

NICK KONZ

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EDUCATION

Duke University | Durham, NC Expected December 2025
Ph.D. in Electrical and Computer Engineering (Machine Learning Specialty) Cumulative GPA: 3.860/4.000

University of North Carolina | Chapel Hill, NC Graduated May 2020
B.S. in Astrophysics and B.A. in Mathematics Cumulative GPA: 3.914/4.000 Earl Nelson Mitchell Scholar in Physics
Honors: Highest Honors and Highest Distinction Phi Beta Kappa Honors College Member

RESEARCH EXPERIENCE

Mazurowski Lab | Duke University Dept. of Radiology | Durham, NC 2021 - PRESENT
Graduate Research Assistant
Ph.D. research in deep learning with a focus on medical image analysis. Specific fields include anomaly detection, domain adaptation and style transfer. Skills include model conception and development, codebase development and experimentation (Python/PyTorch), and paper publication.

Reichart Lab/Skynet Robotic Telescope Network | UNC Dept. of Physics and Astronomy | Chapel Hill, NC 2017 - 2020
Research Assistant
Undergraduate research and thesis work of statistical computational methods for astronomy. Included the continued development and deployment of the TRK (Trotter-Reichart-Konz Regression) and RCR (Robust Chauvenet Rejection) statistical modeling suites. Skills included codebase development, end-to-end web interface development, and writing associated papers and documentation for publication.

Robert Shelton Award for Outstanding Research (2019) NC Space Summer Research Grant (NASA) (2019)

SELECT PUBLICATIONS

I also have two additional first-author journal papers, one accepted and one in revision, as of 2/4/2023.
Full publication list at scholar.google.com/citations?user=a9rXidMAAAAJ&hl=en.

1. **Konz, N.**, et al. "The Intrinsic Manifolds of Radiological Images and their Role in Deep Learning." *The International Conference of Medical Image Computing and Computer Assisted Intervention (MICCAI)*, **2022**.
2. Swiecicki, A., **Konz, N.**, et al. "A generative adversarial network-based abnormality detection using only normal images for model training with application to digital breast tomosynthesis." *Scientific Reports* **11.1**: 1-13, **2021**.
3. Cao, S., **Konz, N.** et al. "Deep Learning for Breast MRI Style Transfer with Limited Training Data." *Journal of Digital Imaging*: 1-13, **2022**.
4. Maples, M. P., Reichart, D. E., **Konz, N. C.**, et al. "Robust Chauvenet Outlier Rejection." *The Astrophysical Journal Supplement Series* **238.1**: 2, **2018**.

TEACHING EXPERIENCE

Duke University | Durham, NC 2022
Graduate Teaching Assistant
ECE 685D/COMPSCI 675D: Introduction to Deep Learning.

UNC Chapel Hill | Chapel Hill, NC 2017 - 2018
Undergraduate Teaching Assistant
PHYS 119 (Introductory Electromagnetism), MATH 528 (Math. Methods for the Physical Sciences), and MATH 233 (Multivariable Calculus).

ERIRA (UNC Chapel Hill/Green Bank Radio Observatory) | Chapel Hill, NC 2017 - PRESENT
Educator/Coordinator
One of the educators of participants in ERIRA, a yearly week-long intensive radio astronomy research program led by Dr. Daniel Reichart of UNC Chapel Hill. Participant of the 2017 session.

GENERAL TECHNICAL SKILLS

Technological:	Machine Learning and Deep Learning, Algorithms, Numerical Methods, Monte Carlo Methods
Analytical:	Statistical Modeling, Data Analysis, Bayesian Analysis, Software Documentation and Publishing
Specific Computer Skills:	PyTorch, C++-to-Python Wrapping

SPECIFIC COMPUTER SKILLS

Proficient with:	Python (6 yrs.), C++/C (3 yrs.), L ^A T _E X (6 yrs.)
Experienced with:	JavaScript, HTML/CSS (2 yrs.), Vim, Unix, Microsoft Excel
Familiar with:	Wolfram/Mathematica Language

RELEVANT COURSEWORK

Duke University Machine Learning & Computer Science:	<i>Deep Learning, Advanced Topics in Deep Learning, Probabilistic Machine Learning, Engineering Deep Neural Networks, Vector Space Methods</i>
University of North Carolina Machine Learning & Computer Science: Mathematics:	<i>Numerical Techniques, Physical Modeling Multivariable and Vector Calculus, Ordinary Differential Equations, Partial Differential Equations, Linear Algebra, Real Analysis, Complex Analysis, Probability, Mathematical Methods I & II, Fourier Analysis</i>
Physics & Astronomy:	<i>Classical Mechanics, Electromagnetism I & II, Quantum Mechanics I & II, Quantum Computing, Cosmology, Astrophysics, Thermodynamics and Statistical Mechanics, Experimental Techniques, Observational Astronomy/Astronomical Data</i>

TALKS AND TUTORIALS

The Intrinsic Manifolds of Radiological Images and their Role in Deep Learning Talk <i>The Pacific Northwest Seminar on Topology, Algebra, and Geometry in Data Science (TAG-DS), Univ. of Washington Math Dept.</i>	Oct. 2022
What Actually is Artificial Intelligence, and How Does it Relate to Astronomy? Talk <i>Educational Research in Radio Astronomy (ERIRA) 2022, UNC Chapel Hill.</i>	Aug. 2022
Train a Neural Network to Detect Breast MRI Tumors with PyTorch Online Tutorial <i>Parts 1 and 2; featured on the Editors' Picks of Towards Data Science.</i>	2022

INDIVIDUAL RESEARCH GRANTS AND SCHOLARSHIPS

NC Space Summer Research Grant Chapel Hill, NC <i>NASA/NC State</i> Each year, NC Space Grant awards Undergraduate Research Scholarships to students who are pursuing careers in science, technology, engineering and mathematics (STEM) fields that support NASA's Mission Directorates. This competitively awarded program engages the future STEM workforce in basic and/or applied aerospace-related research projects and facilitates the development of mentor relationships between students, faculty and the NASA community. (For my work with Prof. Daniel Reichart.)	2019
Earl Nelson Mitchell Scholarship in Physics Chapel Hill, NC <i>UNC Department of Physics and Astronomy</i> Recommended for this scholarship by faculty in the department in recognition of outstanding academic record; The Earl Nelson Mitchell Scholarship was an estate gift to the University, with a provision to establish a scholarship to an outstanding junior or senior majoring in Physics or Astronomy.	2018 - 2020
NC Space Spring Research Grant Chapel Hill, NC <i>NASA/NC State</i> The NC Space Grant Undergraduate Scholarship Program is a competitive scholarship program funded by NASA with the goals of: increasing participation in STEM-related research and careers by students, establishing relationships with a faculty member and a NC Space Grant Undergraduate Research Scholar or Graduate Fellow, and interacting with faculty/other scholars to learn more about the STEM discipline and current research projects and opportunities. (For my work with Dr. Daniel Reichart.)	2018

AWARDS & HONORS

Judges' Choice Award Durham, NC <i>Pratt School of Engineering, Duke University</i> For my research poster "The Intrinsic Manifolds of Radiological Images and their Role in Deep Learning" at the Pratt School of Engineering Fall 2022 poster session.	2022
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Robert Shelton Award for Outstanding Research | Chapel Hill, NC

2019

UNC Department of Physics and Astronomy

This award recognizes outstanding academic performance as a major in the department, and is the highest level research award given by the department.

Benjamin Swalin Orchestra Award | Chapel Hill, NC

2020

UNC Department of Music

This award was established in 2000 in honor of Maestro Swalin, former conductor of the UNC Symphony Orchestra and subsequently Music Director of the North Carolina Symphony for 33 years. The award is given to graduating seniors who have made significant contributions in artistry and leadership to the UNC orchestra program during their undergraduate years. The recipients are determined by the orchestra director.

Most Innovative Hack | Chapel Hill, NC

2018

HackNC Hackathon (UNC Chapel Hill)

A member of the five-person team that created the project "Simulating the Spread of Ideas with Epidemiology" in 24 hours at the 2018 HackNC Hackathon, for which we won the award of "Most Innovative Hack" (see "Other Projects").

Dean's List | Chapel Hill, NC

2016-2020

UNC Chapel Hill

Every semester of my undergraduate coursework.

ORGANIZATIONAL MEMBERSHIP**Effective Altruism (Arete Fellowship)** | Chapel Hill, NC

2020 - PRESENT

*Member (UNC Chapel Hill)***Phi Beta Kappa Academic Honor Society** | Chapel Hill, NC

2018 - PRESENT

*Member (UNC Chapel Hill)***UNC Math Help Center** | Chapel Hill, NC

2018 - 2020

*Volunteer Tutor***Annual Math Counts Competition** | Chapel Hill, NC

2018 - 2020

*Volunteer Grader***American Physical Society**

2018 - PRESENT

*Member***Society of Physics Students ($\Sigma\Pi\Sigma$)** | Chapel Hill, NC

2017 - PRESENT

*Member (UNC Chapel Hill)***UNC Honors College** | Chapel Hill, NC

2016 - 2020

*Member***UNC Symphony Orchestra** | Chapel Hill, NC

2016 - 2020

*Co-principal French Horn***UNC Wind Ensemble** | Chapel Hill, NC

2016 - 2017

*Co-principal French Horn***REFERENCES****Prof. Maciej A. Mazurowski** | Duke University

Graduate research advisor (deep learning and medical image analysis). Email: ✉ maciej.mazurowski@duke.edu

Prof. Vahid Tarokh | Duke University

Professor for my deep learning teaching assistantship and coursework. Email: ✉ vahid.tarokh@duke.edu

Prof. Daniel E. Reichart | UNC Chapel Hill

Undergraduate research advisor (statistical methods for astrophysics). Email: ✉ reichart@physics.unc.edu