

## CONTACT INFORMATION

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## EDUCATION

**Arizona State University**, Tempe, Arizona Dec. 2023  
Ph.D. Physics (condensed matter theory)  
Supervisor: A. S. Botana  
*Thesis: Electronic structure of rare-earth nickelates from first-principles*

**Piedmont College**, Demorest, Georgia 2019  
B.S. Applied Mathematics & Physics, *Summa Cum Laude*

## RESEARCH EXPERIENCE

Graduate Research Assistant, *Arizona State University (Botana group)* 2020 – 2023

- Designed, executed, and published research papers studying quantum materials (e.g., high- $T_c$  superconductors, 2D magnetism) using a variety of *ab-initio* methods (DFT, DFT+DMFT).
- Built and contributed to open-source scientific and data analytic software tools (see [software portfolio](#)).
- Excellent teamwork and collaboration skills demonstrated by simultaneously working on several projects with internal and external research groups.
- Advanced technical communication skills evidenced by several published peer-reviewed articles, conference presentations, and courses taught at the high-school and undergraduate levels.

Pre-Doctoral Researcher, *Center for Computational Quantum Physics, Flatiron Institute* 2022

- Contributed several [pull requests](#) to open-source [software](#) used for computational research in quantum many-body theory (e.g., DMFT).
- Collaborated cross-functionally to design and implement production quality software (in Python and C++) that met computational, mathematical, and physical requirements.

Graduate Research Student, *Arizona State University (Sulc group)* 2019

- Developed machine learning models (e.g., neural networks, natural language processing) for RNA folding prediction.
- Designed and implemented novel reinforcement learning algorithm for RNA folding prediction. Project hosted [here](#).

Research Intern (NSF REU), *Michigan State University* 2018

- Benchmarked several machine learning algorithms as a data analysis technique for spectroscopy experiments.
- Developed convolutional neural network (CNN) as data analysis tool for electron spectroscopy experiments. Project hosted [here](#).

## TECHNICAL SKILLS

*Software portfolio hosted on [GitHub](#)*

Electronic structure (*ab-initio*) methods: VASP, QE, Wien2k, Wannier90, TRIQS  
Programming languages: Python, C++, Julia, Go, SQL  
Software tools: git, cmake, bash, HPC architectures, linux  
Machine learning: Sci-kit learn, PyTorch, Tensorflow  
Data analysis and visualization using the scientific python stack

*Full list of publications can be found on [Google Scholar](#).*

H. LaBollita, A. Hampel, J. Karp, A. S. Botana, and A. J. Millis, “Conductivity of infinite-layer NdNiO<sub>2</sub> as a probe of spectator bands,” *Phys. Rev. B* **107**, 205155 (2023).

H. LaBollita, M. Jung, and A. S. Botana, “Many-body electronic structure of  $d^{9-\delta}$  nickelates,” *Phys. Rev. B* **106**, 115132 (2022).

H. LaBollita and A. S. Botana, “Correlated electronic structure of a quintuple-layer nickelate,” *Phys. Rev. B* **105** 085118 (2022).

G. A. Pan, D. F. Segedin, H. LaBollita et al., “Superconductivity in a quintuple-layer square-planar nickelate,” *Nature Materials* **21**, 160-164 (2022).

H. LaBollita and A. S. Botana, “Tuning the Van Hove singularities in  $AV_3Sb_5$  ( $A = K, Rb, Cs$ ) via pressure and doping,” *Phys. Rev. B* **104**, 205129 (2021).

M. Akram\*, H. LaBollita\*, D. Dey, J. Kapeghian, A. S. Botana, and O. Erten, “Moiré skyrmions and chiral magnetic phases in twisted CrX<sub>3</sub> ( $X = I, Br, Cl$ ) bilayers,” *Nano Letters* **21**, 15, 6633-6639 (2021).

H. LaBollita and A. S. Botana, “Electronic structure and magnetic properties of higher-order nickelates:  $La_{n+1}Ni_nO_{2n+2}$  ( $n = 4 - 6$ ),” *Phys. Rev. B* **104** 035148 (2021).

PRESENTATIONS

† = Talk  
° = Poster

H. LaBollita†, TRIQS Developer Meeting, Paris, France Sept. 2023  
H. LaBollita†, APS March Meeting, Las Vegas, NV, USA Mar. 2023  
H. LaBollita†, APS March Meeting, Online due to COVID-19 Mar. 2021  
H. LaBollita°, APS March Meeting, Boston, MA, USA Mar. 2019

AWARDS &  
HONORS

Wally Stoelzel Scholarship 2021 – 22  
Teaching Excellence Award, Graduate & Professional Student Association, ASU 2020  
Arizona State University Summer Graduate Fellowship 2020  
NCAA Postgraduate Scholarship 2019  
Highest GPA Male Athlete, Piedmont College 2019  
Scholar Athlete of the Year, Piedmont College 2019  
Glenn W. & Edna Ellard Scholarship 2016 – 19  
Seaborn Ashley & Dana Smith Ashely Scholarship 2016 – 18  
Math & Physics Department Scholarship 2015 – 19  
Trustee Scholarship 2015

TEACHING

**Arizona State University**, Tempe, AZ  
*Teaching Assistant*, PHY 121: Mechanics for Engineers Spring 2020  
*Teaching Assistant*, PHY 131: Electricity & Magnetism for Engineers Fall 2019, Fall 2020  
**Piedmont College**, Demorest, GA  
*Teaching Assistant* 2018 – 19  
*Math and Physics Tutor* 2016 – 18

SERVICE

*Organizer*, Grad2Grad Talks, ASU Department of Physics 2021 –  
*Graduate Student Representative*, ASU Department of Physics Bylaws Committee 2021 – 22  
*Mentor*, [ASU Sundial Project](#) 2020 – 21

OUTREACH

*Instructor*, [Clubes de Ciencia](#) 2021  
*Organizer*, Maker Faire, *Henry Ford Museum* 2018  
*Organizer*, UF Center for Pre-Collegiate Education and Training, *University of Florida* 2017