712 W. Green St. Urbana, Illinois, 61801 | (408) 821-8416 | [*sapatha2@illinois.edu*](mailto:sapatha2@illinois.edu)

**EDUCATION ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯**

**University of Illinois at Urbana-Champaign**

*PhD in Physics*  Expected graduation: May 2021

* Preliminary examination completed Fall 2019 GPA: 3.95/4.00
* Relevant coursework: Statistical Learning (STATS 547)

*Bachelor of Science in Physics, Minor in Mathematics* Aug 2013 – May 2016

* Summa Cum Laude, Highest Distinction in Curriculum: Physics GPA: 3.95/4.00
* Relevant coursework: Tensor and vector calculus (MATH 481), Linear algebra (MATH 415)

**RESEARCH AND WORK EXPERIENCE ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯**

**Graduate Researcher in Lucas Wagner Group ⎯** Champaign, IL Fall 2016 – Present

* Use of the supervised machine learning framework Density Matrix Downfolding and *ab initio* quantum mechanics simulations in model Hamiltonian development for quantum systems on high dimensional Hilbert spaces
  + Models already built: non-interacting model Hamiltonian for bulk silicon, many-body model for CuO molecule
* Implementation, optimization and testing of compact quantum wave functions in high dimensional Hilbert spaces
* Development of highly parallel real space *ab initio* quantum Monte Carlo codes: QWalk in C++, PyQMC in Python

**Graduate Teaching Assistant ⎯** Champaign, IL Fall 2016, Fall 2017, Spring 2018, Fall 2018, Spring 2019

* Taught PHYS 212, PHYS 213/214 and PHYS 436
* “Teacher Ranked as Excellent” all five semesters, evaluated by Illinois Center for Innovation in Teaching & Learning

**Graduate Intern at Lawrence Livermore National Lab ⎯** Livermore, CA Summer 2017

* Development of distributed sparse matrix operations on massively parallel quantum simulation code using C++
* Correspondence with experts at LLNL: Daniel Osei-Kuffuor, Jean-Luc Fattebert

**Graduate Intern at Lawrence Livermore National Lab** **⎯** Livermore, CA Summer 2016

* Development and testing for a massively parallel code hydrodynamics code Miranda using FORTRAN 2003 with C/C++ interoperability and Lua interfacing
* Correspondence with experts at LLNL: Samuel Schofield, Bryan Johnson, Andy Cook

**Undergraduate Researcher in Karin Dahmen Group ⎯** Champaign, IL 2013 – 2016

* Data analysis and function fitting for experimental slip avalanche data from nanopillars to earthquakes

**PUBLICATIONS AND AWARDS ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯**

W. Wheeler, **S. Pathak**, L.K. Wagner, “Fitting effective models using QMC parameter derivatives”, APS March Meeting Conference, 5 March 2019.

**S. Pathak**, L.K. Wagner, “Non-orthogonal determinants in multi-Slater-Jastrow trial wave functions for fixed-node diffusion Monte Carlo”, *J. Chem. Phys.* 149 (2018). (<https://doi.org/10.1063/1.5052906>)

**S. Pathak,** L.K. Wagner, “Non-Orthogonal Determinant Multi-Slater-Jastrow Wave Functions in QMC”, APS March Meeting Conference, 3 March 2018.

**S. Pathak,** L.K. Wagner, “Implementing orbital optimization of quantum Monte Carlo wavefunctions in QWalk”, National High Magnetic Field Laboratory Theory Winter School, 12 January 2017.

J.T. Uhl, **S. Pathak** *et al.*  “Universal Quake Statistics: From Compressed Nanocrystals to Earthquakes,” *Scientific Reports* **5**, 16493 (2015). doi:10.1038/srep16493. (<http://www.nature.com/articles/srep16493)>

University of Illinois at Urbana-Champaign University Fellowship Fall 2019

Phi Beta Kappa Honor Society December 2016

Golden Key International Honor Society December 2016

Lorella M. Jones Summer Research Award Summer 2014 University Achievement Scholarship Fall 2013 – Spring 2016

**SKILLS ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯**

Python, C/C++, Git, MATLAB, OriginPro, Linux OS (3+ yrs.); MPI, FORTRAN, Javascript (1 yr.); HTML, Java, Lua (6 mo.)  
 ML libraries and visualization software: scikit-learn, Pandas, seaborn, Vega (3+ yrs.); PyTorch, Tensorflow (6 mo.)

**LEADERSHIP AND ACTIVITIES ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯**

**Wesley Food Pantry** **Board Member and Volunteer ⎯** Champaign, IL 2017 – Present