

CHEN GADI

Physics & Mathematics Graduate with Honors | Master's Student in Physics

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I am Chen, currently pursuing a Master's degree in physics, with a strong passion for theoretical frameworks and a solid foundation in practical applications. I thrive in tackling complex problems and am motivated by opportunities that require innovative thinking and advanced mathematical tools. My expertise lies in leveraging foundational principles in Topology, Homotopy Theory, Group Theory, Statistical Physics, Perturbation Theory, and Analytical Electrodynamics. I hold a B.Sc. in Mathematics and Physics with honors and have a strong passion for Quantum Technologies, Quantum Information, and Machine Learning.

EDUCATION

- **M.Sc. in Particle Physics, Tel Aviv University | 2024 – Present**
- **B.Sc. in Mathematics and Physics, Tel Aviv University**
Graduated with Honors | 2020 – 2024
 - **GPA:** Magna Cum Laude
 - **Dean's List for 2024**
 - **Activities and Societies:**
 - **Working Together, Dean of Students, TAU:** Tutor program for first-year students (2021-2022, 2022-2023).
 - **VC Club:** 2022-2023.

SKILLS

- **Programming:** Python (SciPy, NumPy, TensorFlow, Pandas), Qiskit, MATLAB, LaTeX
- **Machine Learning:** Deep Learning, PINNs, Variational Calculus, Bayesian Methods (MAP Estimation), Diffusion-based Models
- **Mathematical Modeling:** PDEs, Wave Equations, Numerical Optimization
- **Problem-solving:** Creative and effective problem-solving with theoretical and computational approaches.
- **Educational development:** Passionate about developing and delivering educational materials, with three years of experience as a teaching assistant.
- **Creativity:** Strong creative skills applied to both technical challenges and the development of innovative solutions.
- **Self-learner:** Highly autodidactic, adept at quickly acquiring new knowledge and mastering new technologies.

PROJECTS

- **Statistical Mechanics of Learning: Unrealizable Binary Perceptron (Course Assignment)**
 - Modeled a machine learning system through a statistical physics lens, formulating learning as a **Gibbs posterior** and extracting macroscopic behavior via **replica-symmetric mean field** analysis.

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- Derived and interpreted self consistent **saddle point equations** (order parameters) using **Gaussian field decomposition** and high dimensional asymptotics, linking theory to generalization behavior.
- Built a fast **Metropolis MCMC simulation** pipeline to probe the energy landscape, validate theoretical predictions, and produce publication style diagnostic plots/tables.
- **Tools:** Python, NumPy, Monte Carlo (Metropolis MCMC), Statistical Mechanics (Replica/Mean-Field Methods), Probabilistic Modeling.
- **Physics-Informed Neural Networks for PDE Solutions (Course Project)**
 - Developed deep learning models to solve PDEs, leveraging **PINNs (Physics-Informed Neural Networks)**.
 - Implemented optimization methods: **ADAM & L-BFGS** for efficient training.
 - Applied methods to **Allen-Cahn Equation, Heat Equation, and Nonlinear Schrödinger Equation (NLS)**.
 - Designed architectures optimizing error reduction using **tanh(x), ReLU, Swish, and Xavier/He normal initialization**.
 - **Tools:** Python, TensorFlow, Deep Learning Theory, Variational Calculus.
- **Image Processing & Reconstruction Using Machine Learning & Variational Methods (Course Project)**
 - Implemented **Anisotropic Diffusion (Perona-Malik)** for noise reduction and edge preservation in images.
 - Developed **Bayesian Priors & MAP Estimation** techniques for image denoising and reconstruction.
 - Used **Variational Calculus & Diffusion Methods** for improving image fidelity.
 - Applied **Deep Learning-based priors** for restoration in ill-posed imaging problems.
 - **Tools:** Python, OpenCV, SciPy, TensorFlow.
- **Astrophysical Modeling Using PINNs**
 - Applied **Physics-Informed Neural Networks (PINNs)** to study complex astrophysical phenomena.
 - Focused on modeling the **inflowing and rotating hot Circumgalactic Medium (CGM)**.
 - Utilized **Deep Learning and TensorFlow** to analyze high-dimensional astrophysical data.
 - **Tools:** Python, TensorFlow, HDF5, Deep Learning Theory.

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- **AKLT Model Implementation (Outstanding Research Week for Physics, Technion 2023)**
 - Studied and implemented the **AKLT model**, crucial for comprehending quantum spins and physical topology.
 - Explored its significance in **quantum computing**, especially in relation to topological phases and quantum entanglement.
 - Utilized **Julia and Python** for numerical simulations, focusing on identifying the Hamiltonian's ground states.
 - **Tools:** Python, Julia, QuTiP, Pandas.
- **Super-Resolution Optical Fluctuation Image Scanning Microscopy (SOFISM) (Amos De-Shalit Ulpana, Weizmann Institute, 2022)**
 - Studied and implemented **SOFISM**, an advancement in **super-resolution optical microscopy**.
 - Applied **Python and MATLAB** for image processing, leveraging SOFISM's **2.5x lateral resolution enhancement** beyond the diffraction limit.
 - Utilized mathematical tools to optimize **ISM technique** for efficient image acquisition.
 - **Tools:** Python, MATLAB.

EXPERIENCE

- **CO-Founder Q.T.C – Quantum Technologies Community @ TAU** **JULY 2023-present**
- **RESEARCH ASSISTANT, ASTROPHYSICS DEPARTMENT OF TAU** **AUG 2023**
 - Utilizing Physics-Informed Neural Networks (PINNs) to study complex astrophysical phenomena, notably the inflowing and rotating hot Circumgalactic Medium (CGM) as a part of SUMMER PROJECT.
 - Skills: Python - TensorFlow, HDF5, Deep Learning Theory and Astrophysics concepts.
- **TEACHING ASSISTANT, TEL AVIV UNIVERSITY** **September 2022 – Present**
Tutor in Linear Algebra, Calculus 1, and Calculus 2, and exercises grader for Linear Algebra, Calculus 1 and 2, Complex Functions, and Ordinary Differential Equations (ODE).
- **LECTURER, Xtra Student** **MAY 2024 – Present**
Lecturer in supplementary courses at the **Xtra Student Learning Center**, assisting students in mastering challenging topics and preparing for exams

Military Service

2015-2018

Combat soldier, *THE MISSILE BOAT FLOTILLA (SHAYETET 3)*, *ISRAELI NAVY*

Communication, navigation, and encryption systems technician as well as Missile fire controller at INS "EILAT". In addition to the role: Team leader of a group of combatants; Marine firefighter; "Mahanet 2018" - Board of Directors

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VOLUNTEER EXPERIENCE

- Reserve Service – “Miluim” 100+ days.
- SCOUTS' EMISSARY IN BEIT SHEAN - "SHINSHIN", HEBREW SCOUTS MOVEMENT IN ISRAEL.