

Anil Radhakrishnan

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Summary

Computational Physics PhD with 8 years of research experience and 15 years of programming experience. Extensive experience in machine learning and complex system modeling, with a focus on bridging physics and AI. Proven track record of advancing interdisciplinary research and delivering practical solutions through data-driven modeling.

Education

Aug 2020 – May 2025	Ph.D. , Physics, North Carolina State University
Aug 2020 – Dec 2022	M.Sc. , Physics, North Carolina State University
Aug 2016 – Dec 2019	B.Sc. Physics, University of Illinois at Urbana-Champaign

Research Experience

Nonlinear Dynamics & Deep Learning

[North Carolina State University](#)

Raleigh, NC

Aug 2020 – May 2025

Supervised by [Dr. William Ditto](#)

- Implemented and validated novel sustainable and adaptive neural network architectures.
- Developed self-supervised learning approaches for neural architecture optimization.
- Established framework for gradient-based optimization of complex nonlinear logic systems.
- Provided well documented open source implementations of all discoveries using JAX.

High Energy Physics & Deep Learning

[University of Illinois and CERN](#)

Urbana, IL

Aug 2018 – Jul 2020

Supervised by [Dr. Benjamin Hooberman](#)

- Designed multi-modal deep learning architectures (RNN/GRUs) to classify leptons using data from the ATLAS detector.
- Collaborated with cross-functional teams to integrate ML models into a large-scale data processing and analysis system.
- Ported SOTA models from PyTorch to ONNX for efficient deployment and integration into C++ codebase.

Applied Superconductivity | Lee Teng Intern

Batavia, IL

Fermilab

May 2018 – Aug 2018

Supervised by [Dr. Mattia Checchin](#)

- Analyzed superconducting RF cavities to improve gradient and quality factor.
- Automated the data acquisition and processing pipeline for superconducting RF cavities, achieving a $48\times$ increase in data processing efficiency by replacing a manual workflow with a custom C++ implementation and Python wrapper.

Experimental Condensed Matter

Urbana, IL

University of Illinois

Oct 2016 – May 2018

Supervised by [Dr. Virginia Lorenz](#)

- Designed and fabricated thin films for use in magneto-optic experiments.
- Laid the foundation for a second harmonic optical system to image magnetic ordering in thin films.

Awards & Honors

2022	Graduate School Summer Fellowship (\$2500)
2019	Lorella M. Jones Summer Research Award (\$2500)
2018	Lee Teng Undergraduate Fellowship (\$5400)

Publications

Journal Articles

- J1. **Radhakrishnan, Anil**, Sinha, S., Murali, K. & Ditto, W. L. Gradient based optimization of Chaogates. *Chaos, Solitons & Fractals* **192**, 116007. ISSN: 0960-0779. <http://dx.doi.org/10.1016/j.chaos.2025.116007> (Mar. 2025).
- J2. Choudhary, A., **Radhakrishnan, Anil**, Lindner, J. F., Sinha, S. & Ditto, W. L. Neuronal diversity can improve machine learning for physics and beyond. *Scientific Reports* **13**, 13962. <https://www.nature.com/articles/s41598-023-40766-6> (Aug. 2023).
– In the top 5% of all research outputs scored by [Altmetric](#).
- J3. Wang, W., Wang, T., Amin, V. P., Wang, Y., **Radhakrishnan, Anil**, Davidson, A., Allen, S. R., Silva, T. J., Ohldag, H., Balzar, D., Zink, B. L., Haney, P. M., Xiao, J. Q., Cahill, D. G., Lorenz, V. O. & Fan, X. Anomalous spinorbit torques in magnetic single-layer films. *Nature Nanotechnology* **14**, 819–824. ISSN: 1748-3395. <http://dx.doi.org/10.1038/s41565-019-0504-0> (July 2019).

Working papers

- W1. **Anil Radhakrishnan**, Lindner, J. F., Miller, S. T., Sinha, S. & Ditto, W. L. *When less is more: evolving large neural networks from small ones* ArXiv[Preprint], Revise and Resubmit @ Royal Society. 2025. arXiv: [2501.18012](https://arxiv.org/abs/2501.18012) [cs.LG]. <https://arxiv.org/abs/2501.18012>.

Patents/Inventions

- P1. Ditto, W. L. & **Radhakrishnan, Anil** *United States Provisional Patent Application* 63/747,516. Filed January 21, 2025 as Provisional Patent Serial No. 63/747,516 (2025).
- P2. Ditto, W. L., **Radhakrishnan, Anil** & Lindner, J. F. *United States Provisional Patent Application* 63/749,508. Filed January 25, 2025 as Provisional Patent Serial No. 63/747,516 (2025).
- P3. Ditto, W. L., Choudhary, A., **Radhakrishnan, Anil**, Lindner, J. F. & Russell, K. M. *United States Provisional Patent* 63/327,534. Filed October 1, 2020 as Provisional Patent Serial No. 63/086,549 (2022).

Authored Tools & Software

justBibTex: Simple web app that fetches BibTeX entries for DOIs and arXiv URLs.
Chaogatenn: Code for gradient based optimization of chaogates in JAX.
N3: Code for gradient based neural network size evolution in JAX.
jaxDiversity: Code for metalearning intralayer activation functions in JAX.
DiversityNN: Code for metalearning intralayer activation functions in PyTorch.

Skills

Computation

Languages:

- Proficient: Python, \LaTeX , BASH, C/C++
- Familiar: Julia, MATLAB, Mathematica, HTML, CSS
- Exposure to: Rust, CUDA, LabView

Libraries:

- Contributor: Pytorch, Equinox, Diffrax
- Proficient: JAX, NumPy, SciPy, scikit-learn, Optax, Pandas, wandb, Matplotlib

Tools:

- git, quarto, vim, Jupyter-Notebook, GitHub-actions

Software

- Linux, AutoCAD, OriginPro, Excel

Device

Working experience: • cleanroom photolithography (lift-off and ion mill) • DC magnetron Sputtering • Atomic Layer Deposition • X-ray reflectivity measurement • 4-point probe measurements for sample characterization • Vertical Testing for superconducting cavities • Ultrafast femtosecond lasers optical systems • 3d printing • soldering • machining

Language

- English (Bilingual Proficiency)
- Hindi (Full Professional Proficiency)
- Malayalam (Native Proficiency)
- Arabic (Limited Working Proficiency)

Teaching

- Supervised physics lab courses, teaching and grading 200+ students, and trained 7 undergraduate teaching assistants
- Created computational and organizational resources for physics courses used for 2+ years serving ~1000 students
- Pioneered use of LLMs in introductory physics courses and developed course policy on use of generative AI by students

North Carolina State University

Summer 2025	Instructor resource developer, Introductory Physics
Spring 2025	Teaching Assistant, Graduate Statistical Mechanics
Spring 2025	Teaching Assistant, Introductory Physics
Fall 2024	Instructor resource developer, Introductory Physics
Summer 2024	Physics Labs Instructor, Introductory Physics
Summer 2023–Spring 2024	Lab Instructor-Supervisor, Special Program
Summer 2022–Spring 2023	Physics Labs Instructor, Introductory Physics
Fall 2021–Spring 2022	Physics Tutor, Physics Tutoring Centre
Summer 2021	Instructor resource manager, Introductory Mechanics Lab
Fall 2020–Spring 2021	Physics Labs Instructor, Introductory Physics

Last updated: May 22, 2025