a classifier to predict phases of matter and phase transitions in disordered Graphene, leveraging high performance clusters.

Graduate Researcher | **Ben-Gurion University of the Negev,** Beer-Sheva, Israel — Oct 2013 – Nov 2018

- Formulated models to study phases of matter and the properties of quantum vortices in topological superconductors, using quantum field theory and tight-binding models with advanced gauge techniques.
- Demonstrated the ability to articulate complex scientific concepts through high-impact research publications and collaborative projects.

Master's Researcher | **Ben-Gurion University of the Negev,** Beer-Sheva, Israel — Oct 2009 – Jul 2012

- Conceived numerical methods for studying plasma dynamics in space, integrating theoretical physics with practical computational applications.
- Built mathematical models and developed algorithms to interpret space observation data from the spacecraft Voyager II, contributing to the understanding of solar wind interactions with the interstellar medium.

Education

PhD in Physics (Condensed Matter) — Oct 2013 – Nov 2018
Ben-Gurion University of the Negev — Beer-Sheva, Israel

MSc in Physics (Astrophysics) — Oct 2009 – Jul 2012
Ben-Gurion University of the Negev — Beer-Sheva, Israel

BSc in Physics — Oct 2006 – Oct 2009
Ben-Gurion University of the Negev — Beer-Sheva, Israel

Selected publications, Preprints and Patents

- **Daniel Ariad**, Manuel Viotti, Rajiv McCoy. "Methods for distinguishing aneuplodies in non-invasive prenatal testing". Patent Application number: PCT/US2023/081262; Patent number: WO 2024/129354 A1; Publication date: June 20, 2024.
- **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" Genome Research. 2024 Jan 1;34(1):70-84, bioRxiv:10.1101/2023.06.07.543910
- **Daniel Ariad**, Manuel Viotti, Rajiv McCoy. "Methods and related aspects for analyzing chromosome number status". Patent Application number: US 18/035,811; Patent number: US 2023/0307130 A1; Publication date: September 28, 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), bioRxiv:10.1101/2021.05.18.444721; Appeared on the PNAS cover
- **Daniel Ariad**, Yshai Avishai and Eytan Grosfeld. "How vortex bound states affect the Hall conductivity of a chiral p ± ip superconductor". Phys. Rev. B 98, 104511 (2018), arXiv:1603.00840; Appeared on PRB Kaleidoscope
- **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

Technical Skills

Programming Languages	**Python, Julia**, Bash, C++, SQL, HTML, CSS, PHP and Assembler.
Python Packages	**pandas, numpy, scipy, scikit-learn, pytorch**, matplotlib, pysam, cyvcf2 and gmpy2
Sequencing assays	**DNA-seq, RNA-seq, Epigenomics**, Microarrays, Single-cell RNA-seq and Mass Spec-Based Proteomics.
Bioinformatics tools	**BWA, Samtools, Cell Ranger, Nextflow**, Bedtools, GATK and Scanpy.
Genomic databases	**1000 Genomes Projects**, GTEx, TCGA and COSMIC.
Productivity	**Latex, Git**, Confluence, Slack, Zoom and JIRA.
Healthcare	**Real-world data (RWD), Electronic Health Record (EHR)**, ICD-10, CPT, HCPCS, NCCN and ESCP.

Service and Outreach

2020 – 2024	**Reviewer of manuscripts for Nature Portfolio Journals** – Nature, Nature Communication, Cell Discovery
2015 – 2018	**Journal Referee for the American Physical Society** – Physical Review Letters, Physical Review B