Brianna Birkel

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Summary of Qualifications

TECHNICAL SKILLS

- Proficiency in Python, Bash, MATLAB, Slurm-based HPC systems, LaTeX, GitHub; familiarity with Java, Git, Fortran77, OpenMP, Mathematica
- Experience with cutting-edge research techniques in physics and earth sciences, including deterministic modeling and optimization for high-performance computing
- Prior experience with optical testing of quantum defects, including spectroscopy and polarization measurements; working knowledge of quantum computing and mechanics

LEADERSHIP & COMMUNICATION

- Proficiency in communicating complex scientific ideas to specialized and non-specialized audiences in educational, research and nonprofit settings
- Extensive experience leading, organizing and participating in diverse and interdisciplinary groups

Education

DOCTOR OF PHILOSPHY | UNIVERSITY OF SOUTHERN CALIFORNIA | 2019-PRESENT

- Program: Earth Science – Geophysics and Seismology
- Committee: John Vidale (chair), David Okaya, Buka Nweke, John Platt
- Current Research Projects:
  - Comparison of observed, deterministically simulated and empirically derived ground motion metrics for moderate magnitude earthquakes in the Los Angeles Basin
  - Effect of geologic and topographic parameters on site-specific directional resonance
  - Using multichannel analysis of surface waves to explore the impact of gold mining operations on the critical zone in the Peruvian Amazon

BACHELOR OF SCIENCE | UNIVERSITY OF WASHINGTON | 2014-2019

- Major: Physics (Comprehensive Track)
- Relevant coursework: Quantum Mechanics, Optics and Electrical Circuits Labs, Electromagnetism Series, Classical and Statistical Mechanics, Geophysics, Continuum Mechanics, Seismology
- Research Project: Observations of NV formation and disappearance during high temperature annealing

AWARDED SUPPORT

- Development and Implementation of Full 3-Dimensional Waveform Tomography Applied to the Greater Los Angeles Region – Southern California Earthquake Center (2020-2021; $30,030)
- USC Provost Fellow – 1 year fellowship “for PhD students whose combination of background and training will make a substantive, documentable, and unique contribution to the program as assessed by faculty” (2024-2025; $40,000 + tuition and fees)
- UW Honors Undergraduate Scholar Award – full tuition annual scholarship (2014-2015; $11,305)

Experience

RESEARCH ASSISTANT | UNIVERSITY OF SOUTHERN CALIFORNIA | AUG 2019-PRESENT

- Extensive experience in full 3D physical modeling of earthquakes and ground motions, primarily utilizing Python and Slurm-based high performance computing systems
- Developed expertise in signal and waveform processing techniques, active and passive seismic processing, and manipulation of large datasets
- Collaborated with scientists across earth science disciplines, including geology, climate science, hydrology, environmental studies and civil engineering
- Organized and hosted outside speakers as part of a departmental seminar series
- Presented research at several national and international professional conferences

TEACHING ASSISTANT | UNIVERSITY OF SOUTHERN CALIFORNIA | AUG 2019-PRESENT

- Taught several undergraduate courses: Introduction to Geosystems (Fall 2019), Oceanography (Spring 2020), The Process of Change in Science (Fall 2020-2022), Earthquakes (Fall 2023-2024)
- Independently developed curricula for lab and discussion sections spanning a variety of topics, including seismology, volcanology, climatology, oceanography, and other natural hazards
- Emphasized connections to climate change, implications of human intervention in ecologic systems and a variety of current social issues to engage students in class material
- Went beyond prescribed curriculum to create novel exercises for students to explore the effects and consequences of scientific policy

RESEARCH INTERN AT INCORPORATED RESEARCH INSTITUTIONS FOR SEISMOLOGY | CRUSTAL GEOPHYSICS GROUP, STANFORD UNIVERSITY | MAY 2018-SEPT 2018

- Worked extensively in Python and Bash to adapt a complex similarity search algorithm for locating brittle-failure upper mantle earthquakes in Harrat Rahat, Saudi Arabia
- Developed methods to efficiently search through large datasets for characteristically repeating signals
- Participated in internship orientation and regular enrichment opportunities to get a breadth of understanding in geophysical research methods and techniques
- Presented on research at American Geophysical Union Conference, Fall 2018
    - Title: *"Searching for Brittle-Failure Earthquakes in the Mantle Lithosphere below Harrat Rahat"*

UNDERGRADUATE RESEARCH ASSISTANT | OPTICAL SPINTRONICS AND SENSING LAB, UNIVERSITY OF WASHINGTON | JAN 2016-SEPT 2016

- Determined the orientation of nitrogen-vacancy centers in diamond samples through optical polarization measurements
- Analyzed large quantities of optical data and designed a program for image processing in MATLAB
- Annealed diamond NV centers and documented pre- and post-annealing spectral intensity and distribution of NV centers in diamond samples
- Assisted in design of an optical polarizer setup as part of the creation of a lab-built microscope
- Presented scientific results to a group of peers and advisors weekly