

# DUNCAN WILKIE

## PERSONAL INFORMATION

*Born in Arkansas, 3 July 2002*

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"The aim of theory really is, to a great extent, that of systematically organizing past experience in such a way that the next generation, our students and their students and so on, will be able to absorb the essential aspects in as painless a way as possible..." — Sir Michael Atiyah

## EDUCATION

*2019–2023*                      BS Physics, BS Mathematics · 3.76 GPA

*Louisiana State  
University*

Dual degrees, *cum laude*. 15 hours of graduate-level math. Thesis: PyPHITS: A Python Porcelain for JAEA's PHITS.

## RESEARCH PROJECTS AND WORK EXPERIENCE

*Spring 2023*                      Heegaard Floer Homology of 1-1 Knots

*LSU Math 4997*

As the capstone requirement for my math degree, I worked with a professor and graduate student on the mathematical study of a particularly powerful knot invariant. I automated the drawing of the diagrams used to compute this invariant and did exploratory application of Prolog's Popper, an inductive logic programming framework, to automatically generate combinatorial conjectures from lists of data produced by third parties.

Advisor: Jeffery CHANCELLOR · [jeff@spartanphysics.com](mailto:jeff@spartanphysics.com)

*Oct 2022–  
May 2023*                      Research Commercialization

*Atlantis Industries*

I was hired as software engineer/research scientist by my advisor's startup, among its first employees, to commercialize technologies the lab and I had developed in academia, with a grant from the US Space Command. The company was sold this summer.

Advisor: Jeffery CHANCELLOR · [jeff@spartanphysics.com](mailto:jeff@spartanphysics.com)

*Nov 2021–  
May 2023*                      PHITS Usability Improvements

*SpaRTAN Physics*

I designed and implemented a Python interface to the card-input Monte Carlo radiation transport code used by the research group. This opened many further opportunities for integrating highly-validated transport simulations in larger HPC pipelines, especially the inverse design and computational phantom evaluation workloads that compose the lab's primary scientific output. I also developed an Emacs major mode for the input format and a POSIX-friendly invocation script. Advisor: Jeffery CHANCELLOR · [jeff@spartanphysics.com](mailto:jeff@spartanphysics.com)

*Summer 2021*                      Spaceflight Radiation Detector Development

*SpaRTAN Physics*

I was the primary software developer of an iOS-based interface for ADVACAM's MiniPIX detectors, doing 100% of the Swift app development and much of the embedded C implementation of Apple's proprietary iAP2 protocol. Each was my first project in its respective language. The work was intended to fly on SpaceX's Inspiration 4 mission, and we hope it'll become useful for medical physics researchers. Advisor: Jeffery CHANCELLOR · [jeff@spartanphysics.com](mailto:jeff@spartanphysics.com)

*AY 2020*      Independent Reading in Quantum Information

COVID left few traditional research opportunities, so I self-directed some quantum information reading. I began with the Chuang-Nielsen text, and later started to pick up papers in categorical quantum mechanics when I learned of its namesake mathematical field via classes in homotopy theory.

*Summer 2020*      Data Science Intern

I modernized the data pipelining, improved correctness and performance, and ported to Python an old SPSS model that estimated repair time of tractors from basic data (e.g. mileage, repair location). Worked with database systems, most of the features of scikit-learn, SPSS, Databricks, and the Azure DevOps platform.

*AY 2019*      Selected Readings in Functional Analysis

I was directed to read about some of the basics of Lebesgue integration, function spaces, semigroup theory, divergent series, and asymptotic analysis. This work was to result in a poster on weak ODE solutions, but plans were called off due to COVID-induced cancellation of the poster session (and in-person meetings).

Advisor: Frank NEUBRANDER · [neubrand@math.lsu.edu](mailto:neubrand@math.lsu.edu)

## PRESENTATIONS

*October 2021*      Embedded Development for Spaceflight Radiation Detectors

Showcase of the summer 2021 research described above at a statewide poster session for undergraduate and graduate students funded through NASA EPSCoR.

Authors: Duncan Wilkie, Jacob Miller, Jared Taylor, Jeffery Chancellor

## TEACHING

*AY 2018* · High/elementary school math and ACT prep tutoring.

*Aug 2019—May 2023* · Informal homework help for other physics majors.

*Fall 2020* · Engineering physics recitation leader.

*Apr 2022—* · Online, informal tutoring on Discord.

## AWARDS AND SCHOLARSHIPS

*2019–2023* · LSU Ann and Clarence P. Cazalot Jr College of Science HonorsScholar

*2019–2023* · LSU President's Future Leader in Research

*AY 2021* · NASA EPSCoR Louisiana Space Grant Consortium Undergraduate Research Assistantship

*2022* · LSU Goldwater Fellowship Nominee

August 9, 2023

*J. B. Hunt  
Transport Services*

*LaSPACE Council  
Meeting*