

Sebastian Dick | CV

✉ sebastian.dick@stonybrook.edu • 📄 semodi.github.io

EDUCATION

Stony Brook University

Ph.D. student, Physics

Stony Brook, NY

2016–present

Stony Brook University

M.A., Physics

Stony Brook, NY

2014–2015

University of Wurzburg, Germany

B.Sc. with distinction, Physics

Wurzburg, Germany

2011–2014

RESEARCH

Stony Brook University

Research Assistant, Advisor: Dr. Mariivi Fernandez-Serra

Stony Brook, NY

May 2017–present

- Machine learning and Density Functional Theory: Investigate how both can work together to achieve faster and more accurate electronic-structure calculations.
- NeuralXC: Development of a Python framework that lets users train and use density functionals based on machine learning.
- Physics inspired deep learning: Encode physical symmetries in neural network architectures to improve generalization. Work on equivariant neural networks.

University of Wurzburg

Independent research under Dr. Ronny Thomale

Wurzburg, Germany

Aug. 2015–Aug. 2016

- Studied symmetry protected topological phases and conformal field theory
- Developed a C++ code `ed_ising` that allows for the exact diagonalization of 1-d quantum Hamiltonians under various symmetries and boundary conditions

Stony Brook University

Master thesis research, Advisor: Dr. Lukasz Fidkowski

Stony Brook, NY

Jan.–July 2015

- Analyzed short-range entangled topological phases protected by time-reversal symmetry
- Proved that the microscopic model for these phases proposed by Chen et al. and the non-linear sigma model effective field theory are equivalent.

University of Wurzburg

Bachelor thesis research, Advisor: Dr. Ronny Thomale

Wurzburg, Germany

Jan.–July 2014

- Worked with a group-internal Fortran code called FRG that uses the Functional Renormalization Group approach to study phase transitions in strongly correlated systems
- Studied the dependence of high temperature superconductivity in cuprates on doping.

PROFESSIONAL DEVELOPMENT

MLSS 2019

Machine Learning Summer School at University College London

London, UK

July 2019

Parallel Computing in Molecular Sciences

MolSSI Summer School and Workshop

Berkeley, CA

Aug. 2018

Software Carpentry

Instructor training program

Became a certified Software Carpentry Instructor

Stony Brook, NY

Jan. 2018

TEACHING EXPERIENCE

Stony Brook University

Teaching Assistant

Taught life science and physics students in the lab sections of introductory physics courses and graded their activities

Stony Brook, NY

Aug. 2016–May 2017

University of Wurzburg

Teaching Assistant

Taught recitation for a course on mathematical methods for physicists. Supported and graded students in the theoretical condensed matter physics graduate seminar.

Wurzburg, Germany

Oct.–July 2016

PRESENTATIONS

Molecular Simulation with Machine Learning

Presentation

Title: Machine learned XC potentials in SIESTA: NeuralXC

Princeton, NJ

July 2020

Joint Science Meeting

Presentation

Title: Machine learning a highly accurate exchange and correlation functional of the electronic density

Tokyo Institute of Technology, Japan

May 2019

APS March Meeting

Presentation

Title: Learning from the Density to Correct Total Energy and Forces in First Principle Simulations

Boston, MA

Mar. 2019

Gordon Research Conference on Water and Aqueous Solutions

Poster presentation

Presented poster: Combining DFT and Machine Learning: towards faster and more accurate ab-initio calculations of water

Holderness, NH

July 2018

EXTRA-CURRICULAR ACTIVITIES

IACS Diversity & Recruitment Committee

Student Member

Stony Brook, NY

Sept. 2018–present

Initiative Junge Forscherinnen und Forscher e.V.

Teacher

Non profit organization dedicated to teaching high school students physics and nano-science with modern classroom experiments

Wurzburg, Germany

Jan.–July 2016

University of Wurzburg

Physics Student Council Member

Supporting and counseling physics students. Representing students' interests towards university administration.

Wurzburg, Germany

Feb. 2012–July 2014

AWARDS

"Investment" Software Fellowship

MolSSI

Blacksburg, VA

Jan. 2020–June 2021

Jr. Researcher Award

Institute for Advanced Computational Science

Stony Brook, NY

Sep 2019

"Seed" Software Fellowship

MolSSI

Blacksburg, VA

Jan.–June 2019

Jr. Researcher Award

Institute for Advanced Computational Science

Stony Brook, NY

Sept. 2018

DAAD Stipend

USA Exchange Program

Sept. 2014

LANGUAGES

German (native), English (fluent verbal and written), Italian and French (basic verbal and written)

SKILLS

Python, Fortran, C++, OpenMP, MPI, Tensorflow, Pytorch, MySQL, Bash, Git

Publications

Sebastian Dick and Marivi Fernandez-Serra. Machine learning accurate exchange and correlation functionals of the electronic density. *Nature communications*, 11(1):1–10, 2020.

Sebastian Dick and Marivi Fernandez-Serra. Learning from the density to correct total energy and forces in first principle simulations. *The Journal of Chemical Physics*, 151(14):144102, 2019.